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Installation,
Operation & Service
Instructions with
Parts List

Culligan Gold Series™ Water Softener and Culligan Total Home Water Conditioner

Models from 2009

The Culligan logo is written in a black, cursive script font. The word "Culligan" is written in a fluid, handwritten style. A registered trademark symbol (®) is located at the bottom right of the word.

Attention Culligan Customer:

Your local independently operated Culligan dealer employs trained service and maintenance personnel who are experienced in the installation, function and repair of Culligan equipment. This publication is written specifically for these individuals and is intended for their use.

We encourage Culligan users to learn about Culligan products, but we believe that product knowledge is best obtained by consulting with your Culligan dealer. Untrained individuals who use this manual assume the risk of any resulting property damage or personal injury.

NOTICE Please send any suggestions for improving this manual to productmanuals@culligan.com



WARNING! Electrical shock hazard! Prior to servicing equipment, disconnect power supply to prevent electrical shock.



WARNING! If incorrectly installed, operated, or maintained, this product can cause severe injury. Those who install, operate, or maintain this product should be trained in its proper use, warned of its dangers, and should read the entire manual before attempting to install, operate, or maintain this product. Failure to comply with any warning or caution that results in any damage will void the warranty.



CAUTION! This product is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, unless they have been given supervision or instruction.



CAUTION! Children should be instructed not to play with this appliance.



CAUTION! If the power cord from the transformer to the unit looks or becomes damaged, the cord and transformer should be replaced by a Culligan Service Agent or similarly qualified person in order to avoid a hazard.

NOTE This system is not intended for use with water that is microbiologically unsafe or of unknown quality without adequate disinfection either before or after the system.

NOTE Check with your public works department for applicable local plumbing and sanitation codes. Follow local codes if they differ from the standards used in this manual. To ensure proper and efficient operation of the Culligan Gold Softener and Total Home Conditioner to your full satisfaction, carefully follow the instructions in this manual.

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Introduction

Read this Manual First

Before you operate the Culligan Gold Series™ Water Softening System, read this manual to become familiar with the device and its capabilities.

Watch for Special Paragraphs

Please read the special paragraphs in this manual. Examples are shown below.

The Culligan Gold Series™ Water Softeners with Soft-Minder® Meter and Aqua-Sensor® sensing device are tested and certified by WQA against NSF/ANSI Standard 372, CSA B483.1, and NSF/ANSI Standard 44 for the effective reduction of hardness (calcium and magnesium), barium and radium 226/228 as verified and substantiated by test data.

The Culligan Gold Series™ Water Softeners with Soft-Minder® Meter and Aqua-Sensor® sensing device are tested and certified by WQA against NSF/ANSI Standard 61 for material requirements.

For installations in Massachusetts, the Commonwealth of Massachusetts Plumbing Code 248 CMR shall be adhered to. Consult your licensed plumber for installation of the system. This system and its installation must comply with state and local regulations. The use of saddle valves is not permitted.



NOTE Check and comply with your state and local codes. You must follow these guidelines.

Safe Practices

Throughout this manual there are paragraphs set off by special headings.

Note

Note is used to emphasize installation, operation or maintenance information which is important, but does not present any hazard. Example:

NOTE The nipple must extend no more than 1 inch above the cover plate.

Caution

Caution is used when failure to follow directions could result in damage to equipment or property. Example:



CAUTION! Disassembly while under water pressure can result in flooding.

Warning

Warning is used to indicate a hazard which could cause injury or death if ignored. Example:



WARNING! Electrical shock hazard! Unplug the unit before removing the cover or accessing any internal control parts.

Serial Numbers

The control valve serial number is located on the back of the timer case.

The media tank serial number is located on the top surface of the tank.

This publication is based on information available when approved for printing. Continuing design refinement could cause changes that may not be included in this publication.

NOTE Do not remove or destroy the serial number. It must be referenced on request for warranty repair or replacement.

Products manufactured and marked by Culligan International Company (Culligan) and its affiliates are protected by patents issued or pending in the United States and other countries. Culligan reserves the right to change the specifications referred to in this literature at any time, without prior notice. Culligan, Aqua-Sensor, Tripl-Hull, Flo-Pak and Soft-Minder are trademarks of Culligan International Company or its affiliates.

Performance Specifications

Culligan Gold Series™ Water Softener

Control Valve	9" Model 1" Reinforced Thermoplastic	10" Model 1" Reinforced Thermoplastic	12" Model 1" Reinforced Thermoplastic	14" Model 1" Reinforced Thermoplastic
Overall Conditioner Ht	54 in	60 in	58 in	71 in
Media Tank Design	Quadra-Hull™	Quadra-Hull	Quadra-Hull	Quadra-Hull
Media Tank Dimensions (Dia x Ht)	9 x 48 in	10 x 54 in	12 x 52 in	14 x 65 in
Salt Storage Tank Dimensions (Dia x Ht)	16 x 43 in or 18 x 43 in	18 x 43 in	18 x 43 in	24 x 42 in
Exchange Media, Type and Quantity	Cullex® Media, 1.0 ft ³	Cullex Media, 1.5 ft ³	Cullex Media, 2.0 ft ³	Cullex Media, 3.0 ft ³
Underbedding, Type and Quantity	Cullsian® Underbed- ding, 12 lb	Cullsian Underbedding, 15 lb	Cullsian Underbedding, 20 lb	Cullsian Underbedding, 25 lb
Exchange Capacity @ Salt Dosage Per Recharge	19,086 gr @ 4.0 lb 26,301 gr @ 8.0 lb 30,787 gr @ 12.0 lb	28,629 gr @ 6.0 lb 39,451 gr @ 12.0 lb 46,180 gr @ 18.0 lb	35,614 gr @ 8.0 lb 51,659 gr @ 16.0 lb 60,523 gr @ 24.0 lb	53,540 gr @ 12.0 lb 77,660 gr @ 24.0 lb 90,986 gr @ 36.0 lb
Efficiency rated dosage ¹	4,770 gr/lb @ 4 lb salt dosage	4,770 gr/lb @ 6 lb salt dosage	4,450 gr/lb @ 8 lb salt dosage	4,460 gr/lb @ 12 lb salt dosage
Freeboard to Media ²	14.5 in	14.5 in	16 in	25 in
Freeboard to Underbedding ³	44.5 in	47.5 in	46 in	59 in
Salt Storage Capacity	250 lb or 375 lb	375 lb	375 lb	600 lb
Rated Service Flow @ Pressure Drop	9.0 gpm @ 14 psi	9.4 gpm @ 15 psi	10.0 gpm @ 15 psi	10.6 gpm @ 15 psi
Total Hardness, Maximum	75 gpg	99 gpg	99 gpg	99 gpg
Total Iron, Maximum	5 ppm	5 ppm	5 ppm	5 ppm
Hardness to Iron Ratio, Minimum	8 gpg to 1 ppm	8 gpg to 1 ppm	8 gpg to 1 ppm	8 gpg to 1 ppm
Operating Pressure	20-125 psi	20-125 psi	20-125 psi	20-125 psi
Operating Pressure (Canada)	20-90 psi	20-90 psi	20-90 psi	20-90 psi
Operating Temperature	33-120°F	33-120°F	33-120°F	33-120°F
Electrical Requirements	24V/60 Hz	24V/60 Hz	24V/60 Hz	24V/60 Hz
Electrical Power Consumption, Min/Max	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts
Drain Flow, Maximum ⁴	1.6 gpm	1.6 gpm	2.6 gpm	6.6 gpm
Recharge Time, Average ⁵ Recharge Water	68 min	57 min	52 min	55 min
Consumption, Average ⁵	35 gal	46 gal	51 gal	176 gal

¹The efficiency rated dosage is only valid at the stated salt dosage and is efficiency rated according to NSF/ANSI 44.

²Measured from top of media to top surface of tank threads. (backwashed and drained).

³Measured from top of underbedding to top surface of tank threads.

⁴Backwash at 120 psi (830 kPa).

⁵10 minute backwash, 4 lb 9" model, 6 lb. 10" model, 7 lb. 12" model or 12 lb. 14" model salt dosage.

Culligan Total Home Water Conditioner

	9" Model	10" Model	12" Model	14" Model
Control Valve	1", 5-cycle Reinforced Thermoplastic with AccuSoft Plus Circuit Board			
Overall Conditioner Height	54 in	60 in	58 in	71 in
Media Tank Design	Quadra-Hull™	Quadra-Hull™	Quadra-Hull™	Quadra-Hull™
Media Tank Dimensions (Dia x Ht)	9 x 48 in	10 x 54 in	12 x 52 in	14 x 65 in
Salt Storage Tank Dimensions (Dia x Ht)	16 x 43 in or 18 x 43 in	18 x 43 in	18 x 43 in	24 x 42 in
Exchange Media, Type and Quantity	Cullex® Media, 0.8 ft ³	Cullex® Media, 1.0 ft ³	Cullex® Media, 1.5 ft ³	Cullex® Media, 2.3 ft ³
Carbon Media, Quantity	6 lbs	8 lbs	12 lbs	18 lbs
Underbedding, Type and Quantity	Cullsans® Underbedding, 12 lb	Cullsans® Underbedding, 15 lb	Cullsans® Underbedding, 20 lb	Cullsans® Underbedding, 25 lb
Exchange Capacity @ Salt Dosage Per Recharge	15,642 gr @ 3.7 lb 22,458 gr @ 9.6 lb 25,784 gr @ 16.0 lb	16,751 gr @ 4.0 lb 23,084 gr @ 8.0 lb 27,021 gr @ 12.0 lb	31,240 gr @ 7.0 lb 44,853 gr @ 18.0 lb 51,495 gr @ 30.0 lb	39,487 gr @ 9.2 lb 57,276 gr @ 18.4 lb 67,105 gr @ 27.6 lb
Efficiency rated dosage ¹	4,190 gr/lb @ 3.7 lb salt dosage	4,188 gr/lb @ 4 lb salt dosage	4,463 gr/lb @ 7 lb salt dosage	4,292 gr/lb @ 9.2 lb salt dosage
Freeboard to Media ²	15.75 in	19.5 in	17.31 in	25.89 in
Freeboard to Underbedding ³	44.5 in	47.5 in	46 in	59 in
Salt Storage Capacity	250 lb or 375 lb	375 lb	375 lb	650 lb
Rated Service Flow @ Pressure Drop	6.4 gpm @ 8 psi	9.6 gpm @ 14 psi	10.0 gpm @ 14 psi	10.8 gpm @ 15 psi
Auxiliary Service Flow @ Pressure Drop	9.4 gpm @ 15 psi	9.9 gpm @ 15 psi	10.5 gpm @ 15 psi	10.8 gpm @ 15 psi
Total Hardness, Maximum	15 gpg	15 gpg	15 gpg	15 gpg
Total Iron, Maximum	0 ppm	0 ppm	0 ppm	0 ppm
Color	Less Than 1	Less Than 1	Less Than 1	Less Than 1
Turbidity	Less Than 5 NTU	Less Than 5 NTU	Less Than 5 NTU	Less Than 5 NTU
TOC	Less Than 0.5 PPM	Less Than 0.5 PPM	Less Than 0.5 PPM	Less Than 0.5 PPM
Operating Pressure	20-125 psi	20-125 psi	20-125 psi	20-125 psi
Operating Pressure (Canada)	20-90 psi	20-90 psi	20-90 psi	20-90 psi
Operating Temperature	33-120°F	33-120°F	33-120°F	33-120°F
Electrical Requirements	24V/60 Hz	24V/60 Hz	24V/60 Hz	24V/60 Hz
Electrical Power Consumption, Min/Max	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts
Drain Flow, Maximum ⁴	1.6 gpm	1.6 gpm	2.6 gpm	6.6 gpm
Recharge Time, Average ⁵ Recharge Water	68 min	57 min	52 min	55 min
Consumption, Average ⁵	35 gal	46 gal	51 gal	176 gal

¹The efficiency rated dosages are manufacturer claims and have not been evaluated or certified by a third party agency.

²Measured from top of media to top surface of tank threads. (backwashed and drained).

³Measured from top of underbedding to top surface of tank threads.

⁴Backwash at 120 psi (830 kPa).

⁵10 minute backwash, 3.9 lb 9" model, 4 lb. 10" model, 7 lb. 12" model or 9.2 lb. 14" model salt dosage.

Component Description

The water conditioner is shipped from the factory in a minimum of four cartons. Remove all components from their cartons and inspect them before starting installation.

Control Valve Assembly - Includes the regeneration control valve and the Accusoft® Plus Controller. Small parts packages will contain additional installation hardware, and the conditioner Owner's Guide.

Media Tank - Includes Quadra-Hull™ media tank complete with Cullex® ion exchange resin, underbedding and outlet manifold (12" and 14" tanks are shipped without media).

Salt Storage Tank Assembly - Includes salt storage container with support plate and Dubl-Safe™ brine refill valve and chamber.

Bypass Valve - Includes the molded bypass valve, the interconnecting couplings, and the assembly pins.

NOTE This system must be supplied with **COLD WATER** only.

Tools and Materials

The following tools and supplies will be needed, depending on installation method. Observe all applicable codes.

All Installations

NOTE Check and comply with your state and local codes. You must follow these guidelines.

For installations in Massachusetts, the Commonwealth of Massachusetts Plumbing Code 248 CMR shall be adhered to. Consult your licensed plumber for installation of the system. This system and its installation must comply with state and local regulations. The use of saddle valves is not permitted.

- Safety glasses
- Phillips screwdrivers, small and medium tip.
- Gauge assembly
- Silicone lubricant (P/N 00471507 or equivalent) - DO NOT USE PETROLEUM-BASED LUBRICANTS
- A bucket, preferably light-colored
- Towels

Special Tools

- Torch, solder and flux for sweat copper connections
- Use only lead-free solder and flux for all sweat-solder connections, as required by state and local codes.
- Threading tools, pipe wrenches and thread sealer for threaded connections.
- Saw, solvent and cement for plastic pipe connections.

Materials

- Brine line, 3/8" (P/N 01009819 or equivalent) or 1/2" (P/N 00901800 or equivalent)
- Drain line, 1/2" (P/N 00303082, gray, semi-flexible; or P/N 00331946, black, semi-rigid; or equivalent)
- Thread sealing tape
- Pressure reducing valve (if pressure exceeds 125 psi [860 kPa])
- Pipe and fittings suited to the type of installation
- Water softener salt (rock, solar or pellet salt formulated specifically for water softeners)

Application

Water quality

Verify that raw water hardness and iron are within limits. Note the hardness for setting the salt dosage and recharge frequency.

Iron

Iron is a common water problem. The chemical/physical nature of iron found in natural water supplies is exhibited in four general types:

1. **Dissolved Iron** - Also called ferrous or “clear water” iron. Up to 5 ppm of this type of iron can be removed from the water by the same ion exchange principle that removes the hardness elements, calcium and magnesium. Dissolved iron is soluble in water and is detected by taking a sample of the water to be treated in a clear glass. The water in the glass is initially clear, but on standing exposed to the air, it may gradually turn cloudy or colored as it oxidizes.
2. **Particulate Iron** - Also called ferric or colloidal iron. This type of iron is an undissolved particle of iron. A softener will remove larger particles, but they may not be washed out in regeneration effectively and will eventually foul the ion exchange resin. A filtering treatment will be required to remove this type of iron.
3. **Organic Bound Iron** - This type of iron is strongly attached to an organic compound in the water. The ion exchange process alone cannot break this attachment and the softener will not remove this type of iron.
4. **Bacterial Iron** - This type of iron is protected inside a bacteria cell. Like the organic bound iron, it is not removed by a water softener.

When using a softener to remove both hardness and up to 5 ppm of dissolved iron it is important that it regenerates more frequently than ordinarily would be calculated for hardness removal alone. Although many factors and formulas have been used to determine this frequency, it is recommended that the softener be regenerated when it has reached 50 - 75% of the calculated hardness alone capacity. This will minimize the potential for bed fouling (iron removal claims have not been verified by the Water Quality Association or Underwriters Laboratories).

If you are operating a water softener on clear water iron, regular resin bed cleaning is needed to keep the bed from coating with iron. Even when operating a softener on water with less than the maximum of dissolved iron, regular cleanings should be performed. Clean every six months or more often if iron appears in your conditioned water supply. Use resin bed cleaning compounds carefully following the directions on the container. Hardness sample kits are available through your local Culligan dealer.



CAUTION! Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit.

Pressure

If pressure exceeds 125 psi (860 kPa), install a pressure reducing valve (see materials checklist). On private water systems, make sure the minimum pressure (the pressure at which the pump starts) is greater than 20 psi (140 kPa). Adjust the pressure switch if necessary.



CAUTION! The use of a pressure reducing valve may limit the flow of water in the household.

Temperature

Do not install the unit where it might freeze, or next to a water heater or furnace or in direct sunlight. Outdoor installation is not recommended and voids the warranty. Use the Culligan Outdoor Gold Series softener for outdoor installations. The Culligan Outdoor Gold Series softener has been certified by Underwriter's Laboratories for outdoor installation. If installing in an outside location, you must take the steps necessary to assure the softener, installation plumbing, wiring, etc. are as well protected from the elements (sunlight, rain, wind, heat, cold), contamination, vandalism, etc. as when installed indoors.

Location

Space requirements

Allow 6-12 inches (15-30 cm) behind the unit for plumbing and drain lines and 4 feet (1.3 meters) above for service access and filling the salt container.

Floor surface

Choose an area with solid, level floor free of bumps or irregularities. Bumps, cracks, stones and other irregularities can cause the salt storage tank bottom to crack when filled with salt and water.

Drain facilities

Choose a nearby drain that can handle the rated drain flow (floor drain, sink or stand pipe). Refer to the Drain Line Chart, [Table 4 on page 22](#), for maximum drain line length.

NOTE Most codes require an anti-siphon device or airgap. Observe all local plumbing codes and drain restrictions. The system and installation must comply with all state and local laws and regulations.

Electrical facilities

A 10-foot cord and wall mount plug-in transformer are provided. The customer should provide a receptacle, preferably one not controlled by a switch that can be turned off accidentally. Observe local electrical codes.

NOTE P.N. 01012956 and P.N. 01018133 plug-in transformer are rated for indoor installations only. P.N. 01015972 plug-in transformer is rated for indoor/outdoor installations. (Non-Aqua-Sensor®)

NOTE The softener works on 24 volt - 60 Hz power only. Be sure to use the included transformer. Be sure the electrical outlet and transformer are in an inside location to protect from moisture. Properly ground to conform with all governing codes and ordinances.
--

Basic Principles

Terms

Brine - A solution of water and salt used to regenerate the resin.

Distributor - A pipe with slits that allows the water to enter and leave inside the media tank.

Media - The underbedding and resin the media tank holds.

Regenerate - A process where the resin once exhausted of its softening capabilities is revitalized to soften again.

Resin - The actual material that softens hard water, shaped like little beads.

Underbedding - A gravel mixture that keeps the resin from entering the distributors.

Brine Tank (Figure 1)- Refer to section [“Fill The Salt Storage Container” on page 22](#) for proper Brine Tank usage.

Media Tank (Figure 2) -The letters underneath the component’s description refer to the values listed on [Appendix A, Table 15 on page 63](#).

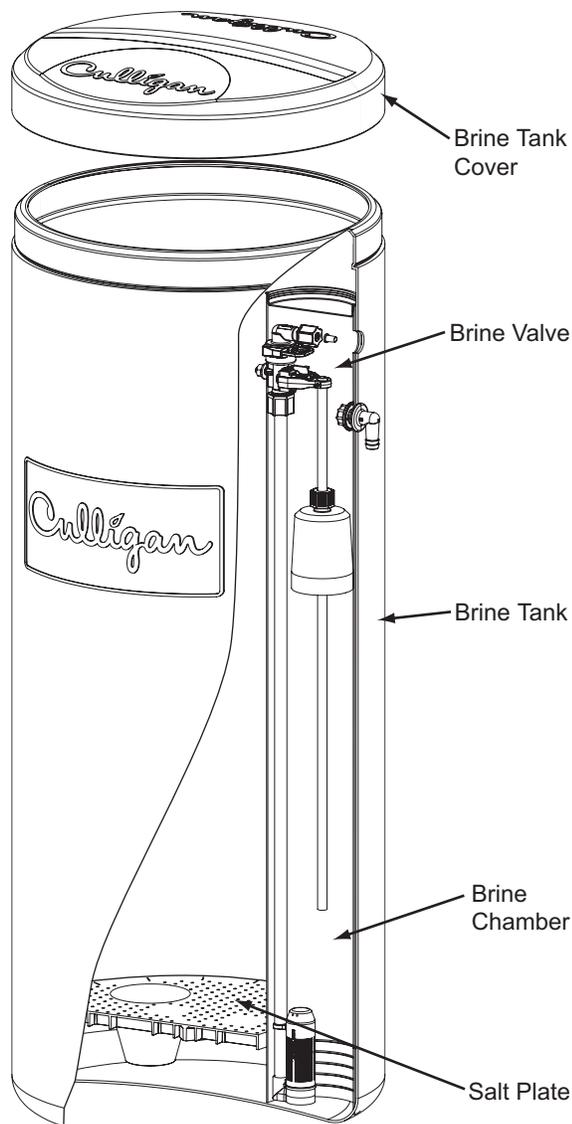


Figure 1. Brine Tank

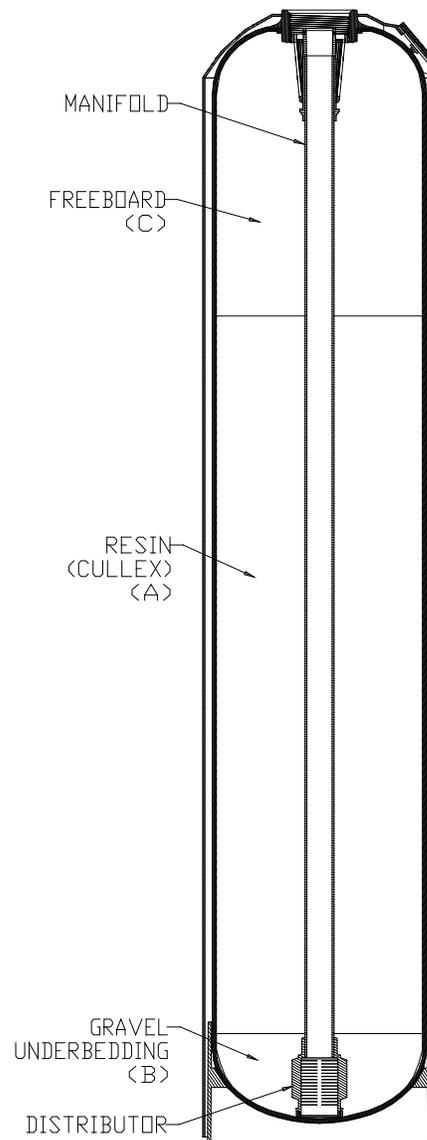


Figure 2. Media Tank

What is Hard Water?

Water is said to be hard when it carries too high a concentration of calcium and magnesium. Acceptable water hardness levels will vary depending on the application.

How Does it Work?

The components of dissolved minerals are called ions. They carry either a positive or negative charge. Hardness ions of minerals dissolved in water carry a positive charge. These positively charged ions (cations) are attracted to a synthetic softening material called ion exchange resin.

The heart of the softening system, therefore, is a deep bed of resin which draws calcium and magnesium ions, as well as ferrous iron, from the water as it passes through the resin bed.

Can the Resin Draw Out Hardness Ions Indefinitely?

No. During normal operation, the resin becomes saturated with positive ions and functions less efficiently. When hardness leakage occurs, the resin should be regenerated to restore its efficiency.

How Do You Regenerate Resin?

You regenerate a resin bed by removing the mineral ions through a process called "ion exchange". This regeneration process occurs in four steps and takes approximately 50 to 70 minutes. Each of the following steps are graphically depicted on [page 9](#) - [page 13](#).

1. **Backwash** - During the backwash step, raw water flows rapidly upward (in reverse direction to the service flow) through the resin bed to expand the bed and flush out accumulated dirt, sediment and other sources of turbidity.
2. **Brine Draw** - The brine solution consisting of water and salt is drawn from a brine storage tank and allowed to flow slowly down through the resin bed. The brine solution removes the calcium and magnesium ions from the resin.
3. **Slow Rinse** - Brine draw is then followed by a raw water slow rinse. This rinse step will slowly remove most of the remaining brine, exchanged calcium and magnesium ions from the resin.
4. **Fast Rinse** - Slow rinse is followed by a raw water flush, a very rapid down flow of raw water which removes the last traces of brine, and settles the resin bed.

