



# **Demand Tannin / Hardness Softener Manual**

**Installation / Operation Manual**

**Water Softeners**

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**Register Your Product**

Online at

[www.csiwater.com](http://www.csiwater.com)



**WARNING**

**Lubricants**

Do NOT use Vaseline, oils, hydrocarbon lubricants or spray silicone anywhere! Petroleum base lubricants will cause swelling of o-rings and seals. The use of other lubricants may attack plastic Noryl®. It is recommended that Dow Corning® silicone grease be used as a lubricant for all control valves. Dow Corning® 7 Release Compound is used in the manufacture of Chandler Systems control valves. (Part # LT-150)

**Sealants**

Pipe dope and liquid thread sealers may contain a carrier that attacks some plastic materials. It is recommended that Teflon® tape be used to seal plastic Noryl® threaded fittings.

**PLEASE NOTE THESE SPECIFICATIONS BEFORE PROCEEDING**

**OPERATING PRESSURE RANGE : 20 - 125 PSI  
OPERATING TEMPERATURE RANGE : 33° F - 120° F  
INLET / OUTLET PIPE SIZE : 3/4: FNPT**

**PLEASE COMPLY WITH ALL APPLICABLE PLUMBING CODES**

**PROTECT THE SOFTENER AND PIPING FROM FREEZING TEMPERATURES**

<b>General Specifications</b>	<b>MST32</b>	<b>MST48</b>	<b>MST64</b>
Grains Capacity - Regeneration / Lbs Salt Used**	24,000	32,000	48,000
Salt Used / Regeneration (pounds)	12.0	15.0	24.0
Maximum Raw Water Hardness (grains)	50	75	100
Maximum Clear Iron / Manganese (ppm)	.50	.50	.50
Exchange Resin (cu. ft.)	.75	1.0	1.5
Tannin Resin (cu. ft.)	.25	.50	.50
Mineral Tank (polyglass)	9 x 48	10 x 54	13 x 48
Brine Tank (polyethylene w/ grid & safety)	18 x 33	18 x 33	18 x 33
Service Flow Rate (gpm)*	10.0	11.0	12.0
<b>Backwash Flow Rate (gpm)</b>	<b>1.2</b>	<b>1.5</b>	<b>2.0</b>
<b>Gallons Used / Regeneration</b>	<b>58</b>	<b>65</b>	<b>100</b>
Space Required (D x W x H inches)	18 X 27 X 56	18 X 28 X 62	18 X 31 X 56
Approximate Shipping Weight (pounds)	130	163	204

## SIGNATURE SERIES Softener Specifications

Please read the entire Owner's Manual and Instruction before installation.  
This Owner's Manual must stay with the unit.

### How A Water Softener Works

Water hardness is derived from Calcium and Magnesium minerals that have been dissolved into the water under the earth's surface. These minerals are found in limestone deposits and are the source of hard water. The amount of hardness in a given water supply is dependent upon the quantity of Calcium and Magnesium present and the length of time water has been in contact with them. This can vary dramatically from well-to-well and, for this reason, a water analysis is imperative in order to determine the proper treatment method. The degree of hardness increases as the concentration of Calcium and Magnesium "ions" increase and is measured in Grains Per Gallon (gpg).

The problem of hard water in the home / business comes to light in many facets of daily use. Water spots and scum left behind on bathtubs, fixtures and showers; wear and tear on appliances; calcium build-up in hot water heaters and piping; and, greater amounts of soap and detergents being used are just a few examples.

The modern water softener is designed to reduce hardness ions and their unpleasant side effects. Special resin beads in the softener mineral tank are used to change hard water into soft water. The surfaces of these beads are covered with sodium ions. As hard water enters the mineral tank and comes into contact with the resin, an exchange of ions takes place as dissolved Calcium and Magnesium ions cling to the resin surface and sodium ions take their place, thus softening the water. This process is called Ion Exchange. Over time, the sodium ions used for the exchange process become depleted and must be replenished.

The water softener provides a Regeneration process whereby brine solution enters the mineral tank, driving-off the collected hardness ions and replenishes the surface of the resin beads with more sodium ions. This process is automatically initiated by the control valve on the mineral tank. The regeneration process has five basic cycles as follows:

1. **Backwash** - The control valve directs the water flow in a reverse direction through the mineral tank, separating the resin beads and flushing any accumulated particles to a waste drain.
2. **Brine & Rinse** - In the first part of this cycle, the control valve directs brine solution downward through the mineral tank, driving-off collected hardness ions and replenishing the resin beads with sodium ions. The second part of the cycle rinses hardness ions and excess brine from the mineral tank to the waste drain.
3. **Rapid Rinse** - The control valve directs the water flow downward, settling and recompacting the resin bed.
4. **Brine Refill** - The control valve directs fresh water into the salt compartment to create new brine solution for the next scheduled regeneration.
5. **Service** - This is the normal "operating" cycle where hard water enters the mineral tank, comes into contact with the resin beads and exchanges hardness ions for sodium ions - the water then becomes "soft" and ready for use.

### Pre-Installation Check List

A water test should always be performed in order to determine total water hardness (in gpg) and total dissolved iron (in parts per million - ppm). This is critical for proper equipment selection, sizing and for determining the program for regeneration frequency. If heavy concentrations of iron (above 5 ppm), iron coloration, iron bacteria or sediment are present, filtration prior to the softener will most generally be required. Certain states may require a licensed plumber for installation.

**Note :** Flexible water supply connectors and flexible drain line tubing may not be allowed in you locale. Please check with local plumbing code officials prior to installation.

**Installation Requirements**

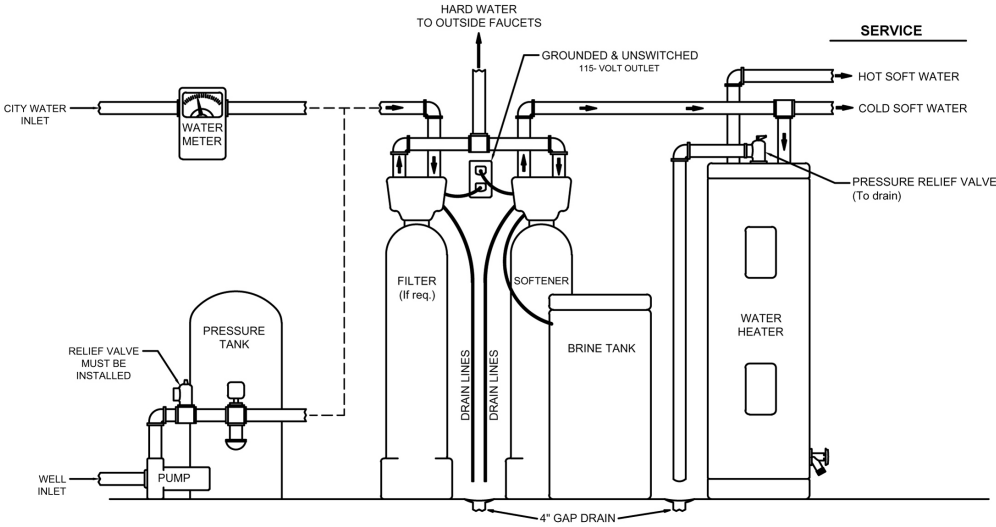
- A level floor position ahead of piping into water heater.
- Unit must be installed at least 10' ahead of the inlet to a water heater to prevent damage due to back-up of hot water.
- DO NOT install the unit in an area of direct sunlight or where freezing temperatures may occur!  
(See Installation Diagrams for proper placement and plumbing connections.)

**Major System Components**

1. **Brine Tank** - This tank holds the salt that is added to the softener. This salt is dissolved with water to form a brine solution used in the softener regeneration process.
2. **Resin Tank** - This tank contains the ion exchange resin media. Water flows through the resin tank under pressure to come into contact with the resin for water softening.
3. **Control Valve** - The valve directs water through the resin tank for water softening and controls the flow of water / brine for the regeneration process.