How Often Must You Regenerate?

Frequency must be determined for each installation based on the amount of water usage, its degree of hardness and the amount of resin through which it flows. In some cases it is necessary to utilize a resin cleaner when the raw water contains iron. Contact your local Culligan dealer for more information.

How Do You Control the Regeneration Process?

The regeneration process for the water softener is controlled automatically either on a predetermined time, volume, or external signal basis through the use of the Culligan Accusoft Plus controller with optional Aqua-Sensor® or flow sensor. The regeneration process can also be initiated manually by the operator as required.

Backwash

Refer to Figure 4

Raw water is directed down the center of the manifold, up through the resin, out the top of the tank to drain. The water to drain should be hard.

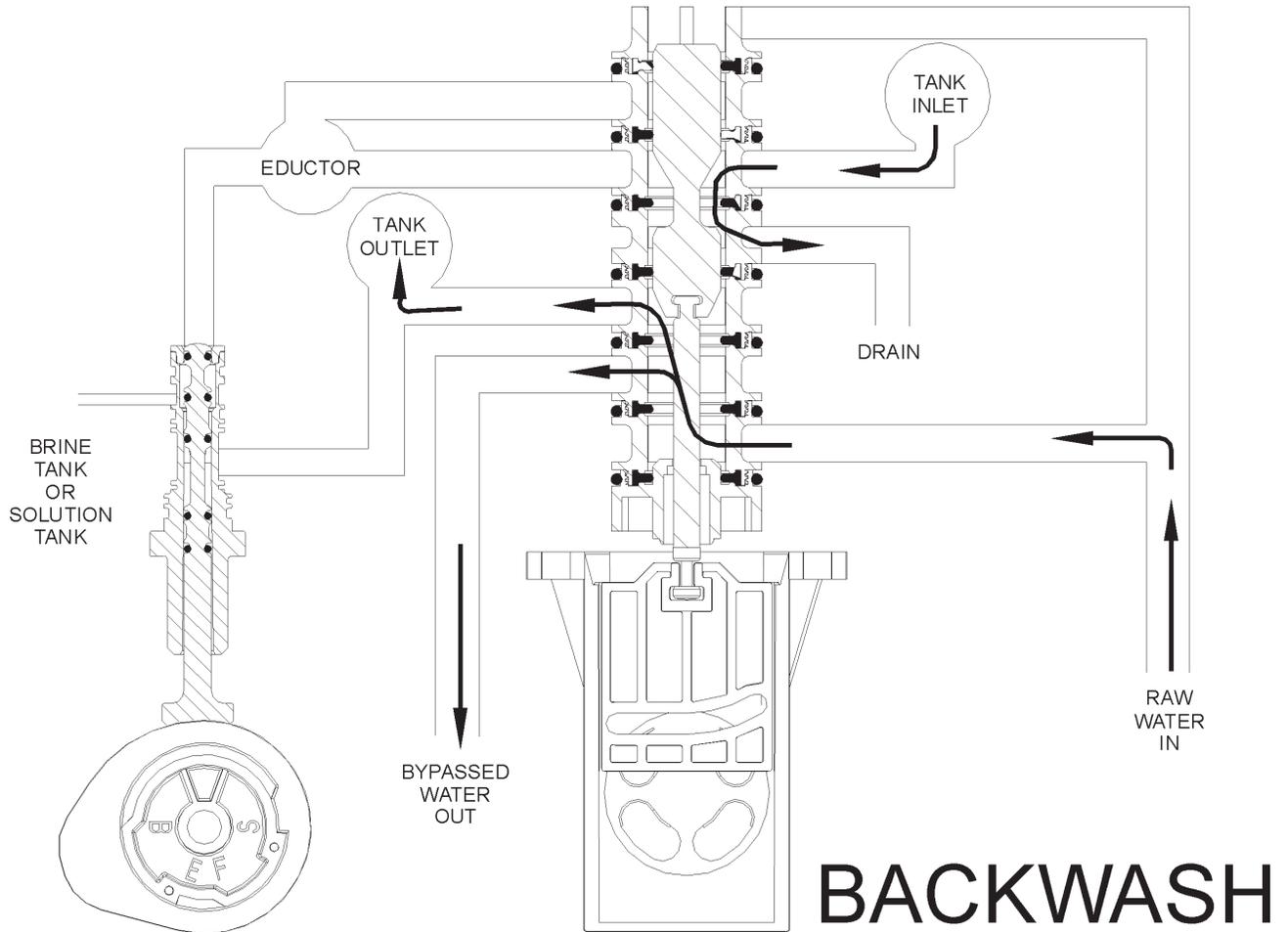


Figure 4.

Regenerant Draw

Refer to Figure 5

Raw water is directed from the inlet through the nozzle and into the throat. A vacuum is created and concentrated brine is educted (drawn). The raw water and concentrated brine combine, enter the mineral tank, and pass through the resin, up the manifold and to the drain. Once all of the brine has been educted and the brine valve seats, the unit goes into slow rinse. Hard water is allowed to service during regeneration.

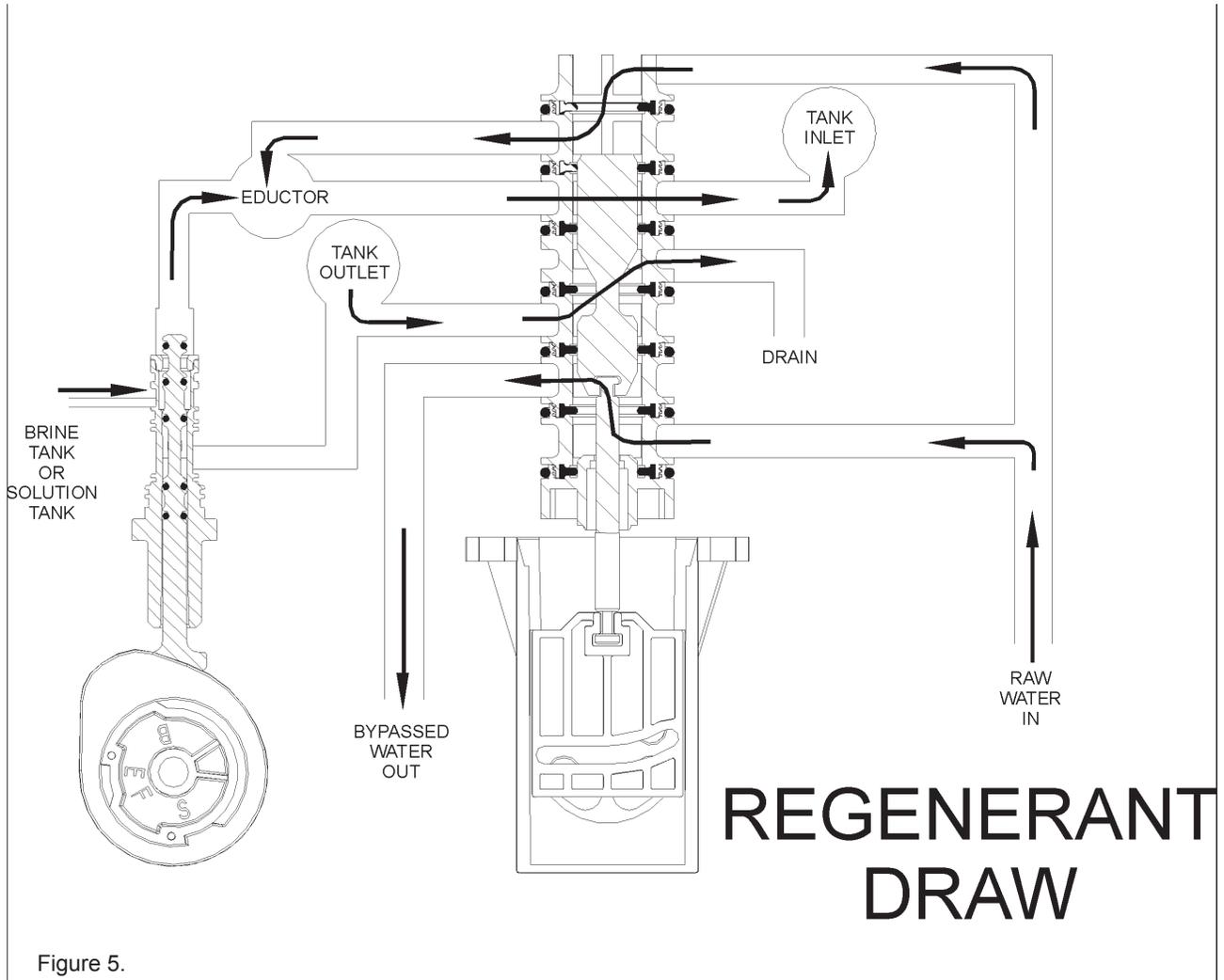


Figure 5.

Slow Rinse

Refer to Figure 6

Raw water is directed from the inlet through the nozzle and into the throat. A vacuum is created but the brine valve has seated, so no brine is educted. The raw water enters the mineral tank, passes through the resin, up the manifold and to the drain. Hard water is allowed to service during regeneration.

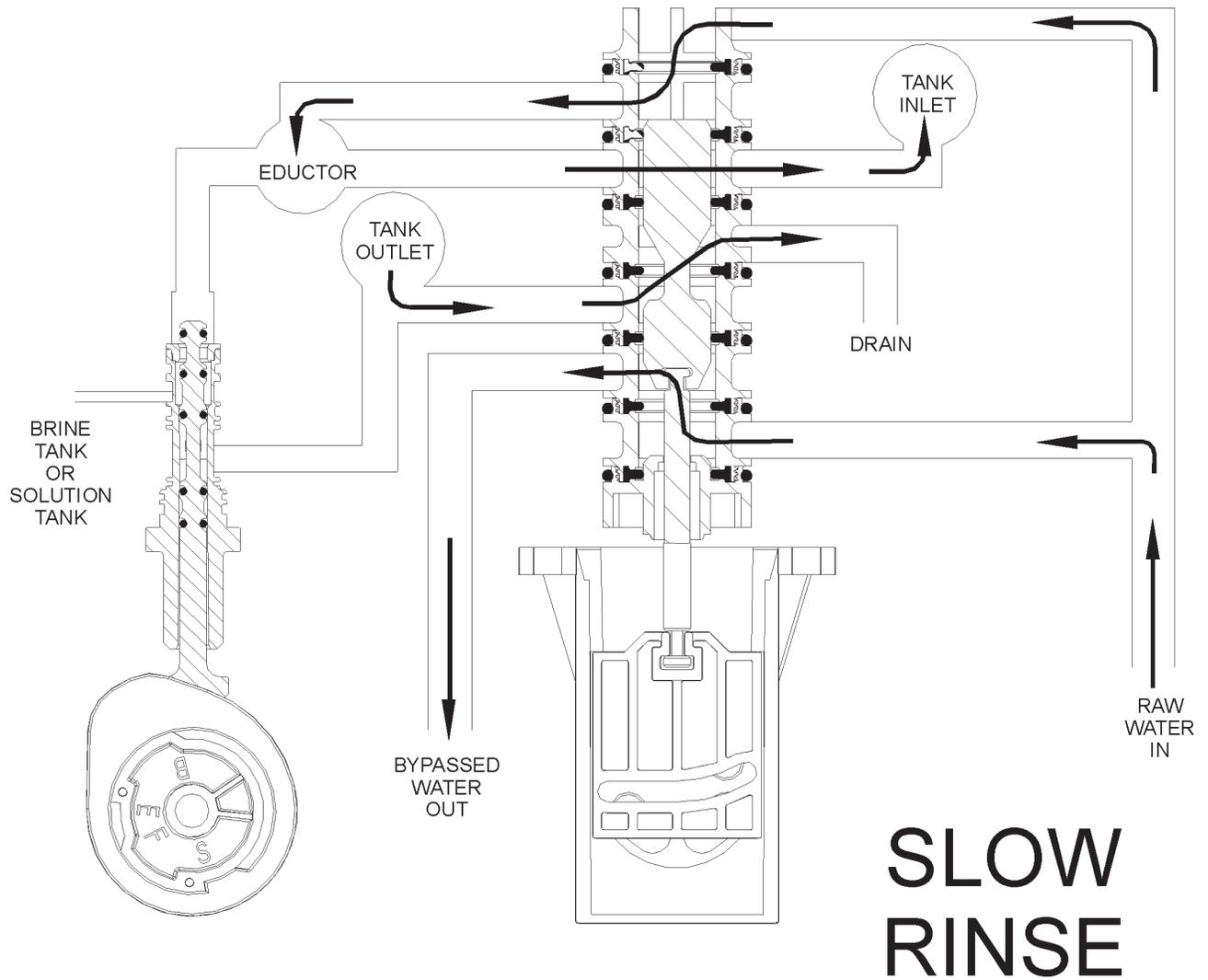


Figure 6.

Fast Rinse/Refill

Refer to Figure 7

Raw water is directed from the inlet, through the eductor and inlet to the top of tank, down the resin, up the manifold, out to drain and brine line until the correct amount of water is in the brine tank. Hard water is allowed to service during regeneration.

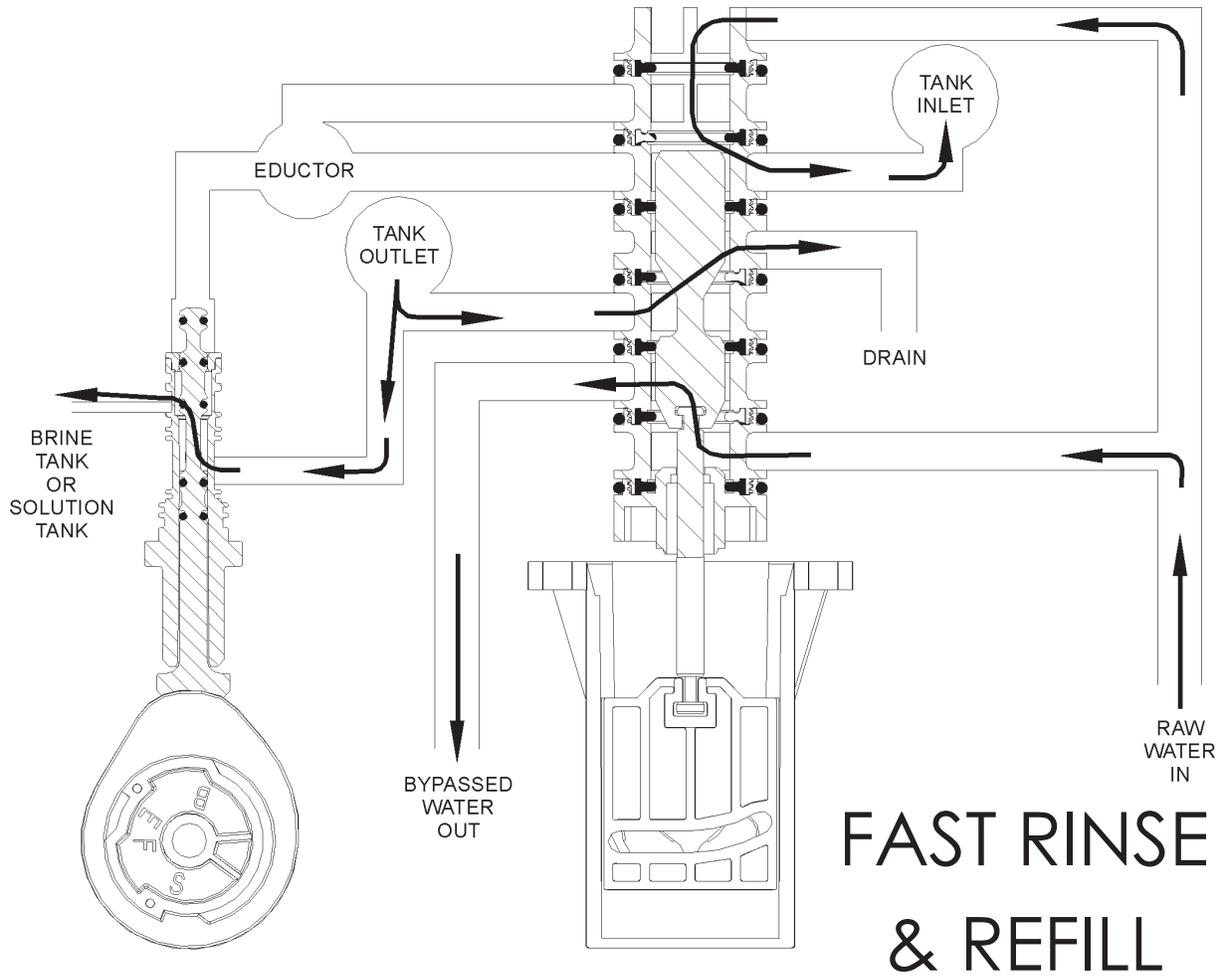


Figure 7.

Controller Features

The Culligan Gold Series™ control's primary function is to initiate and control the regeneration process via methods that are most convenient and cost effective for the customer while offering many operation features and benefits.

Features

Power Source

Electrical power required for the control is 24-VAC 50/60 Hz. A plug-in transformer (120v/24v) is provided

Battery Backup

Battery backup is available as an optional field add-on. The battery back-up will maintain the time of day for a minimum of 4 weeks using a 3.6V 1/2AA-lithium type battery as supplied by Culligan (P/N 01013839).

EEPROM

Saves programmed and statistical functions.

Lock/Unlock

Allows the control to be easily locked out from inadvertent program changes or abuse. This feature can be disabled if desired.

Time of Day

Displays current time in either 12 hour (AM/PM) or 24 hour format.

Regeneration Interval

Provides an ability to initiate a time clock back-up operated system on a number of days (range from 1 to 99 days).

Program Beeper

Emits an audible beep when key pads are depressed to help identify valid (short beep) or invalid (3 short beeps) key pad touches. Can be enabled or disabled as desired.



Figure 8.

Operation

Modes of Operation

Water Meter Mode

In water meter mode, the controller keeps track of the quantity of water that has flowed through the resin bed. Based on the influent water hardness and the hardness capacity of the resin bed, a service life expectancy in the quantity of softened water is calculated and programmed into the control. When the set point is reached, regeneration is triggered. In delay regeneration mode, if the predict mode is turned on, the average daily water usage will be compared to the remaining capacity at the regeneration delay time to predict if another day's water usage can occur before requiring regeneration. If enough capacity is not present then the regeneration will occur at that time. If the predict mode is not selected, the regeneration will start at time of regeneration. If time clock backup is set and the capacity has not been exhausted, the softener will regenerate when days since last regeneration equal time clock back up. In immediate mode the regeneration starts when the capacity is exhausted.

Aqua-Sensor® Mode

The Aqua-Sensor is a conductivity probe that senses when a hardness front passes through the resin bed. It functions independently of the influent water hardness so therefore, is useful in conditions when the influent water hardness varies throughout the year. It provides for the most efficient mode of operation. In addition to sensing when a resin bed is exhausted, it can also be used to determine when the brine solution is rinsed from the resin bed during the Brine Draw / Slow Rinse cycle triggering the control to move to fast rinse. This patented feature provides water savings by optimizing the amount of rinse water required to completely rinse out the resin bed.

Time Clock Backup Mode

This setting is used as a backup feature for either the meter or Aqua-Sensor modes of regeneration. It provides regeneration when a set period of time has elapsed. If the meter or Aqua-Sensor does not trigger regeneration prior to the time clock backup value, the time clock backup will trigger the regeneration.

Manual Regeneration

Pressing and holding the regen button for 3 seconds will initiate regeneration. The beeper is to give one beep at the start of manual regeneration (cam starts to turn). In delay mode, pressing and releasing the regen button will light the regen icon for regeneration to occur at the set delay time. Pressing and releasing the regen button again will turn off the regen icon. This function is active in the Service mode and Diagnostic mode. In the diagnostic mode, toggling the "Up" key will advance to the next valve position while the regeneration is in process until home is reached. The information will not be updated if the last cycle of regeneration does not automatically complete (The "Up" key is pressed to cycle the control to the next position).

Predict Mode

The Predict Mode is used in the flow meter mode to determine the optimum regeneration point. Before the regeneration starts, the control will compare the remaining capacity value with the average daily water use. If the average daily water usage is less than the remaining capacity, the controller will wait 24 more hours before regeneration. If the remaining capacity is less than the average daily water usage, the control will initiate regeneration. This works in delay mode only. At any time, if the total capacity value is reached, the control will initiate an immediate regeneration (Unless "delay" is set in the hidden menu; in this case, the control will always wait until the time of regeneration to regenerate).

Efficiency Mode

Water softeners historically use an optimum time range to control the Regeneration cycle steps with a minimum and maximum time required to perform each step dependent on the salt being used, the hardness total and iron level. Culligan typically uses the maximum time range to ensure effective Regeneration. However, if the iron content of the water to be softened is zero, and the hardness level is less than 20 gpg, Culligan has developed a new set of regeneration times geared to reducing salt and water usage. These times are defined under a new operating mode coined "Efficiency Mode" (Not available if DIP switches #6 or #9 are on). When in Efficiency mode, the control will refill for a higher salt dosage once every 10 regenerations according to tank size as shown in the following table.

Table 1.

Tank Sizes	Salt Dosages (lbs)
9 x 48	10
10 x 54	15
12 x 52	20
14 x 65	30

Pre-Rinse Mode

The Pre-rinse mode is used in the Time Clock, Flow Meter, and Aqua Sensor® softener modes, as well as in Flow Meter Filter mode, to pre-rinse the softener resin bed or filter media. DIP switch 9 must be set to "on". The pre-rinse in flow meter mode will occur after the control has sensed that no water has flowed through the control for a period of X hours (can be set through the programming menu). When the control is in this mode, once the X amount of hours have elapsed the control will cycle to the fast rinse position for the pre-set length of minutes and then return to the home or service position. For Time Clock or Aqua Sensor modes the pre-rinse will occur at a fixed time then return to the home or service position.

NOTE Be sure to set the brine safety level float to the proper position when using this mode since the refill step also occurs in the fast rinse position. failure to do so will result in a higher salt dosage than anticipated.

Culligan Total Home

With the Culligan Total Home the customer will experience the benefits of softened water in addition to the reduction of chlorine taste and odor.

Installation

NOTE Read this section entirely before starting the installation. Follow all applicable plumbing and electrical codes.

For installations in Massachusetts, the Commonwealth of Massachusetts Plumbing Code 248 CMR shall be adhered to. Consult your licensed plumber for installation of the system. This system and its installation must comply with state and local regulations. The use of saddle valves is not permitted.

With the exception of media containers, open the remaining containers, remove all the components, and inspect them before starting installation.

Placement

Refer to Figure 9 for system placement.

- Set the media tank on a solid, level surface near water, drain and electrical facilities.
- Set the brine system on a flat, smooth, solid surface as near the media tank as possible.

Tank Assembly

- 9" and 10" tanks are filled with media at the factory.
- Before the unit can be connected to the plumbing the manifold must be inserted and media loaded into the tank for 12" and 14" units.



CAUTION! Do not lay the tank down unless a suitable lifting device is available. Personal injury and damage to the unit can result if dropped.

NOTE For Total Home units allow the media to soak for 24 hours.

Position the Mineral Tank(s)

Determine the location for the mineral tanks(s) prior to loading, since they will be difficult to move after the underbedding and gravel are loaded.

NOTE Air gap = 2x pipe diameter or 1 inch diameter, whichever is larger.