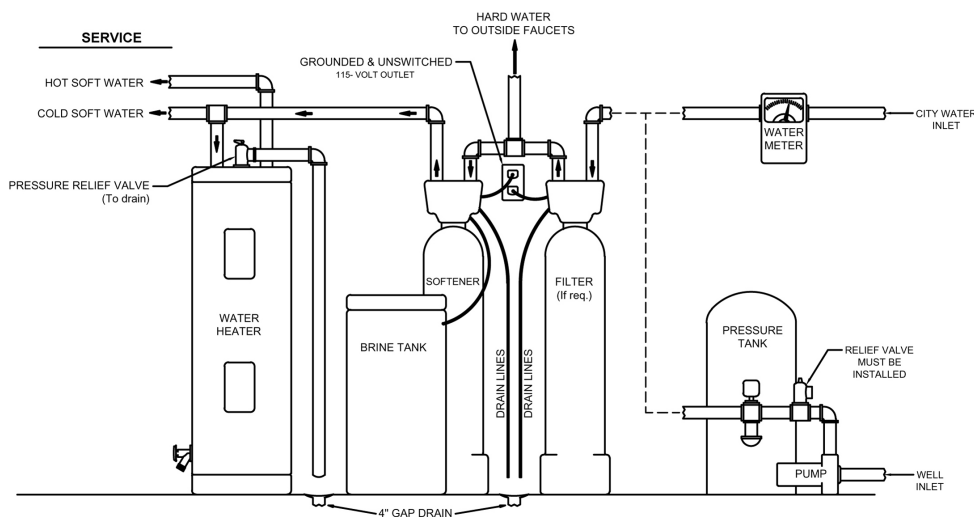
**TWO TANK SETUP**

(Incoming Water from Left-Side)



## TWO TANK SETUP

(Incoming Water from Right-Side)



### -Softener Location / Other Requirements-

- Locate the unit near an unswitched, 120 volt / 60 Hz grounded electrical outlet.
- Check for distance and proper drain installation (e.g. floor drain, washing machine standpipe).
- Determine type and size of piping required for softener connection (e.g. copper, galvanized, PVC plastic).

#### Note

- If household plumbing is galvanized and you intend to make the installation with copper (or vice versa), obtain di-electric unions to prevent dissimilar metal corrosion.
- Where the drain line is elevated above the control valve or exceeds 20 feet in length to reach the drain, use 3/4" I.D. drain line tubing instead of 1/2" I.D. Drain line tubing is not included.
- All plumbing lines not requiring "soft" water should be connected "upstream" of the softener.
- The brine tank drain line is gravity flow and must discharge below the overflow fitting.
- The brine overflow is provided as a back-up in the event the safety float shut-off should fail, allowing the brine tank to overflow. This drain connection would then carry the excess water to the drain and prevent flooding of the floor. Therefore, no liability will or can be assumed by the manufacturer of the softener should this occur.

#### Caution

- If sweat soldering copper pipe (remember to always use lead free solder and flux), cover bypass valve with wet rags to prevent heat damage to connections and control valve! If using PVC or plastic pipe primers and solvent cements specifically recommended for use with potable water are required.
- Do not "TEE" to the main drain line from control valve.

## **-Installation Procedure-**

### **- Water Supply Connections and Bypass Valve -**

To allow for softener servicing, swimming pool filling or lawn sprinkling, a manual bypass valve has been installed at the factory. The bypass allows hard water to be manually routed around the softener.

1. Position softener at desired location for installation. (See Installation Diagrams.)
2. Turn OFF main water supply and OPEN nearest faucet to relieve pressure.
3. Cut main line and install appropriate elbows and extensions. Inlet and outlet connections on the control valve are 3/4" FNPT.