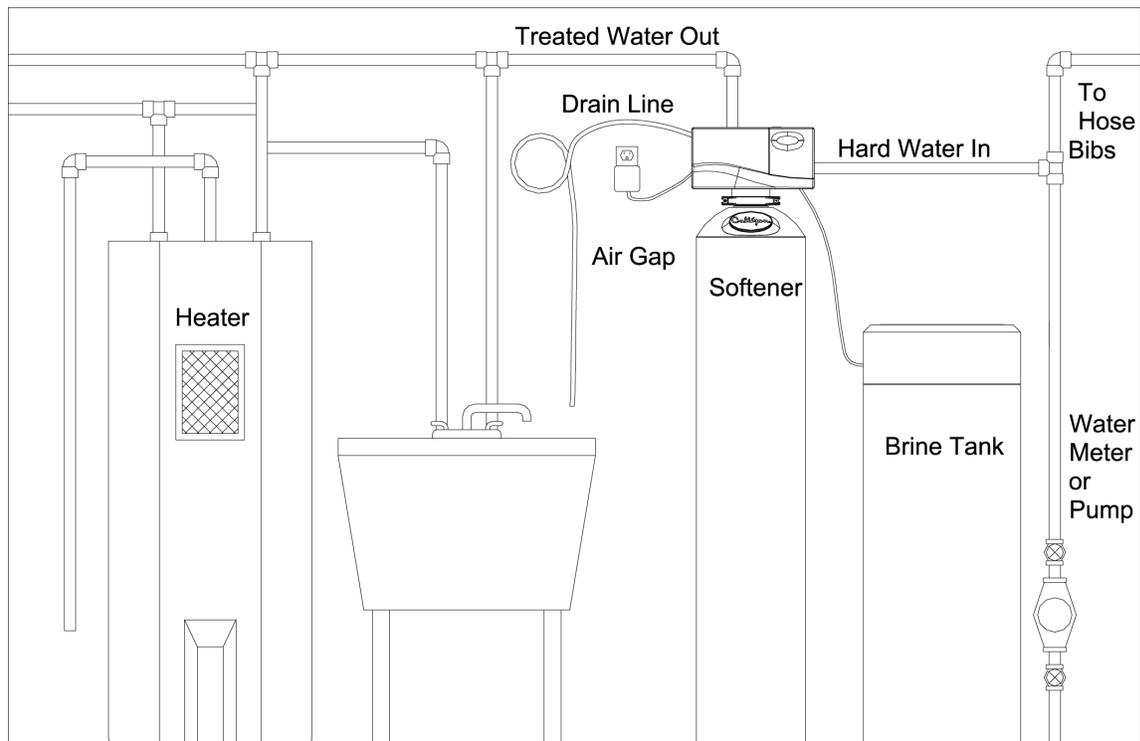


Figure 9.

Loading the Tank (12" and 14" Tanks)

1. Position the tank so that the Culligan® logo is in the front.
2. Remove the inlet strainer.
3. Install the outlet manifold into the tank (Figure 10).
4. Cover the tops of the manifolds with a clean rag.
5. Using a large-mouth funnel, load the Culligan underbedding through the top of the tank.



CAUTION! DO NOT allow the outlet manifold to move when loading the media. The manifold must remain vertical to ensure a good seal at the gasket. Rap the tank near the bottom with a rubber mallet to level the sand.

6. Aqua-Sensor® Installation (optional device)
 - a. Measure the sensor cable length as shown in Figure 10 and Table 2 (the Aqua-Sensor cord is set at the factory for a 9" tank). Dimension "X" is the exposed length the Aqua-Sensor® cord (cord length from the Aqua-Sensor plug to the circuit board connector). You can then verify the Aqua-Sensor probe is inserted to the proper depth by confirming dimension "X" is at the corrected length.
 - b. Loosen the small Aqua-Sensor Plug, a needle-nose pliers works best.
 - c. Moisten the cable sheath and slide the cable grip up or down to the proper cable length.
 - d. Tighten the small Aqua-Sensor plug so that the fitting cannot slide along the cable.

NOTE There must be no kinks or bends in the cable.

- e. Insert the probe and cable through the Aqua-Sensor port.

Table 2.

Tank Model	X	Y
9" Quadra-Hull™ Tank	34 1/2"	40"
10" Quadra-Hull Tank	30 1/2"	44"
12" Quadra-Hull Tank	32 1/2"	42"
14" Quadra-Hull Tank	22 1/2"	52"

7. Load the tank with the Cullex® ion exchange resin. Leveling is not required.
8. For Total Home Advanced units, load the carbon media per the amount in the specifications. Leveling is not required.
9. Remove the funnel.
10. Install the inlet strainer making sure to thread the strainer until it bottoms out on the tank thread. Failure to install the strainer correctly can cause the control to leak.
 - Align the manifold with the center opening in the valve, and press the valve onto the adapter firmly.

NOTE Make sure to push the valve straight down onto the manifold. If the valve is cocked, it may cause the o-ring to slip off the manifold.

- Assemble the tank clamp to the control, and tighten the clamp screw.

NOTE The clamp and valve will be able to rotate on the tank until pressure is applied.

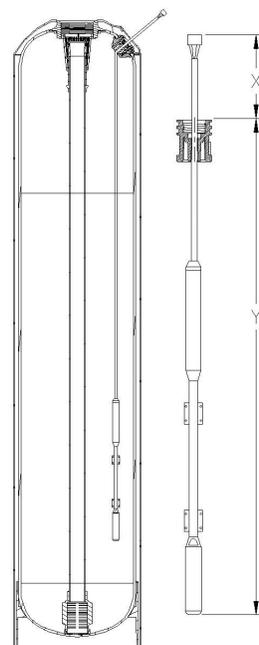


Figure 10.

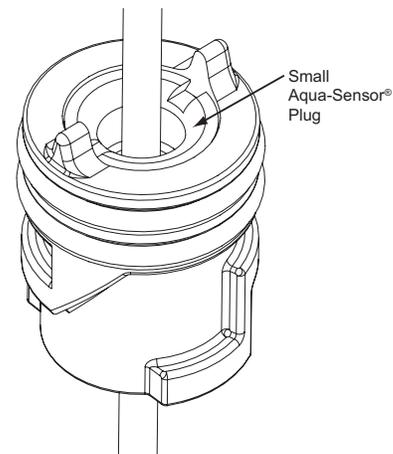


Figure 11.

Mount the Control Valve

See Figure 12 for a visual on mounting the control valve to the tank.

- Assemble the o-rings, located in the parts pack, to the tank adapter.
- The valve adapter o-ring sits on the first step on the adapter. See Figure 13.

NOTE Do not push the top o-ring down to the flange surface on the adapter.

NOTE The larger of the two o-rings in the parts part goes between the adapter and the valve, do not stretch the smaller o-ring onto the top of the tank adapter.

- Lubricate only the top o-ring on the tank adapter, and the outlet manifold o-ring with silicone lubricant.
- Screw the adapter into the tank until the adapter bottoms out on the tank flange.

NOTE The adapter only needs to be tightened hand-tight to the tank flange.

- Align the manifold with the center opening in the valve, and press the valve onto the adapter firmly.

NOTE Make sure to push the valve straight down onto the manifold. If the valve is cocked, it may cause the o-ring to slip off the manifold.

- Assemble the tank clamp to the control, and tighten the clamp screw.

NOTE The clamp and valve will be able to rotate on the tank until pressure is applied.

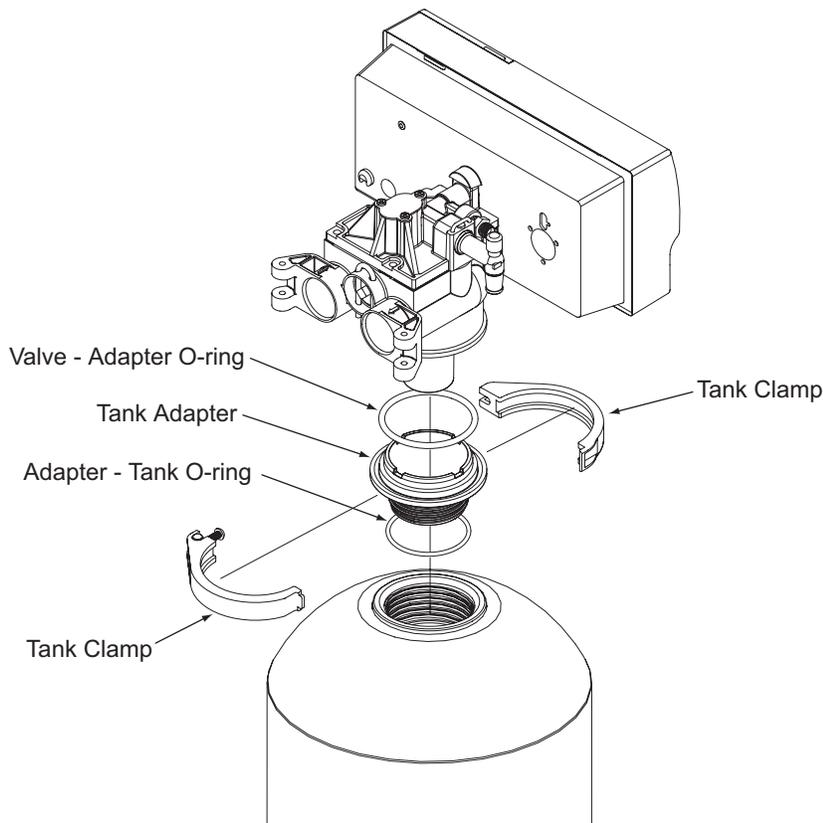


Figure 12.



Figure 13.

Flow Control Eductor Nozzle

Listed below is the recommended eductor nozzle to be used at various salt dosages.

Refer to Figure 14 for a visual on changing the eductor nozzle and the backwash flow control.

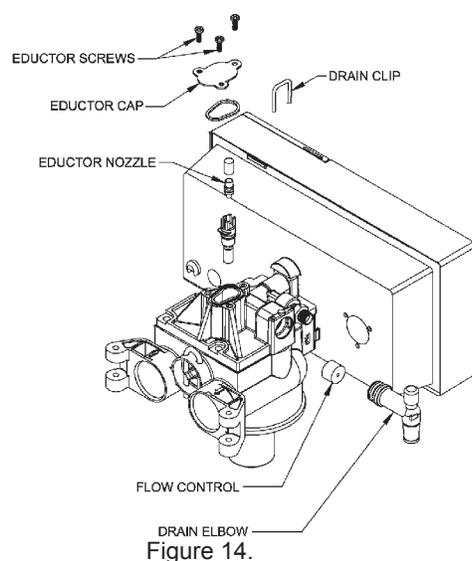
Table 3. Flow Restrictors

Unit	Backwash Flow	Nozzle	Throat	Brine Refill Flow
9"	2.0 gpm (#2 Brown)	Blue*	Light Brown*	0.45 gpm
10"	2.0 gpm (#2 Brown)	Beige	Light Brown	0.45 gpm
12"	3.5 gpm (#3 Green)	Beige	Light Brown	0.8 gpm
14"	5.5 gpm (Black)	Green	Blue	0.8 gpm

* Standard from factory

Eductor Nozzle Replacement:

1. Remove the three screws on the eductor cap and remove the cap.
2. Remove the eductor assembly.
3. Remove the eductor screen from the assembly
4. Remove the blue nozzle and replace it with the beige nozzle. Make sure to put the o-ring on the correct nozzle.
5. Reverse the procedure to reassemble. To prevent leaks, ensure that the gasket is in the proper position.



Backwash Flow Control Replacement:

1. Remove the drain clip and pull the drain elbow straight off.
2. Remove the backwash flow control located behind the elbow.
3. Install the correct backwash flow control.

NOTE The number on the flow control should face into the valve body.

4. Reverse the procedure to reassemble.

NOTE Dip switch #5 is to be in the "off" position for 9" and 10" Tanks (0.45 gpm refill flow control). Dip switch 5 is to be in the "on" position for 12" and 14" tanks (0.80 gpm brine refill flow control).

Plumbing Connections

Shipped with each softener is a Culligan® bypass valve, which is used to connect the softener to the plumbing system. The bypass allows the softener to be isolated from the water service line if service is necessary while still providing water to the home. The bypass valve can be directly plumbed into the system, or can be connected with the following optional sweat connection kits.

- P/N 01010783 1" Sweat Copper Adapter Kit
- P/N 01016564 3/4" Sweat Copper Adapter Kit
- P/N 01016565 3/4" Elbow Sweat Copper Adapter Kit



CAUTION! Close the inlet supply line and relieve system pressure before cutting into the plumbing! Flooding could result if not done!

CAUTION! When making sweat connections, use care to keep heat away from the plastic nuts used to connect the plumbing to the bypass. Damage to these components may result otherwise.

Bypass Valve Installation

The bypass valve connects directly to the control valve with a pair of couplings and two assembly pins (Figure 15). Lubricate all o-rings on the couplings with silicone lubricant.

On Soft-Minder® meter controls, the meter replaces the coupling on the outlet side of the control. The meter body fits in the same space as the coupling between the control valve and the bypass. Make sure that the arrow on the flow meter is pointing in the direction of flow (Figure 15).

NOTE If the ground from the electrical panel or breaker box to the water meter or underground copper pipe is tied to the copper water lines and these lines are cut during installation of the bypass valve, an approved grounding strap must be used between the two lines that have been cut in order to maintain continuity. The length of the grounding strap will depend upon the number of units being installed. In all cases where metal pipe was originally used and is later interrupted by the bypass valve to maintain proper metallic pipe bonding, an approved ground clamp c/w not less than #6 copper conductor must be used for continuity. Check your local electrical code for the correct clamp and cable size.

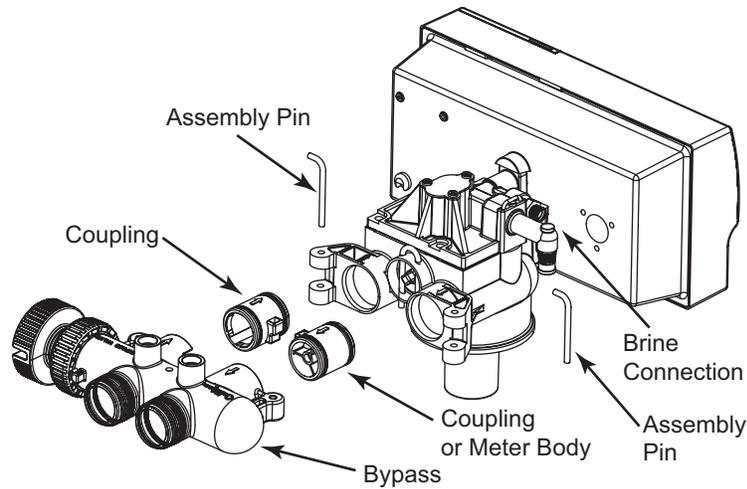


Figure 15.

To bypass, turn the blue knob clockwise (see directional arrow on end of knob) until the knob stops as shown. DO NOT OVERTIGHTEN! (Figure 16).

To return to service, turn the blue knob counter-clockwise (see directional arrow on the end of knob) until the knob stops as shown. DO NOT OVERTIGHTEN! (Figure 17)

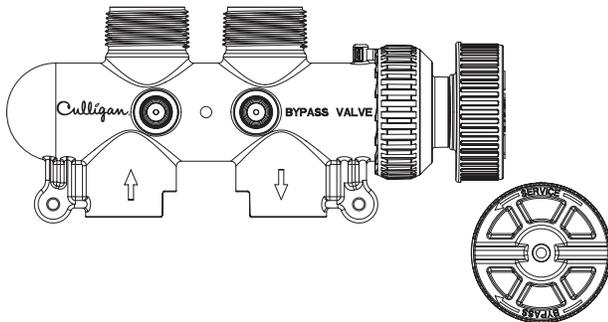


Figure 16.

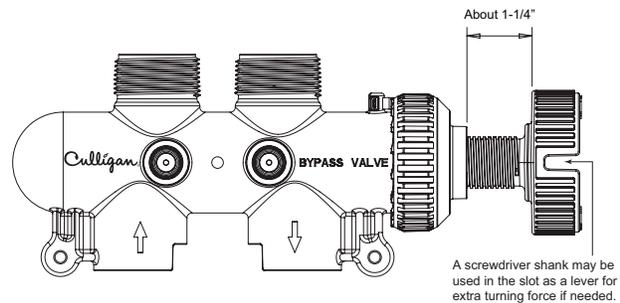


Figure 17.

Drain Line Connection

Refer to Table 4, for drain line length and height limitations.

- Remove 1/2" pipe clamp from the small parts pack included with the control.
- Route a length of 1/2" drain line from the drain elbow to the drain.
- Fasten the drain line to the elbow with the clamp.
- Secure the drain line to prevent its movement during regeneration. When discharging into a sink, or open floor drain, a loop in the end of the tube will keep it filled with water and will reduce splashing at the beginning of each regeneration.

NOTE Waste connections or drain outlets shall be designed and constructed to provide for connection to the sanitary waste system through an air gap of 2 pipe diameters or 1 inch, whichever is larger.

NOTE Observe all plumbing codes. Most codes require an anti-siphon device or air gap at the discharge point. The system and installation must comply with state and local laws and regulations.

Table 4. Height of Discharge Above Floor Level Operating

Operating Pressure	0 ft (0 m)	2 ft (0.6 m)	4 ft (1.2 m)	6 ft (1.8 m)	8 ft (2.4 m)	10 ft (3 m)
30 psi (210 kPa)	60 ft (18 m)	50 ft (15 m)	30 ft (9 m)	15 ft (5 m)	Not allowable	Not allowable
40 psi (279 kPa)	100 ft (30 m)	90 ft (27 m)	70 ft (21 m)	50 ft (15 m)	30 ft (9 m)	12 ft (4 m)
50 psi (349 kPa)	145 ft (41 m)	115 ft (35 m)	80 ft (24 m)	80 ft (24 m)	60 ft (18 m)	40 ft (12 m)
60 psi (419 kPa)	Normal installation should not require more than 100 ft (30 m) of drain line			100 ft (30 m)	100 ft (30 m)	85 ft (26 m)
80 psi (559 kPa)					140 ft (43 m)	120 ft (37 m)
100 psi (699 kPa)						150 ft (46 m)

Connect the Brine Line

1. Measure a length of brine line sufficient to reach from the brine tank to the brine fitting, with no sharp bends. For easier access to the float it is recommended to add an extra four feet (1.3 meters) of length to the brine line. Cut both ends of the brine line squarely and cleanly.
2. Slip the white nut over one end of the tubing and press the plastic insert into the end of the tubing (Figure 18). Connect to the brine valve and tighten nut.
3. Remove white nut and plastic insert from the small parts pack.
4. Slip the white nut over one end of the tubing and press the plastic insert into the end of the tubing (Figure 19). Connect to the brine connection on the valve and tighten nut.

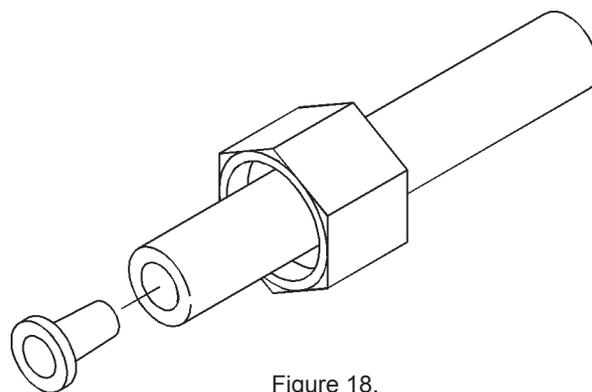


Figure 18.

Fill The Salt Storage Container

Fill the salt storage container with water until the level reaches about 1 inch above the salt support plate. Pour salt into the container. Fill with salt to within a few inches of the top.

Brine Valve “A” Dimension

The Culligan Gold Series™ unit contains a brine float which can serve as a backup refill shutoff in the event of a failure, such as a power outage when in the refill position. For standard applications the float does not need to be adjusted. The only time there is a benefit to setting an “A” dimension is if the Pre-Rinse feature is used. The Pre-Rinse shifts the valve to fast rinse (which is also refill) – the lowered float keeps from over filling the brine tank. The float level should be set based on the salt dosage setting. Refer to Figure 19.

1. Remove nut retaining brine valve to brine chamber.
2. Lift the brine valve from the brine chamber.
3. Find the correct “A” dimension from [Appendix A, “Capacities” on page 64.](#)
4. Set the distance from the top of the filter screen to the base of the float accordingly. The slight difference in height when the float is pulled up or down is negligible.
5. Re-install into brine chamber and replace nut.

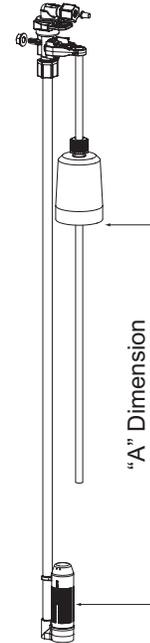


Figure 19.

Aqua-Sensor® Probe and Soft-Minder® Meter Connection

To connect the probe or meter leads refer to [Figure 22](#) and proceed as follows:

1. Remove the timer case from the back plate.
2. Snap the circuit board holding plate off the back plate to provide access to the back of the circuit board.
3. Remove the plastic plug from the backplate.
4. Slip the sensor probe lead or meter cable through the hole and toward the circuit board.
5. Connect the lead to the circuit board. The Aqua-Sensor probe terminal is labeled “Aqua-Sensor” while the Soft-Minder meter terminal is labeled “Flow Meter”.

NOTE The strain relief located on the back of the wire connection for the Aqua-Sensor probe may have to be removed in order to fit it through the backplate. Replace the strain relief if you need to remove it for assembly.

6. Pull any excess cable wire back out of the enclosure, and route the wiring inside the enclosure to avoid any interference with moving parts.
7. Locate the strain relief bushing in the parts pack. Place it on the cable at the point of entry to the rear of the timer plate and push it into the hole.

NOTE The wire connectors must be connected to the circuit board properly. The wires must exit the plug-in connector opposite of the raised white base of the circuit board connector. Failure to properly connect any of the connectors will result in a malfunction of the circuit board operation.

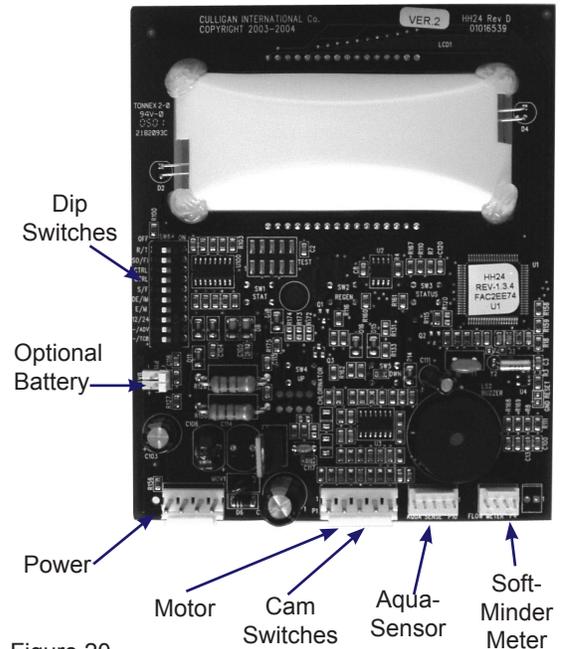


Figure 20.

NOTE Observe all state and local electrical codes.

Electrical Connection

The power cord needs to be connected to the plug-in transformer. Figure 21 shows the cord attachment to the transformer. The Aqua-Sensor® probe requires a 2.5 VAC power source. This source is provided via two of the posts on the 24V/2.5V transformer. Two leads from the transformer must be wired to the 2.5 VAC terminal on the circuit board. The wire connector from the Aqua-Sensor probe is simply plugged in the circuit board (Figure 22).

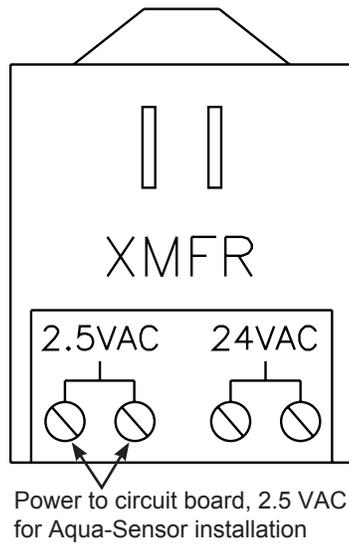


Figure 21.

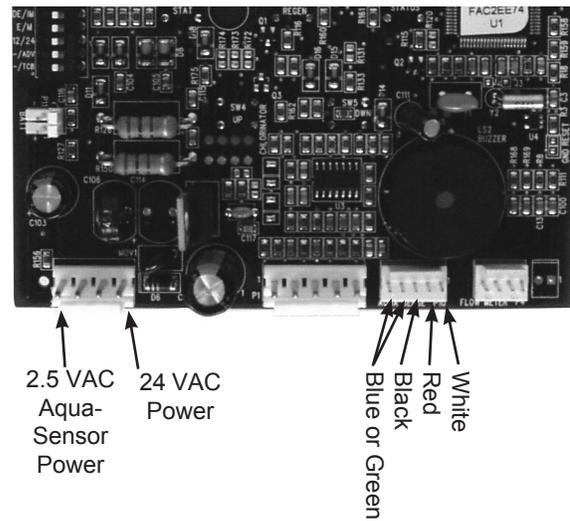


Figure 22.

Aqua-Sensor Wiring



CAUTION! Failure to connect power to the correct terminals will damage the circuit board!

Programming: The Gold Series Softener

Switch Definitions

The circuit board is shipped with all DIP switches in the off position. Prior to programming the controller some DIP switches may need to be moved to the ON position. Because each switch serves a specific purpose, please review the following information, moving the required switches to an ON position as necessary for each controller in the system. The definitions and purpose are as follows:

Table 5.

Switch No.	Abbreviation	Definition	Purpose
1	R/T	Run / Test	Off - Allows controller to function in a normal, operational mode.
			On - Places controller in test mode to verify operation of the board components software.
2	SO / FI	Softener / Filter	Off - The unit shall be operated as a softener.
			On - The unit shall function as a filter. The default time programmed for cycle #2 shall be 2 minutes.
3	4C / 5C	Valve Selection	Off - 4 cycle Gold.
			On - 5 cycle Platinum / 7125.
4	- / other	Valve Selection Override	Off -
			On - 4 or 5 cycle auto-detect "other" mode.
5	S / F	Standard Refill / Fast Refill	Off - The 0.45 gpm refill flow control is used to control the refill flow rate. Set in the off position for 9" and 10" units.
			On - The 0.80 gpm refill flow control is used to control the refill flow rate. Set in the on position for 12" and 14" units.
6	D / I	Demand / Immediate	Off - Regeneration of a unit will occur at a user-selected time of day.
			On - Regeneration shall occur immediately upon a controller receiving a valid regeneration initiation signal, regardless of the time of day.
7	E / M	English / Metric	Off - The unit will function in standard English dimensions.
			On - The unit will function in standard metric dimensions.
8	12 / 24	12 Hour Clock / 24 Hour Clock	Off - All time keeping functions shall be based on an AM/PM basis. The AM or PM icon shall be lit in the display as appropriate.
			On - Time keeping functions shall work on a 24-hour clock (military time). The AM/PM display icons will be disabled.
9	- / ADV	Advanced Features Off / On	Off - The Predict Mode and Pre-Rinse Mode will not be activated. (Efficiency will be active)
			On - The Predict Mode and Pre-Rinse Mode will be activated. (Efficiency will not be active)
10	- / TCB	Time Clock Back-up Disabled / Enabled	Off - The time clock backup option is not enabled.
			On - Allows the user to enable the time clock function of the control as a backup regeneration initiation option. This feature is used as a back up to a primary device such as a flow meter, Aqua-Sensor®.

Table 6.

Dip #3	Dip #4	Control
Off	Off	Gold
On	Off	Platinum
Off	On	Other
On	On	Other

NOTE Dip Switch 5 is to be in the "Off" Position for 9" and 10" tanks (0.45 gpm brine refill flow control). Dip Switch 5 is to be in the "On" position for 12" and 14" tanks (0.80 gpm brine refill flow control).

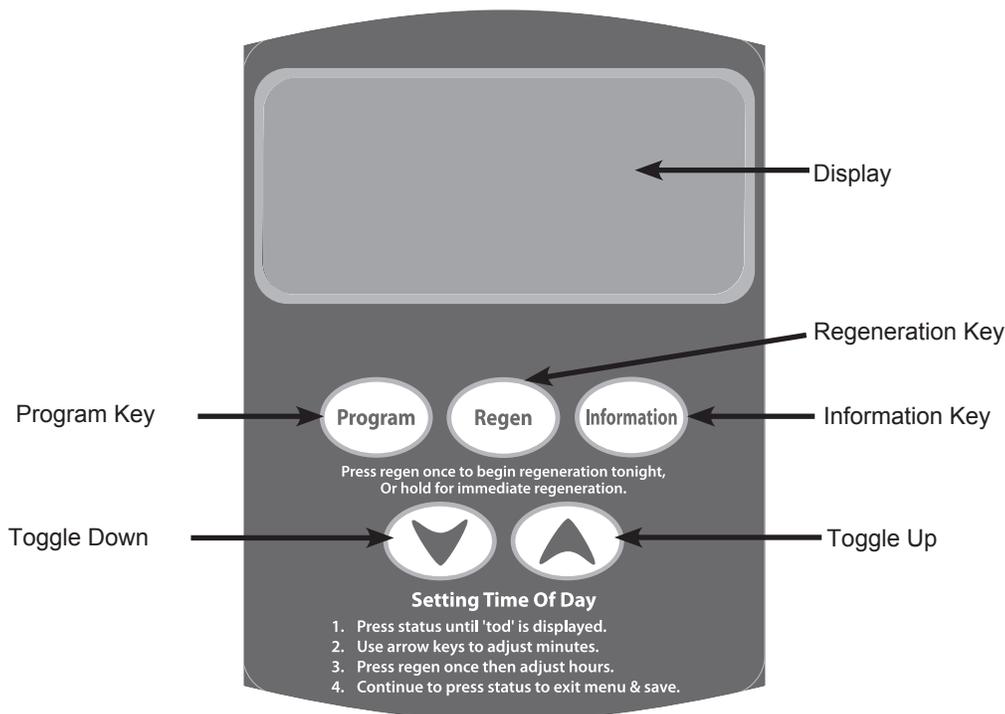


Figure 23.

Keypad Functions

Table 7.

Display	Back lit LCD display.
Program Key	Depress to enter and move through the programming steps.
Regeneration Key	Press and hold the key for three (3) seconds to initiate an immediate regeneration. When pressed during programming the time of day, this key will allow the user to toggle between the hours and minutes setting of timing program segments.
Information Key	Each time depressed, the Information key will display statistical information such a flow rate, time of day. Use with the Toggle Down key to display other statistical information.
Toggle Down Key	In the programming mode this key will move the user through the programming function in a descending mode. If depressed for greater than three seconds, the rate at which the display scrolls through data will increase.
Toggle Up Key	In the programming mode this key will move the user through the programming function in an ascending mode. If depressed for greater than three seconds, the rate at which the display scrolls through the data will increase. This key will also allow the user to manually step through the cycles of regeneration.

Programming Menus

The programming menu will vary depending on which devices are connected to the circuit board and dip switch settings. The program menu can be divided into two sections; inputs and outputs. The outputs are calculated based on selected inputs and can be viewed and customized, if desired. The “Program” key allows the user to scroll through and save each setting. Each value is set by using the “up” and “down” arrow keys to increment or decrement. Pressing the “Program” key after value selection saves the selected value. At the end of the inputs section, the user is prompted to “view” the outputs. At this point the user has the option to view and/or customize any calculated output value. The control recognizes any deviation from the calculated values and will prompt the user to “save” custom settings, if desired. To exit the programming mode, repeatedly press the “Program” key until the display returns to time of day display. The following tables outline all of the input/output programming displays, range limits, default settings and hidden menus on [page 27](#) - [page 28](#).

Inputs

Settings	Display	Range Limits	Default	Comments
Beeper	BEEP 4	Toggle Y / N	Y	Enables/disables the key press beeper (ERR/Alert code beeps can't be disabled)
Time of Day	TOD	12:00 am-11:59 pm (12hr) 00:00-23:59 (24hr)	12:00 pm 12:00	12 / 24 hour function set with dip # 8.
Time of Regen	TOR	12:00 am-11:59 pm (12hr) 00:00-23:59 (24hr)	2:00 am 02:00	Adjustable in 30 minute increments only.
Meter Factor	MTR 50.0	0.5 – 500	50.0	Only active with Flow meter connected and dip # 4 on (other).
Regen Interval	DAYS 03	Days - 1 to 99 days	3 days	Active in Time Clock Mode OR Flow Meter - A/S with dip #10 on
Hardness	HRD 25	1 – 99 English	25 - English	Only active if dip # 4 is off AND dip # 7 is on (N/A in Filter mode)
Iron	IRON N	Toggle Y or N	N	Only active if dip # 4 is off with flow meter connected (N/A in Filter mode)
Low Pressure	LOWP N	Toggle Y or N	N	Only active if dip # 4 is off. If pressure is less than 40psi, choose "Y"
Salt Type	SALT	NACL or KCL	NaCl	Only active if dip # 4 is off with flow meter connected (N/A in Filter mode)
Predict Mode	PRED N	Toggle Y or N	N	Only active if dip # 9 on AND dip # 6 is off with flow meter connected (N/A in Filter mode)
Pre-Rinse Mode	PRE --	RINSE.N Toggle Y or N	N	Only active if dip # 9 is on
Pre-Rinse Duration	RINS 5	01 – 15	05	Only active if dip # 9 is on with Pre-Rinse mode is set to "Yes"
Pre-Rinse Hours	HRSD 24	1 – 240	24	Only active if dip # 9 is on with Pre-rinse mode set to "Yes" AND flow meter connected
Pre-Rinse Time	TIME	12:00 am-11:30 pm (12hr) 00:00-23:30 (24hr)	5:00 am 05:00	Only active if dip # 9 is on with Pre-rinse set to "Yes"; Adjustable in 30 minute increments only; Available only in TimeClock and AquaSensor mode (not flow meter mode)
Efficiency Mode	NO	Toggle Yes or No	No	Available only if dip # 4 is off with flow meter connected; Iron = N; Hardness <= 20 (English hardness units) "Efficiency Mode" icon lit when enabled (Not available with dips #6 or 9 on, or in Filter mode)
Gold Tank Size	GOLD 9	9", 10", 12", 14"	9"	Only displayed if dip # 4 is off with a flow meter connected (N/A in Filter mode)

Outputs

Settings	Display	Range Limits	Default	Comments
Salt Dosage	DOSAGE	3 – 64 Lbs 1.5 – 29.0 kg	Calculated based on tank size	Only active if dip # 4 is off (N/A in Filter mode); If this is changed, then the appropriate outputs get recalculated (brine rinse, refill and capacities).
Cycle 1 time	10	1 to 99 minutes	10 min. (5 min efficiency mode)	
Cycle 2 time	60	1 to 150 minutes	Softener mode- calculated based on tank size, dosage, and pressure Filter mode- 2 minutes	Calculated only with dip # 4 off; add 10 minutes to calculation for A/S mode
Cycle 3 time	10	1 to 40 minutes	Calculated based on dosage and dip # 5 (Gold)	Fast Rinse/Refill on Gold. Calculated value for Gold with dip # 4 off.
Filter Media Life	LIFE N	Toggle (Y or N)	N	Enable/disable the filter media life feature (filter Operation ONLY)
Total Capacity Set Point-MAX-CAP	MAXCAP	1 – 999,999 (can't be set less than BATCH)	999,999 (other or filter); calculated otherwise	-Set point to trigger immediate regeneration. -Only active with flow meter connected. -Triggers "CHANGE MEDIA" alert in Filter mode.
Batch Capacity	BATCH	1 – 999,999 (can't be set greater than MaxCap)	870 (other or Filter); Calculated for (Gold, Plat or Euro softeners)	-Only active with flow meter connected. -For Gold, Platinum and Europe, the value shown is calculated by control; value may be overridden by user by setting 'defaults' to 'no'
Save	SAVE N	Toggle (Y or N)	N	Only active when the control detects customized outputs that differ from the last time through the menu; selecting "Y" saves customized settings; selecting "N" re-calculates outputs based on current inputs.

Hidden Menu Items

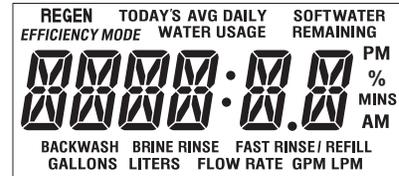
Settings	Display	Range Limits	Default	Comments
Delay / Immed.	DELAY	DELAY or IMMED	Immed.	-Accessible from time display by pressing and holding "Up" and "Down" keys together for 5 seconds; sets whether a regeneration should occur immediately or delayed after a 3 hour or longer power outage; (not while in programming menu). -If set to Delay, when Maxcap is reached, an immediate regeneration will NOT happen. It will always wait until Tor.
Lock / Unlock	UNLOCK	UNLOCK or LOCK	Unlock	-Lock or unlock access to program changes -Accessible from time of day display by pressing and holding the "Up" and "DOWN" keys together for 5 seconds; (not while in programming menu)

Display Icons

The display is to be backlit and have the icons as shown below.

Custom LCD Display

Six standard 12-segment alpha-numeric characters, a decimal separating the first and second character, a colon separating the second and third character positions, AM, PM, REGEN, EFFICIENCY MODE, TODAY'S, AVG DAILY, WATER USAGE, SOFTWATER, REMAINING, %, MINS, BACKWASH, BRINE RINSE, FAST RINSE, /, REFILL, GALLONS, LITERS, FLOW RATE, GPM, LPM Icons



A further description of each programming setting and the corresponding display is outlined below. For a display that has an icon that is displayed solid for the 2 second time period prior to bringing up the settings, the settings menu can be reached prior to the two second time out by pressing the "Up" or "Down" key.

Beeper Setting

This setting is used to turn the beeper on or off for each key press actuation. The display will show "bEEP X" where X is either "Y" or "N". The "Y" or "N" will be toggled with the "Up" and "Down" keys. Setting the Beep option to "N" will only disable the beeper for key press actuation. The beeper will still be active for error and alarm codes.



Pressing the "Program" key will save the setting and move to the next programming step.

Time of Day

This setting is used to program the current time of day. When in this step the display will first show "tod" for two seconds.



After "tod" is displayed, "12:00 PM" will display (or the current set time if already programmed) and the minutes will flash. The minutes are adjusted with the "Up" or "Down" key until the correct value is displayed.

Press the "Regen" key to flash the hours. Adjust with the "Up" or "Down" key until the correct time is displayed.



Pressing the "Program" key will save setting and move to the next programming step. Pressing "Regen" will move back to the minutes adjust.

Time of Regeneration

This setting is used to program the time at which a regeneration is to occur in the delay mode, or in immediate mode with time clock backup on. The display will first show "tor" for two seconds.



After "tor" is shown the display will then show the default of 2:00 AM (or the current programmed time of regeneration if already set). The time can be adjusted in 30 minute increments by pressing the "Up" or "Down" keys.

Pressing the "Program" key will save the setting and move to the next programming step.



Day(s) of Week Regeneration

In the time clock mode only (Meter or Aqua-Sensor® not connected), the following optional days of the week setting will be available to trigger regeneration. The display will show “dAYoWK” for 2 seconds followed by “NO”. The “Up” or “Down” key will toggle “yes” or “no” (default is NO). A “yes” response will indicate that the control is to perform a regeneration on specific days of the week.



Pressing “Program” will save and advance to the next step. If “NO” was chosen, then the control will only initiate regenerations based upon the interval (in number of days) and the display will show as shown in Regeneration Interval below.

If “YES” was chosen, then the specific days of the week to regenerate will be selected as follows:



The display will show “dAY” for two seconds followed by “SUN N”. The “regen” key toggles the days of the week and the “Up” and “Down” keys toggle “Y or N”.

Pressing the “Program” key saves and advances to the next step.

If any of the days were set to “yes”, the display will show “SETdAY” followed by “SUN”. This selects the current day of the week. The “Up” or “Down” key toggles through the days of the week and pressing the “Program” key saves the setting and advances to the next programming step.



If ALL of the days were set to “no”, then specific day of week regens will be canceled and will appear as shown in Regeneration Interval below, and the interval will be set in number of days.

Pressing the “Program” key saves the setting and advances to the next programming step.

NOTE 1. If any day of the week is set to “yes”, the regeneration interval in number of days (“Days 03”) will no longer appear when going through the programming menu at a later time. To go back from specific day of week regeneration to interval in number of days, choose “NO” at “dAYoWK”.

NOTE 2. If a DIP switch is changed anytime (other than run/test dip # 1) after the control has been programmed to regenerate on any specific day, all settings will revert back to default (“dAYoWK” = NO); specific days to regenerate and current day will have to be reprogrammed.

Regeneration Interval

This setting is used to set the days between regeneration in time clock mode. It is also active in meter or Aqua-Sensor mode if the time clock backup DIP switch # 10 is set to on. The display will show “REGEN” icon and “dAYS” as well as the numbers to change. Adjust the value with the “Up” or “Down” keys.

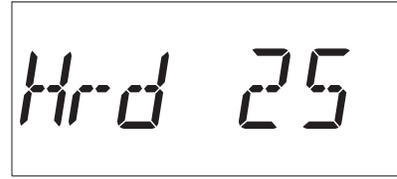


Pressing the “Program” key will save the setting and move to the next programming step.

Hardness Setting

This setting is used to set the hardness (grains) of the influent water supply. For English Units the display will show the Hardness default of "Hrd 25" (or the previously programmed value). Adjust the value with the "Up" or "Down" keys.

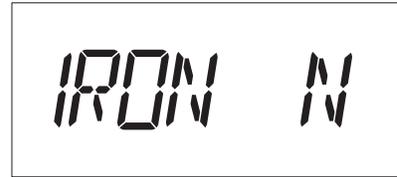
(These settings will not get saved to EEPROM until the 'Program' key is pressed while at the "tank size" programming step)



Iron Setting (flow meter only)

This setting is used to set the iron level of the influent water supply. The display will show "Iron" in the left most digits and the iron default setting (or the previously programmed value) in the far right digit. The display will only appear if a flow meter is connected to the circuit board and the control is set to Gold. If the iron level is set to "Y", the Efficiency Mode is inactive. Adjust the value with the "Up" or "Down" keys.

Pressing the "Program" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'Program' key is pressed while at the "tank size" programming step)



Pressure Setting

This setting is used to set the influent water pressure. The display will show "LowP" in the left most digits and the pressure default setting in the far right digit. If the pressure is less than 40 psi, chose "Y". By choosing "Y" the brine Rinse time will be extended. Adjust the value with the "Up" or "Down" keys.

Pressing the "Program" key will temporarily store the setting and move to the next programming step.



Salt Type (flow meter only)

This setting is used to select the regeneration salt type (softener mode only). This display will only appear if dip # 4 is off. The display will show "SALT" for 2 seconds. Then display the default 'NACL'. Pushing the "Up" or "Down" keys will change to 'KCL'.

Pressing the "Program" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'program' key is pressed while at the "tank size" programming step)



Predict Mode (flow meter only)

This setting will only be displayed if dip # 9 is on, dip # 6 is off, and a flow meter is connected. Only available in softener mode. The display will show "PRED" in the left most characters and toggle between "Y" and "N" in the right most character with the "Up" and "Down" keys.

Pressing the "Program" key will save the setting and move to the next programming step.



Pre-Rinse Mode

This setting will only be active if dip # 9 is on. The display will show "PRE-" for two seconds and then "RINSE" in the left most characters of the display. When "RINSE" is shown the right most character of the display will flash "N" and toggle to "Y" with the use of the "Up" or "Down" keys.

Pressing the "Program" key will save the setting and move to the next programming step.



Pre-Rinse Time Duration

This setting is used to set the length of time that the control will be in the fast rinse position before returning to the Service (Home) position. The display will show "RINS" and XX where XX is the length in minutes that the control is to pre-rinse as well as the "FAST RINSE" icon. Adjust the XX value with the "Up" and "Down" keys.

Pressing the "Program" key will save the setting and move to the next programming step.



Pre-Rinse Hours

This setting will only be active if the Pre-Rinse mode is set to 'Yes' and a flow meter is attached to the control. The display will show "HOUR" in the left most characters and "XX" in the right most digits where "XX" represents the hours setting from 01 - 99. The hours setting is adjusted with the "Up" and "Down" keys.

Pressing the "Program" key will save the setting and move to the next programming step.



Pre-Rinse Time of Day

This setting will only be active if the Pre-Rinse mode is set to 'Yes' and the control is operating in time clock or Aqua-Sensor® mode (without a meter). The Display will show "TIME" for 2 seconds and then the flashing time display as in the time of regeneration display. The time can be adjusted in 30 minute increments with the "Up" and "Down" keys.



Pressing the "Program" key will save the setting and move to the next programming step.

Efficiency Mode (flow meter only)

Efficiency mode will only be active if the conditions as explained earlier are met (Not available if DIP switch # 6 or DIP switch # 9 are on). The "EFFICIENCY MODE" icon will be displayed with a default of "YES". Toggle between "YES" and "NO" with the "Up" or "Down" key.

Pressing the "Program" key will temporarily store the setting and move to the next programming step. (This setting will not get saved to EEPROM until the 'program' key is pressed while at the "tank size" programming step).



Gold Tank Sizes (Meter / AS / TC)

This setting is used to determine what size tank the control is connected to. It will only appear if DIP Switch 3 is set to Gold and dip # 4 is off. The display will first show "GOLD" with the tank size default (or the previously programmed value). Adjust the tank size with the "Up" or "Down" keys.



Pressing the "Program" key will save all input settings to EEPROM and moves to the next programming step ('View').

View

This setting is used to allow the programmer to view the calculated values for salt dosage, cycle times, batch capacity, and total capacity. These values may be changed at this time. The display will show "VIEW N". The "Y" or "N" will be toggled with the "Up" and "Down" keys. The default for this item shall always be "N" and does not get saved in EEPROM. The programmer must always toggle to "Y" in order to view these items. Pressing the "Information" key at this menu will re-calculate outputs, based on saved inputs.



NOTE "Save" does not appear if no value is changed.



If "View Y" is chosen, then pressing the "Program" key will display the value for salt dosage; repeated presses of the program key will display cycle times, batch capacity, and total capacity.

Pressing the "Program" key after viewing "Batch" will exit the programming menu..

If "View N" is chosen, then pressing the "Program" key will exit the programming menu. If any values were changed from calculated values, then "Save" prompt appears. If "Save N" is chosen, the calculated values go back in. The user must choose "Save Y" to save custom values.

Salt Dosage

This setting is used to set the salt dosage. It will only be accessible to be set if dip # 4 is off and 'View' was set to 'Y'. The display will first show "dosAGE" for two seconds and then display the default (or previously programmed value). The proper units (lbs or kg) will appear according to dip # 7 setting (English/Metric). Adjust the salt dosage with the "Up" or "Down" keys.



NOTE This setting also appears during Aqua-Sensor® Programming.

Pressing the "Program" key will save the setting and move to the next programming step.

Cycle 1 Time

This setting is used to program the cycle 1 time that is usually backwash. The time of the cycle is kept in minutes. The display will show the "BACKWASH" and "MINS" icons and the cycle time in the right most digits. Adjust the value with the "Up" or "Down" keys.

NOTE This setting also appears during Aqua-Sensor® Programming.

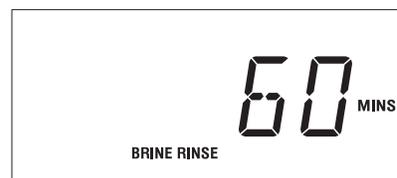


Pressing the "Program" key will save the setting and move to the next programming step.

Cycle 2 Time

This setting is used to set the time in minutes for cycle 2. This cycle is brine draw / slow rinse for softeners. The display will show the "BRINE RINSE" and "MINS" icons and the cycle time in the right most digits. Adjust the value with the "Up" or "Down" keys.

NOTE This setting also appears during Aqua-Sensor® Programming.



Pressing the "Program" key will save the setting and move to the next programming step.

Cycle 3 Time

This cycle is the Fast Rinse/Refill for softeners. The display will show the “Fast Rinse/Refill” and “Mins” icons and the cycle time in the far right digits.

NOTE This setting can not be adjusted! It's based on salt dosage.

Pressing the “Program” key will move to the next programming step.

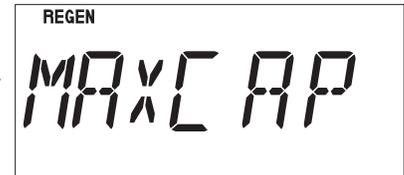


Total Capacity Set Point (Max Capacity)

This setting is used to program a value that corresponds to the maximum capacity that can be expected from a unit before it is completely exhausted. If the unit reaches this set point an immediate regeneration will occur even if dip # 6 is set to delay mode (If hidden menu is set to “Delay” the control will NEVER trigger an immediate regeneration, even if dip # 6 is set to delay. This setting will only appear if a flow meter is connected to the circuit board. Adjust the value with the “Up” or “Down” keys. The display will show the “REGEN” icon and “MAXCAP” for two seconds and then display the “REGEN” and “GALLONS” or “LITERS” (depending on DIP switch # 7 setting) icons and the setting numbers to adjust.

NOTE “Maxcap” can not be set lower than “batch”.

Pressing the “Program” key will save the setting and move to the next programming step.