**Note:** An optional 1" FNPT yoke is available.

**Caution:** Raised arrows located on the sides of control valve body and bypass valve indicate proper direction of water flow. Install inlet and outlet piping in direction of arrows. It is recommended that a vacuum breaker be installed on the inlet plumbing.

4. Rotate inlet and outlet knobs on bypass valve to the bypass position (position of bypass knobs are at right angles to inlet/outlet piping).
5. Turn the main supply line on to restore water service to the home.
6. OPEN nearest faucet to evacuate air and repressurize plumbing lines.
7. Check for leaks!

## **-Drain Line Connection-**

1. Pull out clip and remove drain line assembly located on the left side of control valve. Remove drain line hose barb and wrap threads with Teflon tape. Reinstall drain line hose barb. **Caution** : Hand tighten only!!! Replace drain line assembly and reinstall clip.
2. Install 1/2" I.D. drain line tubing (not included) from hose barb to an open drain. A 4" gap between the end of the drain line and the open drain is required to prevent waste water backflow. Keep the drain line as short as possible. An overhead drain line can be used if necessary, but should discharge below the control valve. A syphon trap (taped loop) at the outlet of the drain line is advisable to keep the drain line full and assure correct flow during regeneration. Elbows or other fittings must be kept at a bare minimum.

**Note** : Where the drain line is elevated above the control valve or exceeds 20' in length, 3/4" I.D. drain line tubing should be used.

**-Brine Line and Overflow Connection-**

1. Position brine tank on a smooth, level surface near the softener resin tank. If necessary, the brine tank can be placed at a higher level than the resin tank, but never at a lower level.
2. Install one end of 3/8" O.D. by 1/4" I.D. brine line tubing (included with unit) to compression fitting located on left side of control valve.
3. Remove brine tank cover.
4. Remove cap from brine well.
5. Insert opposite end of brine line through outer hole in brine tank.
6. Connect brine line to push lock fitting on safety brine valve located inside brine well. Replace brine well cap.
7. Install 1/2" I.D. drain line tubing (not included) to the overflow fitting on brine tank located just below the brine line.
8. Run the opposite end of brine tank drain line to a suitable drain.

**Note :** The brine tank drain line is gravity flow and must discharge below the overflow fitting.

**Caution :** Do not "TEE" to the main drain line from control valve.

**Notice :** The brine overflow is provided as a back-up in the event the safety float shut-off should fail, allowing the brine tank to overflow. This drain connection would then carry the excess water to the drain and prevent flooding of the floor. Therefore, no liability will or can be assumed by the manufacturer of the softener should this occur.

**- Electrical Connection -**

1. Connect the power cord and plug power supply into a 115 volt / 60 Hz receptacle.

**Note :** Do not plug into an outlet controlled by a wall switch or pull chain that could inadvertently be turned off

**- Installing Battery Back-Up -**

1. Remove the rear cover.
2. Install a 9 volt battery. Refer to page 3, item 3 of the Signature Series Service Manual.
3. Reinstall rear cover.



### **- Pressurizing The System -**

1. Make certain Signature Series Control Valve is in **SERVICE** position.
2. Slowly rotate bypass valve to the **SERVICE** position.
3. Open the nearest faucet to evacuate air from plumbing lines.
4. Check for leaks! If water is observed leaking from bottom of bypass, close and open bypass lever several times to seat o-rings.
5. After air is evacuated from plumbing lines, close bypass (position of bypass lever is perpendicular to the direction of pipes)

**Note :** Salt settings are pre-set at the factory for the maximum shown on the capacity charts.

**Warning :** Do not reduce salt settings below 9 lbs. as the water level in the brine tank will not reach the grid plate.

### **Programming The Control Valve**

Refer to page 2 of the Signature Series Service Manual for main menu programming and instruction.

1. Set the time of day.
2. Set a.m. and p.m.
3. Set number of days between regeneration. (Refer to regeneration Charts following.)
4. Follow along the line indicating the number of persons in the family to the column that corresponds with the hardness range. This will indicate how many days between regeneration should be programmed. (Refer to Figure 1.)