Batch Set Point

This setting is used to set the trip point for regeneration when in flow meter operation. It will only appear if a flow meter is connected, dip # 3 is set to Gold, or dip 4 set to ‘other’. The programmed setting displays the actual set point to trigger regeneration. The display will show the “REGEN” icon and “batch” for two seconds and then display the “REGEN” and “GALLONS” or “LITERS” (depending on dip # 7 setting) icons and the setting numbers to adjust. Adjust the value with the “Up” or “Down” keys.

NOTE “Batch” can not be set higher than “maxcap”.

Pressing the “Program” key will save the setting and exit the programming menu.



Save

This setting is used to save customized outputs. Selecting “Y” saves customized settings; selecting “N” recalculates outputs based on current inputs.

NOTE This option does not appear if outputs are unchanged.

Pressing the “Program” key will move to the next programming step.



Programming: Total Home

DIP Switch Settings

The circuit board is shipped with all DIP switches in the off position. Prior to programming the controller some DIP switches may need to be moved to the ON position. Because each switch serves a specific purpose, please refer [Table 5 on page 25](#) for additional information.

Dip Switch

Set dip switches on back of circuit board to the following for the Total Home Water Conditioner.

1. Dip switch 4 is "On"
2. All other dip switch settings should be in the "Off" position.

Programming Menus

Refer to ["Programming Menus" on page 26](#) for more details on the programming menus. The following Screens will appear.

A further description of each programming setting and the corresponding display is outlined below. For a display that has an icon that is displayed solid for the 2 second time period prior to bringing up the settings, the settings menu can be reached prior to the two second time out by pressing the "Up" or "Down" key.

Beeper Setting

This setting is used to turn the beeper on or off for each key press actuation. The display will show "bEEP X" where X is either "Y" or "N". The "Y" or "N" will be toggled with the "Up" and "Down" keys. Setting the Beep option to "N" will only disable the beeper for key press actuation. The beeper will still be active for error and alarm codes.



Pressing the "Program" key will save the setting and move to the next programming step.

Time of Day

This setting is used to program the current time of day. When in this step the display will first show "tod" for two seconds.

After "tod" is displayed, "12:00 PM" will display (or the current set time if already programmed) and the minutes will flash. The minutes are adjusted with the "Up" or "Down" key until the correct value is displayed.



Press the "Regen" key to flash the hours. Adjust with the "Up" or "Down" key until the correct time is displayed.

Pressing the "Program" key will save setting and move to the next programming step. Pressing "Regen" will move back to the minutes adjust.

Time of Regeneration

This setting is used to program the time at which a regeneration is to occur in the delay mode, or in immediate mode with time clock backup on. The display will first show "tor" for two seconds.

After "tor" is shown the display will then show the default of 2:00 AM (or the current programmed time of regeneration if already set). The time can be adjusted in 30 minute increments by pressing the "Up" or "Down" keys.

Pressing the "Program" key will save the setting and move to the next programming step.



Meter “K” Factor

This setting is used to set the “K” factor (the number of pulses a flow device emits to represent a volume of water). Set the “K” factor to 80. Adjust the valve with the “up” and “Down” keys.

Pressing the “Program” key will save the setting and move to the next programming step.



Cycle 1 Time

This setting is used to program the cycle 1 time that is backwash. The time of the cycle is kept in minutes. The display will show the “BACKWASH” and “MINS” icons and the cycle time in the right most digits. Adjust the value with the “Up” or “Down” keys.

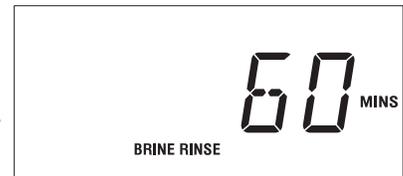
Pressing the “Program” key will save the setting and move to the next programming step.



Cycle 2 Time

This setting is used to set the time in minutes for cycle 2. This cycle is brine draw / slow rinse for softeners. The display will show the “BRINE RINSE” and “MINS” icons and the cycle time in the right most digits. Adjust the value with the “Up” or “Down” keys. See attached capacity charts to set “brine draw / slow rinse” times.

Pressing the “Program” key will save the setting and move to the next programming step.



Cycle 3 Time

This cycle is the Fast Rinse/Refill for softeners. The display will show the “Fast Rinse/Refill” and “Mins” icons and the cycle time in the far right digits. See attached capacity charts to set “refill” time (round to the nearest minute). Adjust the value with the “Up” and “Down” keys.

Pressing the “Program” key will move to the next programming step.



Total Capacity Set Point (Max Capacity)

This setting is used to program a value that corresponds to the maximum capacity that can be expected from a unit before it is completely exhausted. If the unit reaches this set point an immediate regeneration will occur even if dip # 6 is set to delay mode (If hidden menu is set to “Delay” the control will NEVER trigger an immediate regeneration, even if dip # 6 is set to delay. This setting will only appear if a flow meter is connected to the circuit board. Adjust the value with the “Up” or “Down” keys. The display will show the “REGEN” icon and “MAXCAP” for two seconds and then display the “REGEN” and “GALLONS” or “LITERS” (depending on DIP switch # 7 setting) icons and the setting numbers to adjust.

NOTE “Maxcap” can not be set lower than “Batch”. See [Appendix A, “Capacities” on page 64.](#)



Pressing the “Program” key will save the setting and move to the next programming step.

Batch Set Point

This setting is used to set the trip point for regeneration when in flow meter operation. It will only appear if a flow meter is connected, dip # 3 is set to Gold, or dip 4 set to ‘other’. The programmed setting displays the actual set point to trigger regeneration. The display will show the “REGEN” icon and “batch” for two seconds and then display the “REGEN” and “GALLONS” or “LITERS” (depending on dip # 7 setting) icons and the setting numbers to adjust. Adjust the value with the “Up” or “Down” keys.

NOTE “Batch” can not be set higher than “Maxcap”. See [Appendix A, “Capacities” on page 64.](#)



Pressing the “Program” key will save the setting and exit the programming menu.

Hidden Menu

Power Outage

The power outage option can be toggled off and on by pressing and holding “Up” and “Down” keys simultaneously for 5 seconds. This option sets whether a regeneration should occur immediately or delayed after a 3 hour or longer power outage. Also, it determines whether an immediate regeneration occurs when Maxcap is reached.



Pressing the “Program” key will save and go to the next hidden menu option.

Program Lock

The program lock can be toggled off and on by pressing the “Up” and “Down” keys. The display will show “UNLOCK” or “LOCK” depending on the last setting. When locked, the only program menus that can be changed are ‘beeper’, TOD, and TOR. The other menus will appear as normal but their values will not be able to be changed.



Pressing the “Program” key will return to the regular time of day display in standard service mode.

Programming Mode Timeout

If no key activity occurs for a period of 180 seconds (3 minutes) while in programming mode, the mode will time out, exit the programming mode and return to time of day display. Any setting that wasn’t saved by pressing the ‘Program’ key prior to the control timing out will revert back to the previous value. (The few settings that had temporarily stored values will revert back to their previous setting UNLESS the ‘Program’ key was pressed at the ‘Tank Size’ display.)

Regen Time Remaining

Upon exiting the programming menu, the current ‘Time of Day’ should be displayed on the display. If the unit is in regeneration, pressing the “Regen” key will display how much total regeneration time remains. The display will stay active until the “Regen” key is pressed again, or the regeneration ends (In Aqua-Sensor mode, the total regeneration time remaining includes the full brine rinse time, but will adjust accordingly upon auto rinse out).

Information Functions

While in the Information functions, all keys are active. The statistical functions are reached by pressing the “Information” key. The information will have two operational modes; a standard information mode and a service information mode. Repetitive presses of the “Information” key will cycle through the standard information mode until cycled back to time of day display. The service mode information will be entered by an initial key press of the “Information” key and then successive presses of the “Down” key. While in the service mode information, the functions will repeatedly cycle through the menus until the “Information” key is pressed again. The following table outlines the Information function display, range limits and default setting:

Information Menus

The appearance of information menus will vary based on connected devices and dip settings.

The information menus can also be divided into two sections; standard and service. The standard information mode can be accessed by pressing the information key repeatedly. For Aqua-Sensor mode, the display will only “Aqua-Sensor”. When a flow meter is connected, the displays will show flow rate, % capacity remaining, daily usage and average daily usage.

The service information goes into more detail and allows the service tech to see important historical information; total water usage, number of regens, days since last regeneration, last brine rinse time and impedance ratios. The following tables outline all of the statistical programming displays:

Accessed by pressing the “Information” key repeatedly

Standard Statistics	Display	Range Limits	Comments
Aqua Sensor	<i>AQUA SENSOR</i>	N/A	Display shows ‘Aqua-Sensor’, until ‘information’ key is pressed or function times out.
Flow Rate	<i>0.0</i>	0 to 999.0	Based on meter factor setting, updated every second, active only with flow meter
Capacity Remaining (%)	<i>100%</i>	0 – 100%	% of batch capacity remaining, active only with flow meter
Today’s Water Usage	<i>02 50</i>	0 – 9999	Water usage from 12:00AM – 11:59PM
Avg. Daily Water Usage	<i>0 1 50</i>	0 – 9999	Average Daily Water Usage over the last 7 Days

Accessed by pressing the “Information” key once, then the “Down” key repeatedly

Service Statistics	Display	Range Limits	Comments
Flow Rate	0.0	0 to 999.0	Same as above
Capacity Remaining	0008 70	0 – 999,999	Remaining gallons (liters) until batch capacity is reached
Filter Media Life Remaining	LIFE	0 – 999,999	-ONLY active in filter mode with ‘Life’ option set to ‘Y’. -Remaining gallons (liters) until ‘total flow for life of unit’ reaches the value of ‘total capacity set point’, indicating the end of the filter media life.
Total Flow/Life Unit	TOTAL	1 – 999,999	Only active with flow meter connected
Today’s Water Usage	02-50	0 – 9999	Same as above
Avg. Daily Water Usage	01-50	0 – 9999	Same as above
No. of Regens in last 14 days	14 DAY	0 to 99	-Days counter is to be updated at 12:00 am ONLY when dip # 6 is on AND dip # 10 is off; Otherwise, update at TOR -regens in last 14 days is updated after completion of regeneration (full time out of refill cycle).
Number of days since last Regen	DAYS 03	0 to 99	-Days counter is to be updated at 12:00 am ONLY when dip # 6 is on AND dip # 10 is off; Otherwise, update at TOR -After a regeneration is complete (full time out of refill cycle), the counter resets to 0.
Total No. of Regens	TOTAL R	0 to 999,999	Counter incremented after completion of regeneration (full time out of refill cycle)
Last brine rinse time	LST 00	0 to 99	Only active if Aqua-Sensor connected
Z Ratio (read as x.xxx with decimal point after first digit)	ZRATIO 1075	0000 to 9999	[Shows current Z ratio] Impedance ratio only active with A/S; updates every 30 seconds; “1075” would be read as a ratio of 1.075.
Z MIN (read as x.xxx with decimal point after first digit)	ZMIN 1075	0000 to 9999	[Used as reference during service] Impedance minimum only active with A/S; gets reset after a successful regeneration; this is the reference point the control compares Zratio to in order to detect the need for regeneration during service cycle; “1075” would be read as a ratio of 1.075.
Z% Increase	Z INCR% 07.5%	0.00 to 99.9 %	[Indicates the increase of the Z Ratio above the Z Minimum during a service cycle] Impedance ratio percent increase only active with A/S; number only applies while in service, NOT regeneration; updates every 30 seconds like Z ratio.

Once either of the information menus is entered the information shown for each display is outlined below:

Time Clock (standard information)

This display will only show when in time clock mode (no meter or Aqua-Sensor attached). The display will alternate between 'time' and 'clock' every second until the 'Information' key is pressed or until the function times out.

Aqua Sensor (standard information)

This display will only show when in Aqua-Sensor mode (no meter attached). The display will alternate between 'aqua' and 'sensor' every second until the 'Information' key is pressed or until the function times out.

Flow Rate (standard information)

This display will only show if the flow meter is attached to the control. The display shall show the current flow rate of the water passing through the control. The display will show the "FLOW RATE" and "GPM" or "LPM" icons and the current flow rate passing through the flow meter for as long as the "Down" key or "Information" key is not pressed.

This display shall never time out, as opposed to the rest of standard information (10 minutes).

Capacity Remaining (%) (standard information)

This display will only show if the flow meter is attached to the control. The display shows the percent capacity remaining in the batch before regeneration will be triggered. The display will show the "SOFTWATER", "REMAINING" and "%" icons for softeners. This display shall never time out, as opposed to the rest of standard information (10 minutes).



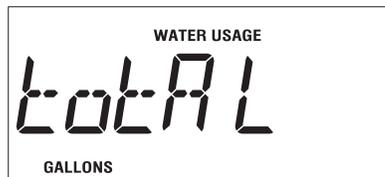
Capacity Remaining (gal/L) (service information)

This display will only show if the flow meter is attached to the control. The display shows the gallons or liters of capacity remaining in the batch before regeneration will be triggered. The display will show the "SOFTWATER", "REMAINING", and "GALLONS" or "LITERS" icons (depending on DIP Switch # 7 setting) for softeners.



Total Flow/Life of Unit (service information)

This display will only show if the flow meter is attached to the control. The display will show a flow totalizer. The total amount of flow that has passed through the unit since it was installed will be maintained. The display will first show "totAL" for 2 seconds and then display the "GALLONS" or "LITERS" icon



(depending on dip # 7 setting) and the totalizer value for 10 seconds. This 2 and 10 second cycle should repeat until the "Information" key or "Down" key is pressed, or the information time out brings the display back to time of day. If in filter mode with 'LIFE' option set to 'Y', pressing and holding the "REGEN" key for 10 seconds at the previous display will reset this value back to zero.



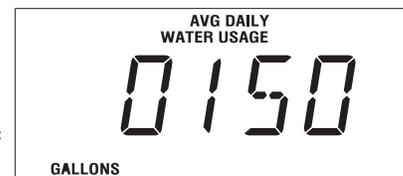
Today's Water Usage (standard information)

This display will only show if the flow meter is attached to the control. The display will show the accumulated flow of water for the current day. The value is to start totaling at 12:00 AM and reset to 0 at 11:59:59 PM. The display will show the "TODAY'S", "WATER USAGE" and "GALLONS" or "LITERS" icons (depending on dip#7 setting) and the total days flow based on the "K" factor and number of pulses received from the flow meter.



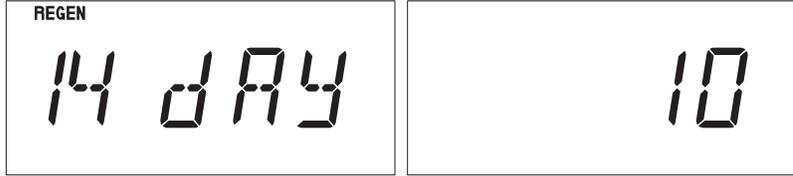
Average Daily Water Usage (standard information)

This display will only show if the flow meter is attached to the control. The display will show a running 7-day average of daily water usage. The display will show the "AVG DAILY", "WATER USAGE" and "GALLONS" or "LITERS" (depending on dip # 7 setting) icons and the averaged flow value.



Number of Regenerations in Last 14 Days (service information)

This display will show the number of regenerations that have occurred in the last 14 days. The display will first show "14dAY" for two seconds and then display the number of regenerations that have occurred.



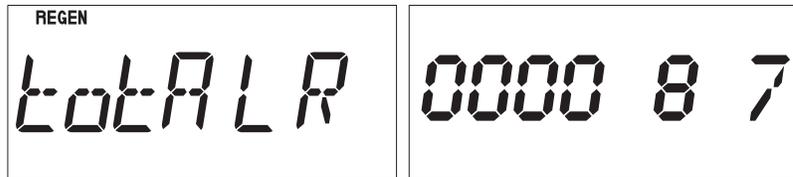
Number of Days since Last Regeneration (service information)

This display shows the number of days that have elapsed since the last regeneration. The display will show "DAYS XX" where XX is the number of days that have elapsed since the unit completed its last regeneration.



Total Number of Regenerations for Life of Unit (service information)

This display will show the total number of regenerations that have occurred since installation. The display will show "totALR" for two seconds and then display the total number of regenerations.



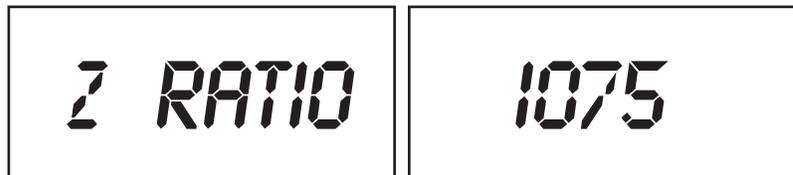
Aqua-Sensor® Information – Last Slow Rinse Time (service information)

This display will appear only if an Aqua-Sensor is attached. The duration of the most recent brine rinse cycle time should be displayed. This time should be displayed (and saved in EEPROM) regardless of how the cycle ended; whether it ended by the auto rinse out feature, by advancing out of the cycle manually, or by the cycle timing out. The display will show the "MINS", "BRINE RINSE" icons and "LSt XX" where XX would be the time in minutes of the last slow rinse cycle.



Z-Ratio (impedance ratio)

Number calculated by microprocessor on measured voltage values that are converted to a digital representation. This is the value that the control monitors in order to determine need for regeneration and salt rinse-out.



Z-Minimum (minimum impedance ratio)

Reference point that the Z-ratio is compared to, in order to initiate a regeneration. This number is reset after every successful regeneration.



Z-Increase Percent (impedance ratio increase)

During service, this number represents the percent increase or z-ratio over z-minimum. A regeneration is initiated when it reaches 7.5% or more for at least 6 minutes.



Information Function Timeout

If no key activity occurs for a period of 600 seconds (10 minutes) while in information functions mode, the mode will time out and return to the time of day display. An exception is that the flow rate and % capacity remaining will not time out but will remain displayed until a key is pressed. Pressing the "Information" key after the last standard information display will return the unit back to the time display.

Manual Control Cycling

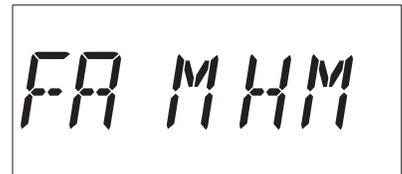
The control can be manually cycled through a regeneration to troubleshoot the control or verify that the set-up is complete. When a control is manually cycled back to the service position, the statistical counters of capacity remaining, days since last regeneration, last slow rinse time and the number of regenerations in the last 14 days and the life of the unit are not to be reset or updated. If the control is allowed to time out from the last position back to service (Home), the applicable statistical counters are to be reset or updated. A manual cycling of the control can be accomplished by following the steps as outlined below.

1. While in the service mode, press the "Information" key.
2. Press the "Up" key to display the current motor position.
3. Press and hold the "Regen" key for 3 seconds until the regeneration is started. Once regeneration is active, the "Regen" key will be ignored until the control returns to the service or "home" position.
4. The REGEN icon will flash and the motor will move the control to Backwash position.
5. Press the "Up" key to cycle to the next position and remain there until the cycle times out or the control is manually indexed.
6. Continue to press the "Up" key until the control returns to the service (Home) position. In order to step through the cycles again, repeat at step 3.

NOTE If the "Down" key is pressed at any time, the control will move back to the first item in the information menu. Pressing the "Up" key from the information menu would move the display back to the current diagnostic cycle. The "Up" key will be ignored once the control returns back to the home position.

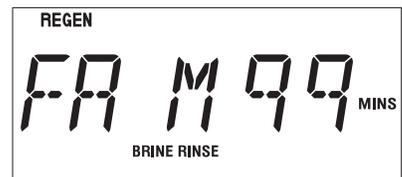
Backwash

- Press and hold the REGEN key for 5 seconds; the control should move to the BACKWASH position.
- The cycle time remaining appears at the right of the display.



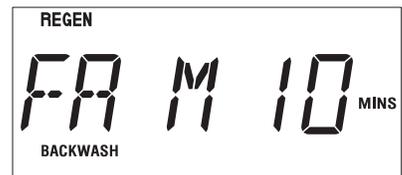
Brine Rinse

- Press the "Up" key; the control should move to the BRINE RINSE position.
- The brine rinse time is determined by the model, tank size and salt dosage (unless dip switch # 4 is on).
- The brine rinse time is calculated value.



Fast Rinse/Refill

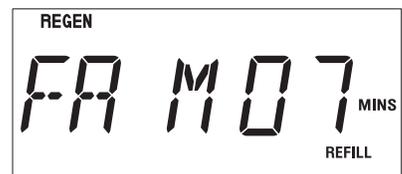
- Press the "Up" key.
- If a 4-cycle control, it will move to the FAST RINSE/REFILL position; the time is determined by salt dosage.



Home

- Press the "Up" key.
- The control will return to the Home position.

NOTE The regeneration indicator will display "F" (flow meter), "A" (Aqua-Sensor®), "t" (time clock) or "M" (manual). If the "REGEN" icon is lit, then the indicator stands for what mode initiated regeneration. If the "REGEN" icon is NOT lit, then the indicator stands for what triggered the last regeneration.



Final Start-Up

Regeneration

There are several conditions that will cause the control to trip a regeneration. The “REGEN” enunciator will light when the control has signaled for a regeneration. The “REGEN” enunciator will flash while the control is in regeneration. The following are conditions that will call for regeneration:

1. When the Soft-Minder® meter has recorded the passage of a predetermined number of gallons.
2. When the Aqua-Sensor® Probe senses the hardness in the Culler Media.
3. At the preset time, when the number of days without a regeneration is equal to the Timeclock Backup setting.
4. At the preset time, when the “Regen” button is depressed once. “Regen” will light.
5. Immediately, when the “Regen” button is depressed for three seconds. “Regen” will light and blink.
6. Immediately, if power to the unit has been off for more than 3 hours and time of day has been restored.

An override function is to exist to allow for the control to initiate a delayed regeneration if DIP switch # 6 is set to ‘delay’. To initiate the override function simultaneously press and hold the “Up” and “Down” keys for 3 seconds while in the service mode. The display will show the program of power up as “dELAY” or IMMEd” with “IMMEd” being the default.

Toggle the setting with the “Up” or “Down” key and save the setting and exit by pressing the “Program” key. If set to delayed, then after a >3hr power outage the “regen” icon will light and the regeneration will begin when the timer reaches the next programmed time of regeneration. If set to immediate, the regeneration will begin as soon as the control completes the homing cycle. If DIP switch 6 is set to “ON”, the unit will begin a regeneration immediately for instances 1 and 2. With DIP switch 6 set to “OFF”, the regeneration will not begin until the preset regeneration time.



NOTE If set to immediate mode as timeclock or timeclock backup, the unit will initiate regeneration at 12:00 AM. In the delay mode, “REG” indicator will light at Time of Regeneration and regeneration will occur at delayed time.

NOTE If set to “Delay”, the unit will NOT do an immediate regeneration when Maxcap is reached.

Recommended Meter Start-Up Procedure

- Close the main water supply valve.
- Set the Cul-Flo-Valv® to the bypass position.
- Ensure that all faucets at the installation site are closed.
- Direct the drain line discharge into a bucket where flow can be observed.
- Plug the transformer into a 120 Volt, 60 Hz, single-phase receptacle.
- Wait for the control to energize the motor and home itself.
- Set the timer to the correct time of day.
- Open the main supply valve.
- Initiate an immediate regeneration to move the control into the backwash position.
- Refer to the section on manual cycling for information on cycling the control through its positions.
- When in the backwash position, slowly shift the bypass to the soft water position until water flows.
- Allow the tank to fill slowly until water flows from the drain line.
- When flow to drain is established, open the bypass fully. Watch the drain line discharge for signs of resin. If signs of resin particles appear, reduce the flow. Increase the flow again when resin no longer appears in the discharge.
- When the unit is filled with water, return the timer to the service position and proceed with setting the microprocessor. Refer to the programming section.
- Sanitize the unit as you leave the installation site (See [“Sanitizing Procedure” on page 46](#)).
- Initiate a regeneration and allow the regeneration sequence to run to completion.

NOTE Unplugging the Culligan Gold Series™ water softener will not affect any of the control settings (the control must be plugged in for at least 10 minutes). Once programmed in, the settings will be stored indefinitely. In the event of a power failure the time-of-day setting will be stored for 12 hours maximum. If longer time storage is necessary, a battery backup is available.

Recommended Aqua-Sensor® Start-Up Procedure

NOTE You may find it useful to pre-test the sensor probe in your shop using the test detailed in the section titled "[Sensor Probe Resin Test](#)" on page 55. The same test setup can be used in the field.

- Close the main water supply valve.
- Install the sensor probe into the tank but do not connect the sensor to the control at this time.
- Set the Cul-Flo-Valv® to the bypass position.
- Ensure that all faucets at the installation site are closed.
- Direct the drain line discharge into a bucket where flow can be observed.
- Plug the transformer into a 120 Volt, 60 Hz, single-phase receptacle (make sure to connect both 24V and 2.5V properly).
- Wait for the control to energize the motor and home itself.
- Open the main supply valve.
- Initiate an immediate regeneration to move the control into the backwash position.
- Refer to the section on manual cycling for information on cycling the control through its positions.
- When in the backwash position, slowly shift the bypass to the soft water position until water flows.
- Continue backwash until the drain effluent is clear – at least 10 minutes (use a white foam coffee cup to occasionally collect a sample of backwash water; the stark white of the cup will show the presence of color throw and resin fines).
- Continue or repeat the backwash cycle if needed (while in the backwash step, you can pull the plug on the control and allow it to run as long as needed).
- After the backwash water runs clear, step the control to the Fast Rinse/Refill position to fill the brine tank and purge air from the brine line.
- Unplug the control and connect the sensor to the circuit board.
- Reconnect the power; the control will home again.
- To check the condition of the sensor, press the Information key, followed by the up key (the screen at right appears, HM alternating with the time remaining in the sensor lockout period – should be 00); with a sensor connected the A enunciator should appear in the second digit from the left.
- Press the Program key and program the control to the desired settings.
- Complete installation and cleanup.
- Sanitize the unit as you leave the installation (see "[Sanitizing Procedure](#)" on page 46).
- Initiate a regeneration and allow the regeneration sequence to run to completion.

The thorough backwashing process should have cleared the fines and color-throw from the tank. The probe should settle into the resin bed during the first couple of minutes of backwashing.

Operation, Care & Maintenance

Before Leaving The Installation Site

- **Sanitize the water softener.** See sanitizing procedure on [page 46](#).
- **Ensure that the brine tank has water** to the level of the float. Add water to the tank with a hose or put the unit into a full recharge so that the brine refill cycle will fill the tank with the proper amount of water.
- **The water heater will hold hard water for several days.** Advise the customer that the existing water volume in the tank will need to be used before the hot water is soft. If soft hot water is required immediately, refer to the water heater owner's manual for the proper method of draining the water heater.
- **Explain the operation of the softener to the customer.** Make sure the customer knows that there will be new sounds associated with the recharging of the unit. Advise the customer to periodically check and replenish the salt supply.
- **Fill in the hardness and number of people,** and then sign and date the corresponding performance data sheet. Leave the Owner's Guide with the customer.
- **Attach the appropriate data plate label** located in the Parts Pack onto the back of the control.
- **Clean up the unit and installation site,** removing any soldering, or pipe threading, residues from the equipment and surrounding area with a damp towel.

Use of Bypass Valve

Depending on where the particular installation was made, the outside sill cocks may or may not be served by conditioned water. Ideally, all lines not requiring soft water should be taken off upstream of the softener. This is not always possible, however, due to the difficulty or expense of rearranging the piping.

Bypass the softener if:

- The outside lines do not bypass the water softener and the water is to be used for lawn sprinkling or other outside uses.
- Water is not used for several days.
- You wish to inspect or work on the valve or brine system.
- A water leak from the valve is evident.

Three-Valve Bypass

To bypass, close the inlet and outlet valves, and open the bypass valve. Reverse the process to get soft water once again. Be sure to close the bypass valve completely to avoid mixing hard water with soft water.



CAUTION! If the media tank is to remain attached to the control valve, close only the inlet valve, then open the bypass valve. This will prevent pressure from increasing in the media tank due to warming.

Care and Cleaning

Protect the operation and appearance of the water conditioner by following these precautions:

- Do not place heavy objects on top of the conditioner cover.
- Use only mild soap and warm water to clean the exterior of the unit. Never use harsh abrasive cleaners or compounds which contain acid or bleach.
- Protect the conditioner and drain line from freezing temperatures.
- Reset the time, if required, after any interruption of electrical power to keep the unit on its normal schedule.

Recommended Preventative Maintenance

Sanitizing Procedure

A water softener in daily use on a potable water supply generally requires no special attention other than keeping the salt tank filled. Occasionally, however, a unit may require sanitization under one of the following conditions:

- At start-up time.
- After standing idle for a week or more.
- On private supplies, the appearance of off-tastes and odors, particularly if musty or “rotten egg” (caused by harmless sulfate-reducing bacteria).

NOTE If the water supply contains iron, regenerate the softener before sanitizing to remove iron from the resin.



CAUTION! Hazard from toxic fumes! Chlorine bleach and common iron control chemicals may generate toxic fumes when mixed.

- If the unit uses culligan softner-gard® or other compounds containing sodium hydrosulfite, sodium bisulfite, or any other reducing agent, disconnect the device feeding the chemical(s) and manually regenerate the unit before sanitizing.
- Do not use this procedure if the softener salt contains iron control additives.

1. Remove the brine tank cover.
2. Pour directly into the brine chamber 1/3 to 1/2 cup of common household bleach (5.25% sodium hypochlorite) for each cubic foot of resin in the tank.
3. Manually start recharge. Allow the unit to complete the recharge cycle automatically.

If tastes and odors return frequently, even after sanitization, a continuous chlorination system may be needed. Send a water sample to a qualified laboratory for bacterial analysis.

Analyzing the System

Analyzing the problem involves three basic steps:

1. Check the system in all cycle positions.
2. Compare the data to normal operating data.
3. Determine which component may cause the problem (troubleshooting).
4. If steps 1-3 did not reveal the problem, initiate a regeneration cycle and manually cycle the valve to brine draw (#2 position). Allow the unit to complete the brine draw cycle and observe how the system reacts.

Although it may be possible to solve a specific problem simply by changing a component, analyzing the entire system can reveal additional problems which would otherwise require extra service calls. “Parts changing” is not the same as service.

Check the System

The following tools are needed to collect data:

- Hardness, iron and chlorine test kits
- Thermometer
- Pressure gauge, 0-120 psi
- 5-Gallon bucket and watch
- Calculator

The customer can provide most data. By collecting data prior to a service call, a “first guess” about the cause of the problem can be made and the need for any special parts can be determined. If the problem is as simple as lack of salt in the brine tank, a service call may not be needed at all.

Application Problems

Many service problems are not due to equipment malfunction, but rather to misapplication or environmental conditions.

The Operation & Performance Specifications

This provides the limits of water characteristics for the Culligan Gold Series™ water softeners. If the water characteristics fall outside these limits, additional water treatment equipment may be required, or the water characteristics should be brought inside the limits. The system flow rates and exchange capacities are also listed. (See [page 2](#) and [page 3](#))

Appendix A, Table 16 - Flow Rates.

The backwash, brine, and slow rinse flows should not differ from those in [Appendix A, “Table 16. Flow Rates” on page 63](#) by more than 15%.

Appendix A, Table 17 through Table 24 - “Capacities”

This shows the gallon capabilities for each unit as a function of salt dosage. If the hardness or water usage has increased, a higher salt dosage, more frequent regeneration, or a larger softener may be needed.

NOTE The rate at which brine is drawn from the brine tank should not differ by more than 5%. The refill rate should be as close as possible to the rate shown in [Appendix A, “Table 16. Flow Rates” on page 63](#); high or low pressure installations may require the substitution of a different refill flow control.

If there are no apparent general problems or environmental problems, refer to [“Troubleshooting” on page 52](#).

Recommended Preventative Maintenance Inspection Schedule

The Culligan Gold Series water softener has been designed to provide a good, consistent service life. Routinely inspecting the system may help avoid potentially costly breakdowns related to circumstances outside of the control of the dealer and/or user.

Table 8.

Component	Suggested Inspection Frequency	Reason for Maintenance
Entire System	At Start-up, after infrequent use (idle for one week or more) or every 3 - 6 months if on a private water supply.	On private supplies, the appearance of off-tastes and odors, particularly if musty or “rotten egg” (caused by harmless sulfate-reducing bacteria) may indicate a need for the system to be sanitized. See page 46 .
Backwash Flow Controller	Every 12 months or every time service is performed on the system.	Build up of sediment, iron and/or other foreign materials (found in some water supplies but not necessarily all) could negatively affect system performance. Monitor item for normal or unexpected wear.
Brine eductor nozzle and throat	Every 12 months or every time service is performed on the system.	Build up of sediment, iron and/or other foreign materials (found in some water supplies but not necessarily all) could negatively affect system performance. Monitor item for normal or unexpected wear.
Softening Media	Every 2 - 3 years	Chlorinated water supplies can breakdown and destroy resin material. Resin material may also perform poorly if subjected to other materials (sediment, iron, alum, etc.) found in some water supplies (but not necessarily all).
Total Home Media	Replace as needed	Replace when taste and odor of chlorine can no longer be removed.

Error Codes and Alerts

The Gold control has enhanced error handling. When the control detects an error in the operation of the valve, it will make an attempt to at least try to find and stay in service position, where it will generate a specific error code depending on the type of failure as shown in the table below, as well as sound an audible beep.

Alert codes are specific to Aqua-Sensor mode and filter mode only. These do not stop the control from operating; they just alert the customer to call Culligan. Other regeneration triggers will still be valid.

When an error code is detected, the control will attempt to find and stay in service position and display the appropriate error code. If the control fails to detect service position, it will eventually stop the motor and display the appropriate error code. The error code display will have additional information indicating what the program was when the error was first detected. The appropriate regeneration cycle icon (backwash, brine rinse, fast rinse/refill, or "H" for home) will be lit indicating whether the control was in that position when the error occurred (icon not flashing), or whether the control was advancing to that cycle (icon flashing). The "Regen" icon will indicate whether the control was in a regeneration cycle or not. If the letter "P" is in the display, the error occurred during a "pre-rinse" cycle. In order to manually clear an error code (after correcting the problem), push and hold the "Program" key for 10 seconds. After the 10 seconds, the control will clear the error code, beep once, and cycle the valve to service position. Other methods of manually clearing the error code are powering down the control for 60 seconds or toggling dip#1. While in error mode, the control will not function. When returning from Error mode, the control shall use the values stored in EEPROM unless another dip switch was toggled or device program was changed. In these cases, the programmed values would revert back to the defaults.

The alert codes are cleared differently depending on which one is detected. The two alert codes are "Check Salt" and 'Change Media'.

'Check Salt' is enabled only when an Aqua-Sensor is connected and goes into effect when no brine is detected during the brine rinse cycle. If the control detects no brine during the brine rinse cycle of regeneration, it will complete that regeneration and set the control to regenerate again. If the control detects no brine during the brine rinse cycle for the second time, the "Check Salt" alert will be displayed at the end of the regeneration cycle. The control will beep every 10 minutes to alert the customer. The z-minimum statistic will not be reset at the start of service since a good regeneration did not occur, thus the Aqua-Sensor will no longer be a valid regeneration trigger. Until the alert is cleared, the control will function normally and will only accept regeneration triggers via manual button press, time clock backup or meter. The only way to clear this alert is to successfully draw brine during a brine rinse cycle.

'Change Media' is optional. It can only be enabled with the control set in Filter Mode with 'Life' option set to 'Yes'. This alert is triggered when the total gallons used reaches the media life setpoint. It can be cleared by pressing and holding the 'Regen' button for 10 seconds while at the 'Life remaining' display in information menu. After clearing the 'Change Media' alert, the total gallons and total regens information reset back to zero.

Table 9.

Error Code Description	Mode of Detection	Comments
Err 1 No cam switch action detected (motor failure to start).	If the control fails to see any switch action while trying reach the desired state within 2 minutes of driving the motor. The control will attempt to start the motor 3 times for 2 minutes each time with a 10-second 'pause' period between each attempt.	All error codes can be cleared manually by: <ol style="list-style-type: none"> 1. Pressing and holding the "PROGRAM" button for 10 seconds. 2. Powering down the control for 60 seconds. 3. Toggle dip#1 on and off. Beeping only occurs between the hours of 8:00am and 8:00pm. Beeping can be silenced by pressing any key.
Err 2 Detected the next step in the cam switch sequence when not expected (motor failure to stop).	If the control detects changes in the cam inputs that match the next step in the expected sequence when the motor is not supposed to be turning.	
Err 3 Detected a combination of switches that is not in the expected sequence (intermittent/faulty connection; misaligned switches).	If the control detects changes in the cam inputs that don't match the next step in the expected sequence.	
Err 4 Control type mismatch.	<ol style="list-style-type: none"> 1. If dip # 3 is set for '5 cycle' and 4 cycle valve is detected. 2. If dip # 3 is set for 'Gold' and 5-cycle valve is detected. 3. If one type of switch sequence is already established and the other sequence is later detected. 	

Examples of enhanced error codes:

Table 10.

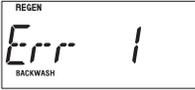
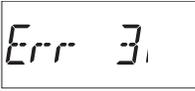
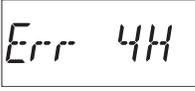
Error Code Display	What it means:
	-Err 2 -In regeneration -While in brine rinse cycle
	-Err 1 -In regeneration -While advancing to backwash cycle
	-Err 3 -In service -While in home position
	-Err 3 -In Pre-Rinse cycle -While advancing to home position
	-Err 4 -In service -While seeking home position (initializing)
	-Err 3 -In regeneration -While in fast rinse/refill cycle

Table 11.

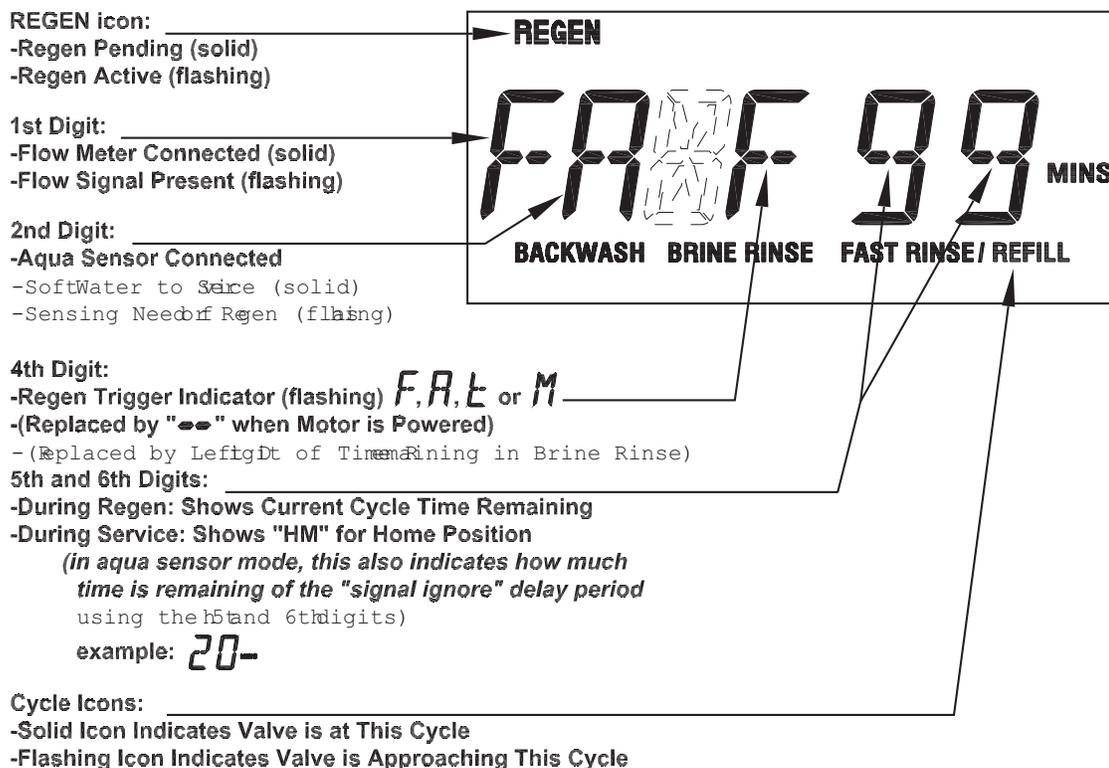
Display	Alert Code Description	Mode of Detection	Comments
CHECK SALT	A/S mode; control detected no brine during brine rinse cycle.	A very distinct signal is expected from the probe during brine rinse; lack of this signal means no brine was detected.	Once this alert is triggered, the A/S is no longer a valid regen trigger. The alert can only be cleared after a successful regeneration of the resin bed.
CHANGE MEDIA	Filter mode; total gallons equals the media life setpoint.	With 'Life' set to yes, the maxcap is the media life; once total gallons reaches this number, the alert is triggered.	Can be cleared by pressing and holding the 'regen' button for 10 seconds while 'Life remaining' statistic is displayed; resets total gallons and total regens information.

Diagnostic Functions

While in the diagnostic functions mode all keys will be active. The mode is entered by pressing the "Information" key, then the "Up" key. These functions are used to perform diagnostics on the control during regeneration. The display shows the "REGEN" icon solid (if a regeneration is pending) or flashing (if in regeneration). The display is to show Current Cycle along the bottom (4-cycle valve: Backwash, Brine Rinse, Fast Rinse/Refill; 5-cycle valve: Backwash, Brine Rinse, Fast Rinse, Refill). The program of the motor output is to be shown in the 3rd digit from the right. The center bar of the digit will light for the motor being powered. The cycle time remaining will be displayed in the two rightmost end digits along with the "MINS" icon. When in home position, the two rightmost digits will alternate displaying "HM" (with "MINS" icon off), and time remaining (with "MINS" icon on) 2 seconds each. If an Aqua-Sensor is connected, the 20-minute stabilization delay time will be displayed here after a regeneration (only if regeneration is allowed to be completed on its own). If a flow meter is attached, the far left digit will show "F" solid, and flash if the control is getting a flow signal from the flow meter. If an Aqua-Sensor is attached, the second digit from the left will show "A". The "A" will be solid for a balanced condition, and flash for an unbalanced condition. A typical display for this function is shown below.

Last Regeneration Trigger

The fourth digit from the left can be "F" (Flow Meter), "A" (Aqua-Sensor®), "t" (time clock) or "M" (Manual). If the "REGEN" icon is off, this letter stands for what triggered the last regeneration. If regen icon is on, this letter stands for what armed it.



Test Mode

In this mode the control can be put through a performance test to verify the operation of the control's components and software.

NOTE Device connections and DIP settings before entering Test Mode. Upon exiting test mode, if a device connection or DIP switch setting is different from when Test Mode was entered, the control's program settings will default accordingly.

Switching DIP #1 on from "R" (run) to "T" (test) enters Test Mode. When entering Test Mode, all current program settings, DIP switch settings and statistical data are saved. When exiting test mode, the valve will home itself. The test sequence is shown in the table below.

Table 12.

User Action	Desired Result	Functionality Tested
Switch DIP #1 on	All LCD segments on	DIP switch #1 and Test Mode Entry
Press any button	Software version displayed (ERRSUM displayed if software integrity check fails)	Software Integrity check
Press any button	Blank Display (unless devices connected)	Exit Software Integrity check
The actions below can be done in any sequence		
Switch DIP #2 on	Display to show "2"	DIP switch #2 input
Switch DIP #2 off	"2" disappears	
Repeat for each DIP #3-10	Display to show corresponding DIP number	DIP switch inputs
Press PROGRAM button	Display to show "11" and run motor for 15 seconds	PROGRAM button input and motor output
Press UP button	Display to show "12"	UP button input
Press DOWN button	Display to show "13"	DOWN button input
Press REGEN button	Display to show "14"	REGEN button input
Press INFORMATION button	Display to show "15" ("EE" displayed if EEPROM memory check fails)	INFORMATION button input and EEPROM memory check
Close "Home" Cam Switch	Display to show "H"	"Home" Cam Switch input
Open "Home" Cam Switch	"H" disappears	
Close "Position" Cam Switch	Display to show "P"	"Position" Cam Switch input
Open "Position" Cam Switch	"P" disappears	
Connect Flow Meter	Display to show "gpm" icon when connected	Flow Meter 'Detect' input
Provide flow pulses	"gpm" icon flashes when pulses are present	Flow Meter 'Signal' input
Connect Aqua-Sensor Simulator Device or Probe (probe must be in the resin bed)	Display to show "REGEN" icon when connected and "OK" if Aqua-Sensor circuitry is operating within proper range	Aqua-Sensor 'Detect' input and Digital Aqua-Sensor circuitry check
"Balance" Aqua-Sensor Simulator Device	"REGEN" icon to stop flashing within 30 seconds and "OK" indication should remain	Aqua-Sensor 'Signal' input
"Unbalance" Aqua-Sensor Simulator	"REGEN" icon to flash within 30 seconds and "OK" indication should remain	

When exiting test mode, if the dip switches or sensors have not changed, the control is to restore all values from EEPROM. If the dip switch or sensors have changed the values should reset to factory defaults. In either case the valve will home itself.

Troubleshooting Guide

Problem or Symptom	Cause	Solution
1. Unit has blank display.	A. Unit has no power.	A. Verify that unit is connected to a constant power source (Not an outlet on a switch).
	B. Defective plug-in transformer.	B. Replace plug-in transformer.
2. Softener fails to automatically initiate a regeneration.	A. Electrical service to the unit has been disrupted.	A. Verify that unit is connected to a constant power source (Not an outlet on a switch).
	B. Soft-Minder® meter not properly recording total gallons used. The flow meter connection and operation can be verified using the test mode setting on the circuit board.	B. Verify that meter cable is plugged into circuit board. Verify that meter cable is snapped into flow meter housing. Verify that flow meter has not become plugged with debris.
	C. Aqua-Sensor® probe not sensing hardness front. The Aqua-Sensor connection and operation can be verified using the test mode setting on the circuit board with Aqua-Sensor simulator.	C. Verify that Aqua-Sensor connector is properly connected to circuit board and 2.5VAC is properly connected to circuit board. Verify that Aqua-Sensor probe is working. Clean probe if necessary.
	D. Incorrect programming.	D. Refer to the 'Programming' section and verify all settings.
3. Regeneration occurs at incorrect time.	A. Timer setting incorrect.	A. Reset timer.
	B. Timer flashing.	B. Reset timer and verify that unit is connected to a constant power source.
	C. Circuit board set to immediate regeneration.	C. Set circuit board to delayed regeneration by flipping dip switch 6 to the OFF position.
	D. Incorrect programming.	D. Refer to the 'Programming' section and verify all settings.
4. Error message is displayed.	A. Jammed seal pack or brine piston (ERR 1).	A. Replace the seal pack or brine piston
	B. Defective cam microswitches or harness (ERR 1, ERR 2, or ERR 3).	B. Replace cam microswitches or harness.
	C. Defective drive motor (ERR 1).	C. Replace the drive motor.
5. Hard water to service. The root cause of hard water to service may also lead to problems such as Iron or Hardness bleed in softener.	A. Salt or Chemical storage tank is empty.	A. Add salt or chemical to storage tank and verify that proper level of salt or chemical is maintained.
	B. Eductor screen or nozzle plugged.	B. Clean or replace eductor nozzle and/or screen.
	C. Incorrect programming (Salt dosage too low for influent hardness).	C. Refer to the 'Programming' section and verify that settings are correct.
	D. Insufficient water flowing to salt storage tank.	D. Verify that refill settings are correct and clean the refill flow restrictor.
	E. Internal seal leak.	E. Replace seal pack.
	F. Excessive water usage.	F. Verify that programming is correct. For Time Clock units increase regeneration frequency.
	G. Unconditioned water in water heater tank.	G. Flush water heater to fill tank with conditioned water.
6. Loss of water pressure	A. Control and/or resin bed plugged with debris or iron build-up.	A. Clean control and increase frequency of regenerations or length of backwash. Plant recondition if necessary.
	B. Inlet manifold plugged.	B. Remove control from tank and clean inlet manifold. Check if eductor screen/nozzle are also plugged.
	C. Control plugged with foreign material broken loose from recent plumbing work.	C. Clean control.