Refer to page 7 of the Signature Series Service Manual for master programming and instruction.

1. Set regeneration time if other than 2:00 a.m. is desired.

**Note:** If the water contains tannins, iron and/or manganese, multiply the total parts per million (ppm) by four (4) and then add to the grains per gallon (gpg) of hardness. Use this COMPENSATED HARDNESS level when programming the regeneration frequency.

**- Control Valve Operation -**

1. Advance control valve to BACKWASH (cycle 1) position and allow water to run to drain for 3 to 4 minutes.

**Warning :** Close valve on bypass prior to selecting the backwash position. After backwash position has been established, slightly open bypass to evacuate air from the media tank. Fully open valve when all air is depleted. This procedure will prevent media from being uplifted into control valve.

2. Advance control valve to BRINE REFILL (cycle 4) position and allow the brine tank to fill just over the salt grid plate.
3. Advance control valve to BRINE & RINSE (cycle 2) and allow the control valve to draw water from the brine tank until it stops. If no draw is observed, check tightness of brine line compression fittings.
4. Advance control valve to RAPID RINSE (cycle 3) position and let run to drain for 3 - 4 minutes.
5. Advance control valve to BRINE TANK REFILL (cycle 4) position and allow the control valve to automatically fill the brine tank.

**Note :** Control valve will advance to service position automatically.

**- Start Up Procedure -**

**- Disinfection -**

For disinfection of your unit, please follow the Sani-System Procedure on the back of the packet provided.

**- Filling The Brine Tank With Salt -**

To expect a high level of performance and reliability, a salt manufactured specifically for water softeners must be used. Salt of this grade is virtually free from dirt and other particulates that would eventually cause the softener to malfunction. A pellet type salt is recommended, although any high quality water softener salt (such as solar salt) will suffice. If iron is present in raw water, use of iron inhibiting salt is recommended. The salt level will decrease after each regeneration cycle. Consequently, the salt compartment will need to be checked and replenished periodically.

1. Fill the brine tank or salt compartment with water softener salt as described above. This will be approximately 250 pounds of salt. (150 lbs. for cabinet models.)

**Warning :** Do not fill salt above level of the brine well.

2. Replace brine tank lid.

**- Final Check -**

1. Be certain the bypass valve is in the SERVICE position.
2. Make sure the power supply is connected to an uninterrupted 115-volt outlet.
3. Check that the time of day is set
4. Double check regeneration schedule.
5. Make final check for leaks!
6. Fill out warranty card online at [www.csiwater.com](http://www.csiwater.com)
7. Leave all manuals with unit.

**- Operation, Care and Cleaning -**

When the bypass valve is in the SERVICE position (position of bypass lever is parallel to the inlet / outlet piping), water is directed through the water softener. Water may be bypassed by turning the lever to the bypass position (position of bypass lever is at right angles to inlet / outlet piping). Water to the home will bypass the softener and be untreated.

You should manually bypass the softener if :

1. The outside lines do not bypass the water softener and water is to be used for lawn sprinkling or other similar uses.
2. Servicing the water softener.
3. A water leak from the water softener is evident.
4. Shock treating water well and piping with chlorine or other disinfectant.

**- Extra Regeneration -**

If soft water demands are unusually heavy, an extra regeneration can be initiated manually :

**- To Skip A Regeneration -**

1. For vacations or extended periods of absence, the power supply can be disconnected from the control valve. It is recommended that the 9-volt battery be removed.
2. Upon return, plug in cord and reset the time of day. Replace 9-volt battery.

**- General Care and Cleaning -**

1. Do not place heavy or sharp objects on water softener or cabinet.
2. Use only mild soap and warm water to clean exterior of the unit. Never use harsh, abrasive cleaners.
3. Protect the water softener and drain line from freezing.
4. Reset time for daylight saving time periods.
5. Replace 9-volt battery once a year.
6. Inspect and clean the brine tank when sediment appears in the bottom of the salt compartment.
7. Always keep the brine tank supplied with good quality salt, a type designed for use in water softeners.