Problem or Symptom	Cause	Solution
7. Loss of mineral to drain.	A. Improper drain line flow control.	A. Ensure that the control has the proper drain line flow control (see Table 4 on page 22).
	B. Air in water system.	B. Ensure that brine is working properly.
8. Mineral to service.	A. Control connected to tank backwards.	A. Verify that control is properly mounted to the tank.
	B. Defective outlet manifold.	B. Replace outlet manifold.
9. Water in storage tank up to float.	A. Plugged drain line flow control (Unit will not draw brine).	A. Clean drain line flow control.
	B. Plugged eductor system (Unit will not draw brine).	B. Clean eductor screen and nozzle.
	C. Slow leak to brine line. Faulty eductor piston.	C. Replace eductor piston.
	D. Power outage while control was in refill position.	D. Verify that items A-C are not the cause for the extra water in the storage tank.
10. Excessive water in salt storage tank (Water above brine valve float).	A. Faulty brine valve; float shut-off failure. When the brine valve is faulty, one of the items listed under problem 9 is also required in order to produce excessive water in the storage tank.	A. Clean brine valve, replace stem seat, or replace brine valve.
11. Unit fails to refill storage tank.	A. Refill restrictor plugged.	A. Clean or replace refill restrictor.
	B. Air in brine line causes float to slam shut (float rod is rigid).	B. Verify that all tubing connections are properly assembled.
12. Unit fails to draw brine or chemical.	A. Drain line flow control is plugged.	A. Clean drain line flow control.
	B. Plugged eductor system.	B. Clean or replace eductor screen or nozzle.
	C. Line pressure too low.	C. Increase line pressure to a minimum of 20 psi (210 kPa).
	D. Internal control leak.	D. Replace seal pack and/or eductor piston assembly.
	E. Drain line too long or restricted.	E. Verify proper drain line length. See Table 16 on page 63 and Table 4 on page 22 .
	F. Eductor is drawing air into system.	F. Verify that all tubing connections are properly assembled.
13. Unit uses an excessive amount of salt or chemical.	A. Incorrect programming.	A. Refer to 'Programming' section and verify all settings.
	B. Excessive water in storage tank.	B. Refer to problems 9 & 10.
14. Continuous flow to drain	A. Internal seal pack leak.	A. Replace seal pack.
	B. Seal pack or brine piston jammed in position.	B. Replace seal pack or brine piston.
	C. Power failure while unit was in regeneration.	C. Restore power to unit. Verify that unit is connected to a constant power source.
15. Salt water to service	A. Inadequate Brine/Rinse setting for desired salt dosage.	A. Refer to the 'Programming' section and verify all settings.
	B. Low water pressure lengthens brine draw time.	B. Increase line pressure to a minimum of 20 psi (210 kPa).
	C. Too much brine in the storage tank.	C. Refer to problems 9 & 10.

Brine System Analysis

1. WATER LEVEL in the brine tank
 - a. Empty
 - b. Below level of safety valve
 - c. At level of safety valve float
2. SAFETY VALVE in brine tank
 - a. Fiberglass rod travels up and down freely (approximately 1/2")
 - b. Fiberglass rod is rigid

If the brine system is functioning properly, there will be water in the brine tank, but the level should be below the safety valve float and the fiberglass rod should travel freely. If these conditions do not exist, one of the following conditions will indicate the nature of the problem:

- NO WATER IN BRINE TANK – ROD TRAVELS FREELY. The flow control is plugged. Remove refill flow control. Clean or replace.
- NO WATER IN BRINE TANK – ROD IS RIGID. Air or water slammed the safety valve closed before water could enter the tank. Clean parts at the base of the brine safety valve and also make sure that the seat of the check valve in the brine line is clean. Check for possible air leaks in the brining system.
- WATER IN BRINE TANK UP TO SAFETY VALVE FLOAT – ROD IS RIGID. There are two possible causes:
 - Brine piston is not in service position when control is in service or brine piston seals are defective. Remove brine line while in service. There should be no flow to brine tank.
 - Refill flow rate is too high or refill time length is too long. Check refill flow rate and compare to specification in [Appendix A, "Table 16. Flow Rates" on page 63](#).

Aqua-Sensor® Troubleshooting

The following procedure will help you diagnose problems in units equipped with Aqua-Sensor® sensing device. Because many "sensor problems" are actually regeneration problems, it contains a combination of sensor diagnostics and routine control valve and brine system checks. Refer to the ["Aqua-Sensor Troubleshooting Flowchart" on page 57](#) for the recommended sequence and [Appendix B on page 68](#) for suggested Aqua-Sensor® application guidelines.

Circuit Board Test

1. Verify there is 2.5 VAC power supply at the Culligan Gold Series™ circuit board for the Aqua-Sensor®.
2. Record program, DIP switch settings and statistical information (last slow rinse, Z ratio, Z minute and Z increase %) before beginning this procedure.
3. Unplug the unit.
4. Remove the Aqua-Sensor® cable from the board.
5. Move DIP switch(es) to Test Mode. DIP switch 1 ON, all others OFF
6. Connect Soft-Minder® Meter/Aqua-Sensor® Tester (same as the Aqua-Sensor®, P/N 01017705) to board. The color of the wire on the far right as you look at the back of the board should be white.
7. Move toggle to Balanced position.
8. Apply power; all segments should be lit on display.
9. Press any key. The software version should be displayed.
10. Press any key. Display should go blank except for solid "regen" icon and "OK" indicator. The "Regen" icon should stop flashing within 30 seconds. The "OK" indicator means the control has successfully self-tested the Aqua-Sensor circuitry. If "OK" does not appear, then replace the circuit board.
11. Toggle to unbalanced position. Regen icon should flash.
12. If regeneration icon does not flash when balanced and flashes when unbalanced, then the board is good.

Optional Service Test

If desired, the circuit board can also be tested while in the Service mode.

1. Unplug control.
2. Disconnect probe and connect Soft-Minder Meter/Aqua-Sensor® Simulator (P/N 01017705) and set to the “balanced” position.
3. Plug in the control.
4. Press the “Information” key once and then repeatedly press the “down” key until “z-ratio” is displayed. Wait 30 seconds for the reading to stabilize.
5. With the simulator device set to “Balanced”, the “Z-ratio” should read between 900 and 1130.
6. Set the simulator device to “Unbalanced” and wait 30 seconds for the reading to stabilize. The “Z-ratio” should read between 1130 and 1250.

Sensor Probe Resin Test

The Probe Resin Test uses fully regenerated, but previously used, Cullex® resin to simulate a balanced environment. Run this test only on a circuit board that has passed the Circuit Board Test with simulator device.

Preparation

You will need a container that can hold enough regenerated Cullex resin to completely immerse the probe’s electrodes without making contact with the container’s sidewall. A section of PVC pipe, either 2” or 3”, makes a suitable chamber for testing either residential or commercial probes.

1. Cut a piece of pipe about 18 inches long and close the bottom end with a cap or a flat piece of PVC (which can also serve as a base)
2. Close the other end with a cap that has been drilled and tapped for a 1” PVC pipe plug, or use a reducing adapter and plug.
3. Fill the chamber with used, regenerated Cullex resin and soft water; the water level should be at least one inch above the resin (when not in use, plug the end to prevent spillage of resin and water)

Probe Test

1. Remove the probe from the resin tank. Make sure pressure is relieved on tank before removing probe.
2. Visual inspection
 - Look for discoloration (brown film or blue spots) on electrode fins.
 - If discolored, try cleaning the probe (Sofner-Gard chemical or white vinegar). The fins can be lightly scrubbed with a soft toothbrush.

Testing

1. Set the chamber in a stand so that it is vertical.
2. Remove the top plug and lower the probe to be tested into the chamber until it bottoms, then lift it up an inch or so; the electrodes must not touch the sides of the chamber
3. Unplug the control and place the softener control into the test mode (Set Dip switch 1 to the ON) position
4. Connect the sensor to the control circuit board
5. Plug the control in again (in test mode)
6. With the probe fully immersed in the resin, the “Regen” icon should stop flashing within 30 seconds.
7. Now lift the probe so that the upper cell pair is out of the resin and water mixture; it should now be unbalanced and you should observe the “Regen” icon flashing within 30 seconds.
8. At the completion of the test, disconnect the power from the control, reinstall the sensor into the resin tank, return the control to the RUN position (Dip switch 1 in the OFF position) and set any other Dip switches to activate the desired feature(s)
9. Restore the control’s power (it will home) and reprogram to the desired settings. Put the unit into regeneration to settle the probe into the resin.

NOTE Disregard the appearance or disappearance of the “OK” indicator; this only applies to testing with an Aqua-Sensor® simulator device.

Resin and Regeneration

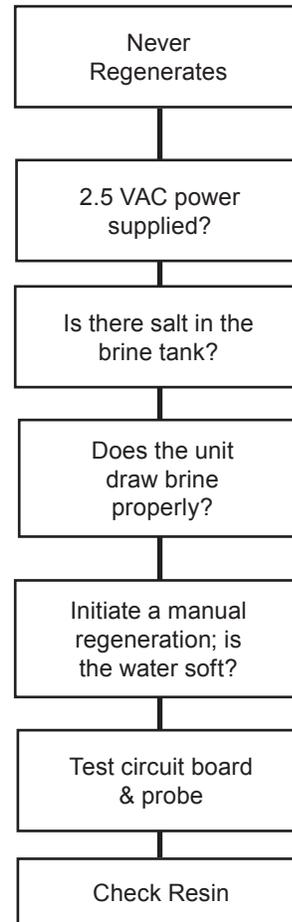
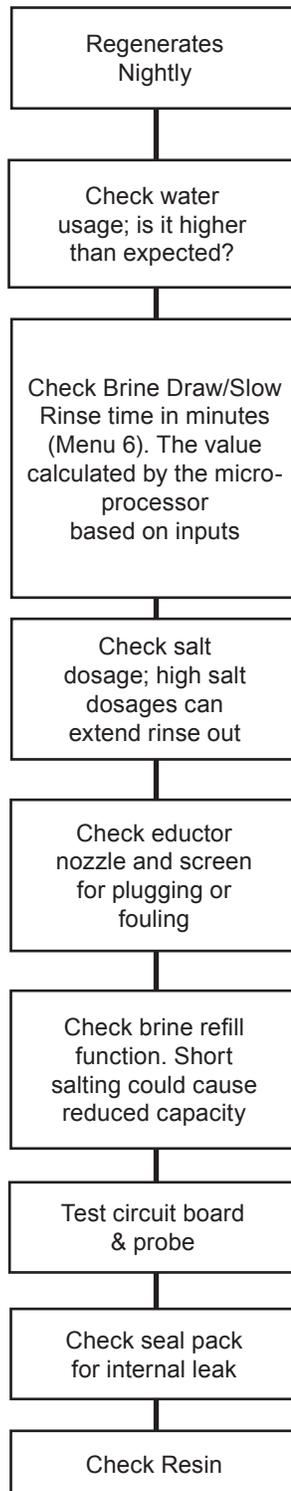
If the circuit board and the probe pass all tests, the condition of the resin or the regeneration process may actually be to blame.

1. While the probe is out of the tank, take a sample of resin and examine it for breakage (fines) and fouling.
2. Remove the power to the control.
3. Return the probe to the tank and reconnect it to the circuit board.
4. Power up the control and verify that the program matches the settings recorded at the beginning of the procedure. Also, make sure that the settings are correct for the application. It is recommended that the brine rinse time be left at the time calculated by the microprocessor automatically (increases for higher salt dosages or low inlet pressure conditions) to assure adequate rinse time. The Automatic Rinse Time feature will shorten the actual rinse time as it detects the passage of the salt from the tank. Setting the time at too short a value could prevent complete rinse-out and cause daily regeneration.
5. Backwash the unit for 2 - 3 minutes after installing the probe to eliminate any air pockets in the unit.
6. Check the unit for regeneration function (salt dosage, brine draw, rinse and refill).

Aqua-Sensor Troubleshooting Flowchart

Problem:

Diagnostics Sequence:



Circuit Board Troubleshooting

Most circuit board problems are caused by outside influences and it is not the board itself. Replacing the board may seem to work only because the cause hasn't been reproduced.

Let's start with what to check when you come upon a circuit board problem:

- 1. Are those switches aligned too far away to the cam?**
There should be a small as possible gap between the switches and the cam so that a "wobbling cam" doesn't accidentally open the switch.
- 2. Has the seal pack been checked for free movement?**
Feedback and experience has demonstrated that seal packs that are over-tightened create drag on the motor and delays that would result in an error code: If the motor never stops (still runs after the desired position is sensed, causing unexpected switch closures) OR if the motor gets stuck "timing out" and the control never sees any switch action.
- 3. Are all the wiring terminals tightly connected?**
Sometimes a loose or poorly connected wire can give feedback to the board that would result in an error code or default.
- 4. After checking all of these possibilities you should run the diagnostics (test mode) on the board.**

Listed below are some other rare circuit board behaviors and their explanations:

Board skips the service position or only stops for a second in service before advancing to the backwash position
Board has been armed for regeneration. Let the board time out of the last cycle OR reset and reprogram the board.

Motor goes round and round

Only one of two things can happen when this is the case; it can find its desired position or it gives you an error code. So, **Let It Run** until you find out which will occur.

- If the motor still runs or there is power to motor after the error code is displayed, then the triac is likely bad – change the board.
- If the error code is displayed and the motor is stopped (no power to the motor), check switches, cam and wire harness – the board got a signal it wasn't supposed to or a connection failed.

The board repeatedly defaults, resets or gains time

Look at the power supply or source. Most of these issues are caused by the power source, so-called "dirty power" having noise interference or incorrect voltage. This could be erratic fluctuations caused by other heavy power draws, poor wiring, low voltage wiring running along high voltage, having active electrical storms that causes "corruption" of the EEPROM. Consider the use of a surge protector or an uninterruptible power supply after you see this repeatedly.

If you suspect the power source is causing problems, take a voltage reading at the outlet, at the power connection on the board, and on the motor leads while the motor is running. We are looking for a consistent range of 108-132 volts at the receptacle and 22-28 volts on the board. Also, the wall transformer is only used to step down the voltage; it is not used for protection or filtering the power source.

Service

Familiarize yourself with the replacement procedures and component parts thoroughly before attempting any repair.



WARNING! Disconnect all electrical power to the unit before servicing. Bypass the unit and relieve system pressure before attempting repair.

Circuit Board

To replace the AccuSoft™ Plus circuit board, refer to the parts list and proceed as follows:

1. Remove the timer cover by unsnapping it from the back plate.
2. Unhook the circuit board mounting plate by lifting the top snap and removing from the backplate.
3. Remove all connected wire leads from the board.



CAUTION! Grip all connections to the circuit board by the connecting terminals for assembly and disassembly. Failure to do so could result in damage to the wire leads or connecting terminals.

4. Unsnap the circuit board from the mounting plate. See Figure 24.



CAUTION! Do not touch any surfaces of the circuit board. Electrical static discharges may cause damage to the board. Handle the AccuSoft™ circuit board by holding only the edges of the circuit board. Keep replacement boards in their special anti-static bags until ready for use. Mishandling of the circuit board will void the warranty.

5. The new circuit board can be installed by reversing the steps 1 - 4 above. When reassembling the mounting plate to the backplate, it is easiest to hook the top snap first and then gently push the base in until it snaps into place.



CAUTION! The wire connectors must be connected to the circuit board properly. The wires must exit the plug-in connector opposite of the raised white base of the circuit board connector.

CAUTION! Extra care should be taken when connecting the 2.5 vac and 24 vac power. Failure to connect properly will result in damage to the circuit board.

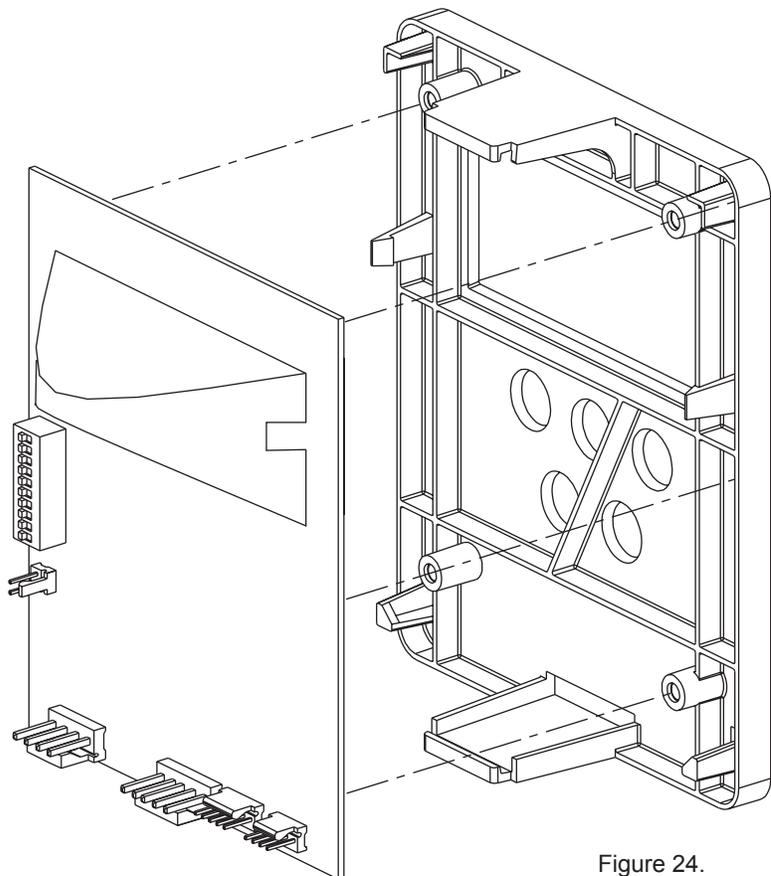


Figure 24.

Refer to Figure 25 for assembly and disassembly of the various valve components listed below.

Drive Motor Assembly

1. Remove the drive motor cam switches by removing the one screw holding the switches to the motor
2. Remove the E-ring holding the drive motor cam to the camshaft with a flat tip screwdriver.
3. Lift the cam off the shaft.
4. Remove the screw above the eductor piston assembly.
5. Loosen the two screws holding the yoke support plate and the motor to the control valve.
6. Remove the yoke support plate and yoke by gently pulling them down.
7. Fully remove the two screws holding the motor to the control. The motor will pull away from the control.

NOTE Care should be taken to not damage the brine piston if it is not going to be replaced. The brine piston will need to be twisted slightly in order to remove it from the motor die casting.

This procedure can be followed in the reverse order to reassemble the motor to the control. When reassembling the scotch yoke, the yoke must slide into the yoke support plate prior to pushing the assembly up into the piston end and follower. [Figure 26](#) shows proper assembly of the yoke into the support plate.

NOTE The seal pack may need to be repositioned in order for the follower to be inserted into the yoke, using the motor and backplate to push the seal pack fully into the valve is helpful in aligning the yoke. Make sure that the follower is in the follower slot on the yoke, and that the end of the piston rod is held in the end of the yoke.

NOTE When attaching the support plate be certain to push up on the plate until the two mounting screws bottom in the U-shaped channels of the support plate.

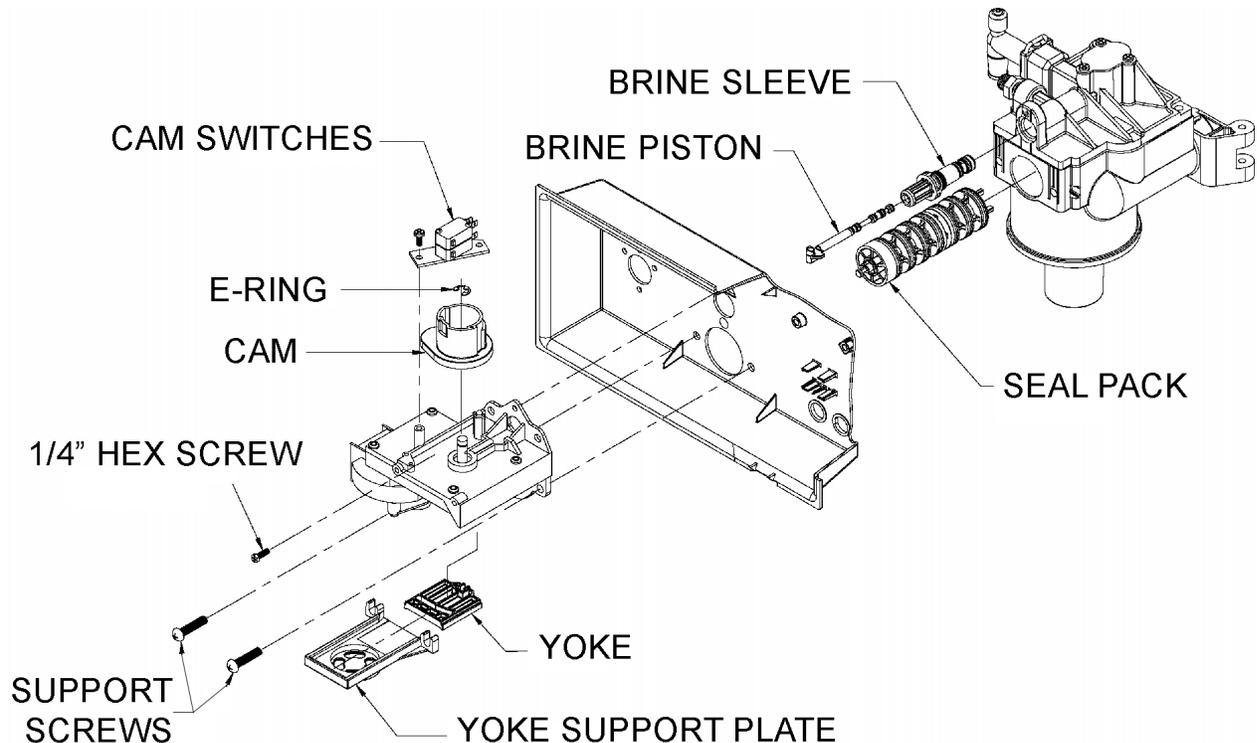


Figure 25.

Seal Pack Assembly

Follow the instructions for the replacing drive motor assembly through step 7, then continue as follows:

1. With the drive motor set aside, firmly pull the seal pack assembly from the valve body.
2. Lightly lubricate the o-rings of the replacement seal pack with silicone grease.
3. Reverse the procedure for reassembly.

NOTE Use only silicone grease; petroleum-based lubricants will cause the degradation of the rubber components.



CAUTION! Do not twist the seal pack upon insertion. This can cause the outer o-rings to pinch, cut, or crimp.

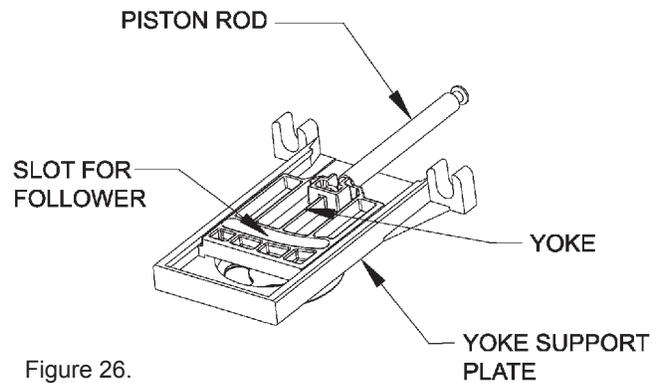
Eductor Piston/Eductor Sleeve Assembly

Follow the instructions for the replacing drive motor assembly through step 7, then continue as follows:

1. With the drive motor set aside, firmly pull the eductor piston & sleeve assembly from the valve body.
2. Lightly lubricate the o-rings of the replacement piston & sleeve assembly with silicone grease.
3. Reverse the procedure for reassembly.

NOTE Use only silicone grease; petroleum-based lubricants will cause the degradation of the rubber components.

NOTE The eductor piston & sleeve assemblies are unique to the softener, filter, and controls. Refer to the parts list to ensure that the proper assembly is used.