## SIGNATURE SERIES

### Error Codes

#### Control Valve Error Code Diagnosis

Under normal operating conditions, when your control valve is in the “in service” position, the display should alternate between the current time of day and the number of days remaining (for filters and time clock softeners) or gallons remaining (for metered softeners) until the next regeneration. This is the “home display.” If the valve is currently going through a regeneration cycle, the display will show the cycle step on the left side of the display and the number of minutes remaining in that step on the right side of the display. If any other information is being displayed, then the valve is informing you of an issue. There are five error codes which could indicate an issue with the control valve. When an error is being displayed, the valve will be in a stopped position, and the buttons will not respond to being pressed. Even if the cause of the error code is corrected, the error code will not clear until the power supply has been disconnected and reconnected (this will be referred to as “cycling” the power). All error codes are displayed as the letters “Err” followed by a flashing number 2-6:

#### **Error 2** - Valve is searching for homing slot.

Allow valve to continue running. If the homing slot is found, the valve will return to the home display, otherwise, another error code will appear.

#### **Error 3** - No encoder slots are being seen.

This occurs when the motor is running, but the encoder is not seeing any of the slots in the encoder wheel. This can happen if the encoder has been disconnected, but most commonly occurs when debris in the valve body has stopped the piston, causing the encoder wheel to be unable to turn.

1. Check encoder connection. If the encoder is plugged in and snapped into place, skip to step #2 below. If encoder is disconnected, reconnect it and cycle power to clear the error.
2. Disconnect powerhead from valve body, cycle power to clear the error code. Manually cycle the powerhead through the regeneration cycle steps to verify that the motor can cycle properly while the powerhead is disconnected from the valve body. If the error 3 does not reappear, skip to step #3 below. If the error 3 does reappear, order a board & motor kit to replace the circuit board & motor.
3. Remove piston and seals from the valve body and inspect valve body for debris. Replace the seal & spacer kit. Inspect piston and replace piston if Teflon coating is worn

#### **Error 4** - Unable to find homing slot.

1. Check encoder wheel for debris.
2. Cycle power. Valve should either find home or go to a different error code. If error 4 returns, replace powerhead assembly.

#### **Error 5** - Motor overload.

This occurs when the motor current is too high. This could be caused by an issue with the motor itself, but is typically caused by friction in the valve body

1. Disconnect powerhead from valve body and cycle power to clear the error code.
2. If the error 5 returns, replace the motor. Otherwise, manually cycle the powerhead through the regeneration cycle steps to verify that the motor can cycle properly while the powerhead is disconnected from the valve body. Either way, proceed to the next step.
3. Remove piston and seals from the valve body and inspect valve body for debris. Replace the seal & spacer kit. Inspect piston and replace piston if Teflon coating is worn.

#### **Error 6** - No motor current.

This typically occurs if the motor cable has come unplugged from the circuit board. Check that the motor cable is plugged into the circuit board and attached to the motor. If this is not the issue, the motor or circuit board may need to be replaced.

#### **No Display**

If your display is blank, there is no power going to the circuit board due to one of the following factors:

- The electrical outlet is not powered or is switched off
- The power cable has come unplugged from the circuit board
- The power supply has come unplugged from your electrical outlet
- The power supply has come unplugged from the control valve
- The power supply is not working

## WATER TREATMENT EQUIPMENT

This warranty cannot be transferred - it is extended only to the original purchaser or first user of the product. By accepting and keeping this product, you agree to all of the warranty terms and limitations of liability described below.

**Important Warning:** Read carefully the CSI Water Treatment Systems Equipment Installation, Operating and Maintenance Instructions Manual to avoid serious personal injury and property HAZARDS and to ensure safe and proper care of this product.

Model Numbers Covered:  
Water Softeners, Media Filters and Upflow Filters

\*FOR AS LONG AS YOU OWN AND LIVE IN YOUR SINGLE FAMILY HOME, this warranty covers your water treatment equipment, if you are the first user of this CSI Water Treatment Systems equipment and purchased it for single family home use - subject to all of the conditions, limitations and exclusions listed below. Purchasers who buy the CSI Water Treatment Systems equipment for other purposes, and other component parts are subject to more limited warranties and you should read all of the terms included in this form to make sure you understand your warranty.

What is covered by this warranty?  
CSI Water Treatment Systems warrants that at the time of manufacture, the water treatment equipment shall be free from defects in material and workmanship as follows :

Product	Warranty
Residential Mineral Tank	10 Years
Proprietary Control Valves	7 Years
Other Softener / Filter Control Valves	5 Years
Brine Tank	5 Years
Residential Reverse Osmosis System	5 Years
Other Accessories and Parts	1 Year
Brine Tank Components	1 Year
REVERE Wireless Low Salt Alarm	90 Days

\* This warranty does not include media and/or cartridge filter elements.

### Additional Terms & Conditions

What CSI Water Treatment Systems will do if you have a covered warranty claim CSI will at its option either make repairs to correct any defect in material or workmanship or supply and ship either new or used replacement parts or products. CSI will not accept any claims for labor or other costs.

### Additional Exclusions and Limitations

This warranty is non-transferable and does not cover any failure or problem unless it was caused solely by a defect in material or workmanship. In addition, this warranty shall not apply :

- If the water treatment equipment is not correctly installed, operated, repaired and maintained as described in the Installation, Operating & Maintenance Instructions Manual provided with the product.
- Defects caused as a direct result of the incoming water quality

- If the tank is not the size indicated for the supply line size of the installation, as described in the manual.
- To any failure or malfunction resulting from abuse (including freezing), improper or negligent; handling, shipping (by anyone)
- If the unit has not always been operated within the factory calibrated temperature limits, and at a water pressure not exceeding 125 psi other than CSI), storage, use, operation, accident; or alteration, lightning, flooding or other environmental conditions;
- To any failure or malfunction resulting from failure to keep the unit full of potable water, free to circulate at all times; and with the tank free of damaging water sediment or scale deposits;
- This warranty does not cover labor costs, shipping charges, service charges, delivery expenses, property damage, administrative fees or any costs incurred by the purchaser in removing or reinstalling the water treatment equipment.
- The warranty does not cover any claims submitted to CSI more than 30 days after expiration of the applicable warranty, and does not apply unless prompt notice of any claim is given to an authorized CSI Dealer or to CSI or a designated contractor is provided access to the installation and to the water treatment equipment.

THESE WARRANTIES ARE GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. NO CSI REPRESENTATIVE OR ANY OTHER PARTY IS AUTHORIZED TO MAKE ANY WARRANTY OTHER THAN THOSE EXPRESSLY CONTAINED IN THIS WARRANTY AGREEMENT.

### Additional Warranty Limitations

ANY IMPLIED WARRANTIES THE PURCHASER MAY HAVE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE TIME PERIODS SPECIFIED ABOVE. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

### Limitations of Remedies

The remedies contained in this warranty are the purchaser's exclusive remedies. In no circumstances will CSI or the seller of the product be liable for more than, and purchaser-user's remedies shall not exceed, the price paid for the product. In no case shall CSI or seller be liable for any special, incidental, contingent or consequential damages. Special, incidental, contingent and consequential damages for which CSI is not liable include, but are not limited to, inconvenience, loss or damage to property, consequential mold damage, loss of profits, loss of savings or revenue, loss of use of the products or any associated equipment, facilities, buildings or services, downtime, and the claims of third parties including customers. Some states do not allow the exclusion or the limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you.

### What to do if you have a problem covered by this warranty

Any warranty coverage must be authorized by CSI. Contact the person from whom you purchased the product, who must receive authorization from a CSI Dealer .

If your product is new and not used and you wish to return it, contact your CSI Dealer.