Wiring Schematic

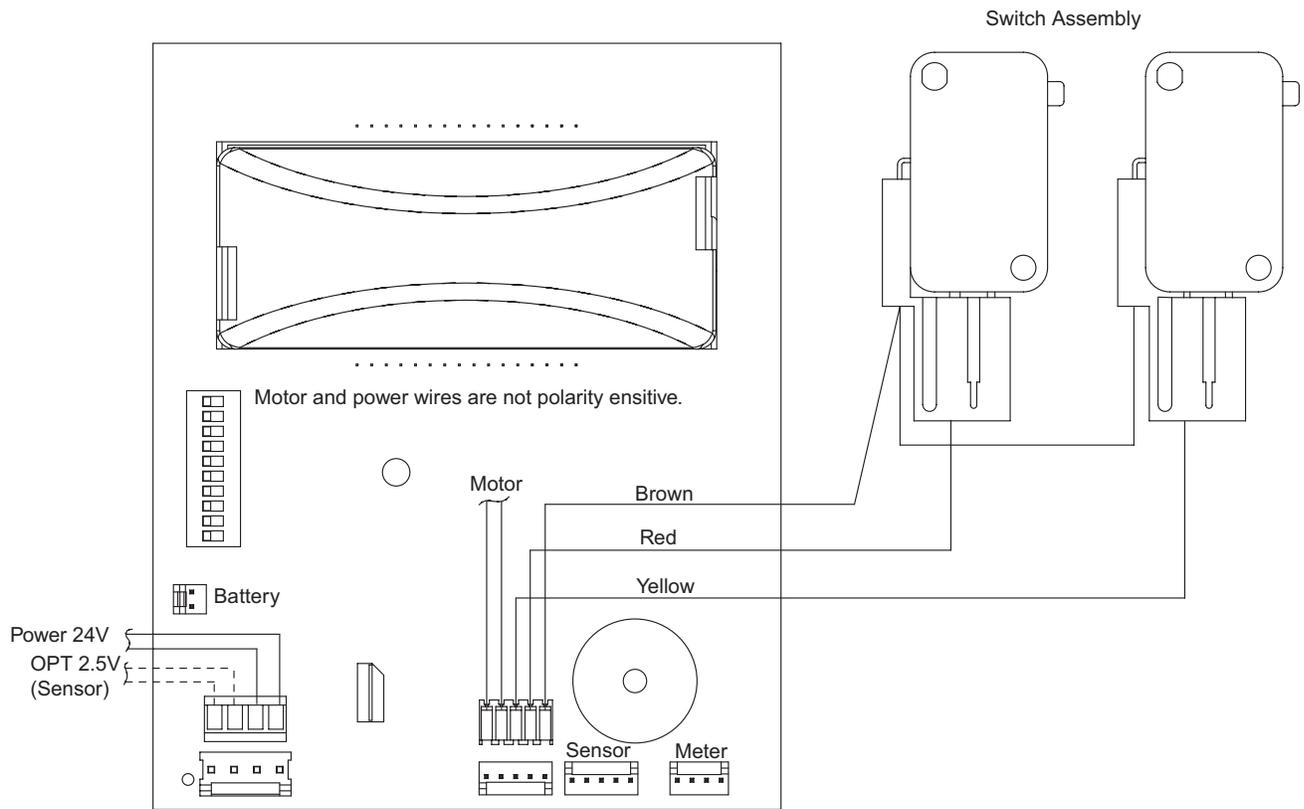


Figure 27. Rear View of Circuit Board

Appendix A System Data

Table 13. Dimension “X” is the exposed length the Aqua-Sensor® cord

Model	X	Y
9” Quadra-Hull™ Tank	34 1/2”	40”
10” Quadra-Hull Tank	30 1/2”	44”
12” Quadra-Hull Tank	32 1/2”	42”
14” Quadra-Hull Tank	22 1/2”	52”

NOTE Dimension “X” is the exposed length the Aqua-Sensor® cord (cord length from the Aqua-Sensor plug to the circuit board connector). You can then verify the Aqua-Sensor probe is inserted to the proper depth by confirming dimension “X” is at the corrected length.

Table 14. Maximum Allowable Drain Line Length

Operating Pressure	0 ft (0m)	2 ft (0.6m)	4 ft (1.2m)	6ft (1.8m)	8ft (2.4m)	10ft (3m)
30psi (210 kPa)	60 ft (18 m)	50 ft (15 m)	30 ft (9 m)	15 ft (5 m)	Not allowable	Not allowable
40 psi (279 kPa)	100 ft (30 m)	90 ft (27 m)	70 ft (21 m)	50 ft (15 m)	30 ft (9 m)	12 ft (4 m)
50 psi (349 kPa)	145 ft (41 m)	115 ft (35 m)	80 ft (24 m)	80 ft (24 m)	60 ft (18 m)	40 ft (12 m)
60 psi (419 kPa)	Normal Installation should not require more than 100 ft (30 m) of drain line			100 ft (30 m)	100 ft (30 m)	85 ft (26 m)
80 psi (559 kPa)	Normal Installation should not require more than 100 ft (30 m) of drain line			140 ft (43 m)	120 ft (37 m)	60 ft (18 m)
100 psi (669 kPa)	Normal Installation should not require more than 100 ft (30 m) of drain line			150 ft (46 m)	120 ft (37 m)	60 ft (18 m)

Table 15. Gold Series Media Volumes and Freeboard

Model	Cullex® (ft3) (A)	Cullsan (lbs) (B)	Freeboard (in)* (C)
9”	1.0	12	14.5
10”	1.5	15	14.5
12”	2.0	16	16
14”	3.0	25	20

* Measured from the top of the resin to the top surface of tank threads.

*See [page 3](#) for the Total Home Media Volumes and Freeboard.

Table 16. Flow Rates

Model	Service	Backwash/ Fast Rinse	Brine Draw	Slow Rinse	Refill
9”	9.0 gpm @ 13 psi	1.6 - 2.2 gpm	0.44 gpm	0.27 gpm	0.45 gpm
10”	9.6 gpm @ 15 psi	1.6 - 2.2 gpm	0.44 gpm	0.27 gpm	0.45 gpm
12”	10.0 gpm @ 15 psi	2.6 - 4.0 gpm	0.93 gpm	0.27 gpm	0.80 gpm
14”	10.6 gpm @ 16 psi	5.5 - 6.7 gpm	1.85 gpm	1.35 gpm	0.80 gpm

Capacities Gold Series™ Softener

Table 17. Softener Capacities for Gold 9" x 48"

Gold 9" x 48"					NaCl				KCl				"A" Dimension	
Hardness Grains	Salt Dosage lbs.	Brine Rinse Time Min.	Refill Time		Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal			
			Min.	Sec.	STD	EFF	STD	EFF	STD	EFF	STD	EFF	250 lb	375 lb
5	6	59	4	54	4567	4567	3197	4202	3654	3654	2558	3362	9 3/8	7 1/2
10	6	59	4	54	2284	2284	1599	2101	1827	1827	1279	1681	9 3/8	7 1/2
15	7	62	5	43	1666	1666	1166	1533	1333	1333	933	1226	10 7/8	8 1/2
20	8	65	6	32	1343	1343	940	1236	1074	1074	752	988	12 1/4	9 1/2
25	8	65	6	32	1074	X	752	X	859	X	601	X	12 1/4	9 1/2
30	9	68	7	21	948	X	664	X	758	X	531	X	13 5/8	10 1/2
35	9	68	7	21	812	X	568	X	650	X	455	X	13 5/8	10 1/2
40	10	70	8	10	743	X	520	X	594	X	416	X	15	11 1/2
50	11	73	8	59	614	X	430	X	491	X	344	X	15	12 1/2
60	12	76	9	48	524	X	367	X	419	X	293	X	17 3/4	13 1/2
70	13	79	10	37	455	X	319	X	364	X	255	X	19 1/8	14 1/2
80	14	82	11	26	400	X	280	X	320	X	224	X	20 1/2	15 1/2
90	15	85	12	15	354	X	248	X	283	X	198	X	X	16 1/2

Table 18. Softener Capacities for Gold 10" x 54"

Gold 10" x 54"					NaCl				KCl				"A" Dim 375 lb.
Hardness Grains	Salt Dosage lbs.	Brine Rinse Time Min.	Refill Time		Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal		
			Min.	Sec.	STD	EFF	STD	EFF	STD	EFF	STD	EFF	
5	9	60	7	21	6284	6284	4399	5781	5027	5027	3519	4625	10 1/2
10	10	62	8	10	3294	3294	2306	3030	2635	2635	1845	2424	11 1/2
15	11	63	8	59	2293	2293	1605	2110	1835	1835	1285	1688	12 1/2
20	11	63	8	59	1720	1720	1204	1582	1376	1376	963	1266	12 1/2
25	12	65	9	48	1432	X	1002	X	1145	X	802	X	13 1/2
30	13	67	10	37	1237	X	866	X	990	X	693	X	14 1/2
35	14	69	11	26	1096	X	767	X	877	X	614	X	15 1/2
40	15	70	12	15	988	X	692	X	791	X	554	X	16 1/2
50	16	72	13	4	813	X	569	X	650	X	455	X	17 1/2
60	18	76	14	42	711	X	498	X	569	X	398	X	19 1/2
70	19	77	15	31	623	X	436	X	498	X	349	X	20 1/2
80	21	81	17	9	565	X	396	X	452	X	316	X	22 1/2
90	23	84	18	47	517	X	362	X	413	X	289	X	24 1/2

Table 19. Softener Capacities for Gold 12" x 52"

Gold 12" x 52"					NaCl				KCl				"A" Dim 375 lb.
Hardness Grains	Salt Dosage lbs.	Brine Rinse Time Min.	Refill Time		Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal		
			Min.	Sec.	STD	EFF	STD	EFF	STD	EFF	STD	EFF	
5	12	56	5	36	8171	8171	5720	7517	6537	6537	4576	6014	13 1/2
10	13	58	6	4	4277	4277	2994	3935	3421	3421	2395	3147	14 1/2
15	14	60	6	32	2973	2973	2081	2735	2378	2378	1665	2188	15 1/2
20	15	62	7	0	2317	2317	1622	2132	1854	1854	1298	1706	16 1/2
25	16	63	7	28	1920	X	1344	X	1536	X	1075	X	17 1/2
30	17	65	7	56	1652	X	1156	X	1322	X	925	X	18 1/2
35	18	67	8	24	1459	X	1021	X	1167	X	817	X	19 1/2
40	19	69	8	52	1312	X	918	X	1049	X	734	X	20 1/2
50	22	74	10	16	1123	X	786	X	899	X	629	X	23 1/2
60	24	78	11	12	970	X	679	X	776	X	543	X	25 1/2
70	26	81	12	8	856	X	599	X	685	X	480	X	27 1/2
80	28	85	13	4	766	X	536	X	613	X	429	X	29 1/2
90	30	88	14	0	692	X	484	X	554	X	388	X	31 1/2

Table 20. Softener Capacities for Gold 14" x 65"

Gold 14" x 65"					NaCl				KCl				"A" Dim 650 lb.
Hardness Grains	Salt Dosage lbs.	Brine Rinse Time Min.	Refill Time		Total Capacity		Capacity to Signal		Total Capacity		Capacity to Signal		
			Min.	Sec.	STD	EFF	STD	EFF	STD	EFF	STD	EFF	
5	18	52	8	24	12889	12889	9022	11858	10311	10311	7218	9486	10 1/2
10	19	53	8	52	6630	6630	4641	6100	5304	5304	3713	4880	11
15	21	54	9	48	4655	4655	3259	4283	3724	3724	2607	3426	12
20	23	55	10	44	3654	3654	2558	3362	2923	2923	2046	2689	13
25	24	55	11	12	3654	X	2558	X	2388	X	1672	X	13 3/4
30	26	56	12	8	2582	X	1807	X	2066	X	1446	X	15
35	27	57	12	36	2252	X	1576	X	1801	X	1261	X	15 1/2
40	29	58	13	32	2032	X	1422	X	1626	X	1138	X	16 1/2
50	32	59	14	56	1690	X	1183	X	1352	X	946	X	18 3/8
60	36	61	16	48	1465	X	1026	X	1172	X	820	X	20 1/2
70	39	63	18	12	1282	X	897	X	1025	X	718	X	22 1/2
80	42	64	19	36	1137	X	796	X	910	X	637	X	24
90	45	66	21	0	1018	X	713	X	815	X	571	X	25 3/4

Culligan Total Home Capacities

Table 21. Softener Capacities for Total Home 9" x 48"

Total Home 9" x 48"					NaCl Regeneration	
Hardness	Salt Dosage	Brine Draw / Slow Rinse Time	Refill Time		Total Capacity	Capacity to Signal
Grains	lbs	Min	Min	Sec	MAXCAP	bAtch
5	5	56	4	5	3654	2558
6	5	56	4	5	3045	2131
7	5	56	4	5	2610	1826
8	5	56	4	5	2284	1599
9	5	56	4	5	2030	1421
10	5	56	4	5	1827	1279
11	6	59	4	54	1818	1272
12	6	59	4	54	1666	1166
13	6	59	4	54	1538	1076
14	6	59	4	54	1428	1000
15	6	59	4	54	1333	933

Table 22. Softener Capacities for Total Home 10" x 54"

Total Home 10" x 54"					NaCl Regeneration	
Hardness	Salt Dosage	Brine Draw / Slow Rinse Time	Refill Time		Total Capacity	Capacity to Signal
Grains	lbs	Min	Min	Sec	STD	STD
5	6	55	4	54	4189	2933
6	6	55	4	54	3491	2443
7	6	55	4	54	2992	2095
8	6	55	4	54	2618	1833
9	7	56	5	43	2440	1708
10	7	56	5	43	2196	1537
11	7	56	5	43	1997	1398
12	7	56	5	43	1830	1281
13	7	56	5	43	1689	1183
14	7	56	5	43	1569	1098
15	7	56	5	43	1529	1070

Table 23. Softener Capacities for Total Home 12" x 52"

Total Home 12" x 52"					NaCl Regeneration	
Hardness	Salt Dosage	Brine Draw / Slow Rinse Time	Refill Time		Total Capacity	Capacity to Signal
Grains	lbs	Min	Min	Sec	STD	STD
5	9	51	4	12	6128	4290
6	9	51	4	12	5107	3575
7	9	51	4	12	4377	3064
8	10	53	4	40	4010	2807
9	10	53	4	40	3564	2495
10	10	53	4	40	3208	2246
11	10	53	4	40	2916	2042
12	10	53	4	40	2673	1871
13	11	55	5	8	2573	1802
14	11	55	5	8	2389	1673
15	11	55	5	8	2230	1561

Table 24. Softener Capacities for Total Home 14" x 65"

Total Home 14" x 65"					NaCl Regeneration	
Hardness	Salt Dosage	Brine Draw / Slow Rinse Time	Refill Time		Total Capacity	Capacity to Signal
Grains	lbs	Min	Min	Sec	STD	STD
5	14	50	6	32	9882	6917
6	14	50	6	32	8235	5765
7	14	50	6	32	7058	2118
8	15	51	7	0	6354	4448
9	15	51	7	0	5648	3954
10	15	51	7	0	5083	3558
11	15	51	7	0	4746	3322
12	15	51	7	0	4351	3046
13	15	51	7	0	4016	2811
14	16	51	7	28	3823	2676
15	16	51	7	28	3569	2499

Appendix B Aqua-Sensor® Guidelines

Aqua-Sensor® Application Guidelines

Parameter	Value
Hardness (gpg as CaCO ₃)	4 - 99 (See Notes 1 & 2)
Soluble iron (ppm as Fe)	< 2 (See Note 3)
Manganese (ppm as Mn)	< 0.5 (See Note 4)
Hardness versus Salt Dosage	See Table 25 and Note 2
TDS to Hardness Index	TDS hardness (as CaCO ₃) <10 (i.e., hardness must be at least 10% of TDS; see Note 5)
Temperature, °F	Any within equipment's operating range
Alum and phosphate	Anecdotal evidence indicates potential foulant; effect has not been confirmed experimentally
Commercial cell: distance between sensing and reference cell pairs	6 inches (See Note 2)
Residential cell: distance between sensing and reference cell pairs	3 inches (See Note 2)

Hardness vs. Salt Dosage

Avoid using maximum salt dosages. The sensor doesn't require high salt dosages to operate effectively. Below is a table with suggested salt dosages at various hardness ranges. Maximum dosages defeat the purpose salt efficiency feature of the Aqua-Sensor® sensing device, prolong rinse times and daily regeneration may occur. It is also important the correct eductor nozzle is used to ensure proper salt dosages.

Table 25. Hardness vs Salt Dosage

Hardness (gpg as CaCO ₃)	Recommended Salt Dosage (lbs/ft ³)
7-10	5-6
10-15	6-8
15-25	8-9
25-50	9-11
50-75	11-12
75-99	12-16

Notes:

¹Although the Aqua-Sensor device has been used successfully on water with hardness as low as 3 gpg, there is an increased risk of missed signal (no regeneration) when the hardness less than 6 gpg.

²For each tank diameter, there is a specific volume of resin in the space between the cell pairs. The capacity of that resin is influenced by hardness and salt dosage. Any combination of flow rate and hardness that causes the hardness front to pass through that volume of resin in less than 6 minutes will result in the sensor failing to detect the need to regenerate.

³If precipitated or bound iron is present it must be removed before the softener.

⁴Manganese can deposit on the sensor electrodes, particularly on the upper pair, causing missed signals (no regeneration). Periodic cleaning may be needed to maintain satisfactory performance.

⁵Adequate signal strength has been demonstrated at ratios as high 14 but signal strength diminishes with decreasing TDS to hardness index.

Parts List

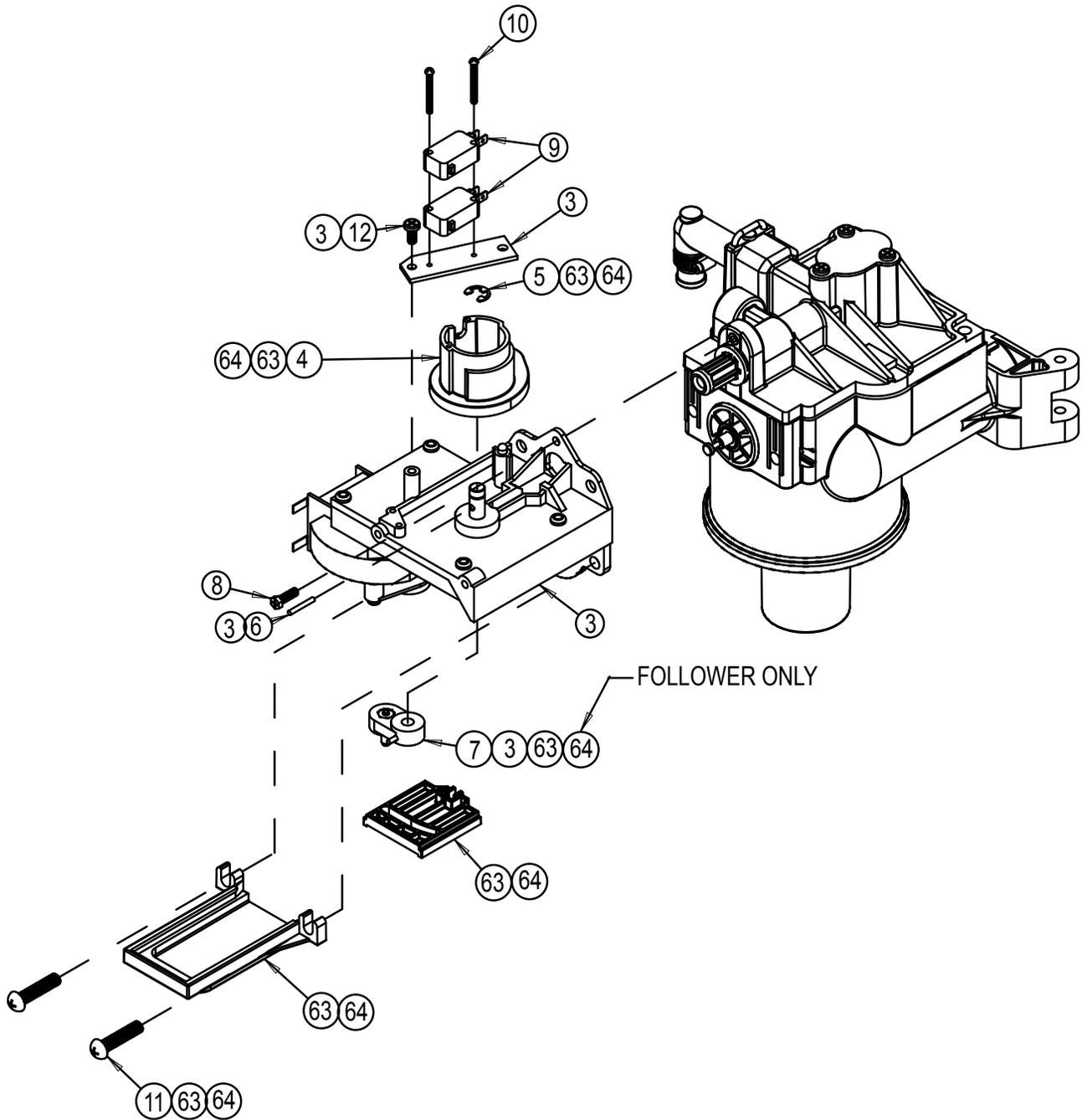


Figure 28. Gold Series Softener Valve

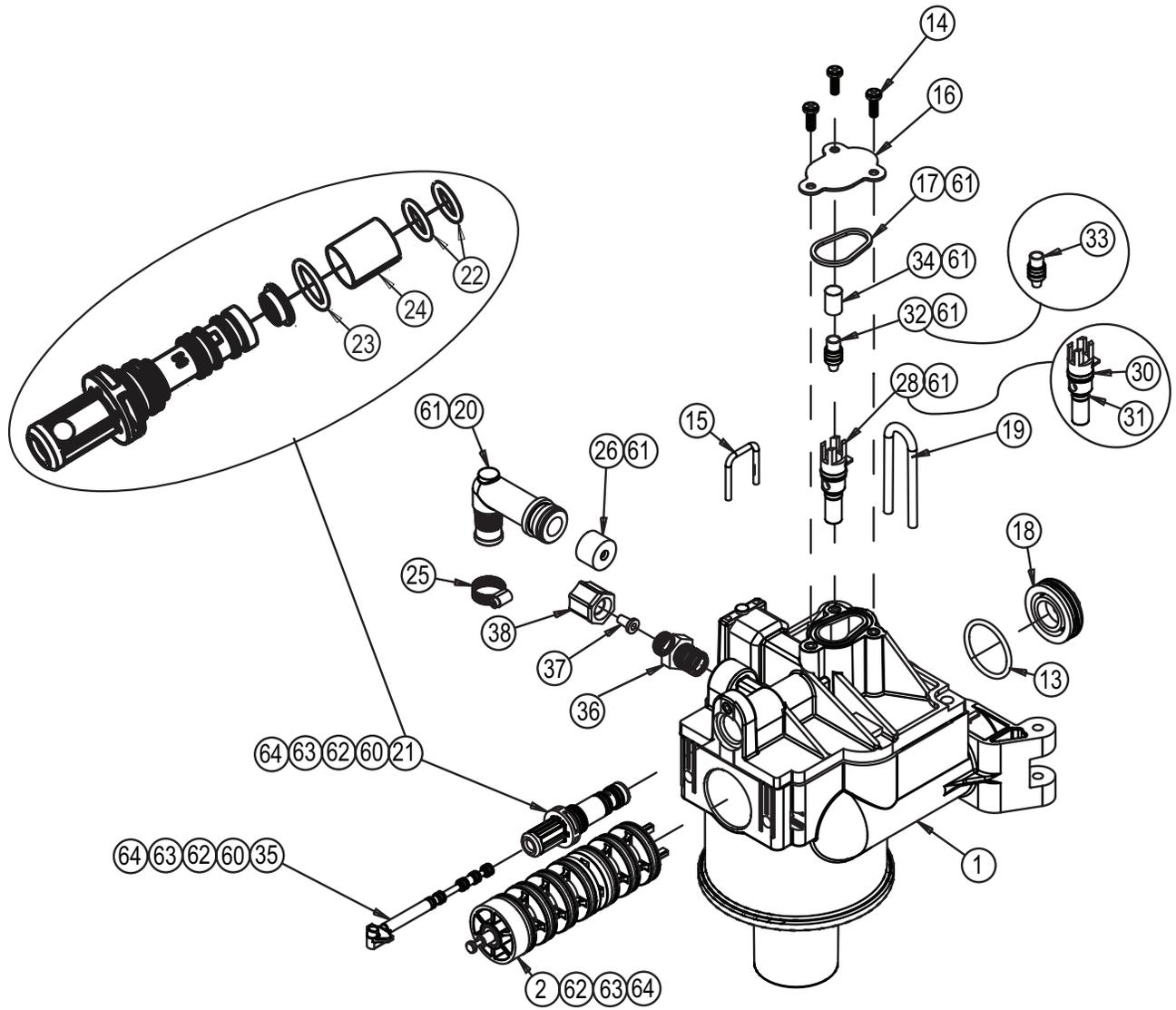
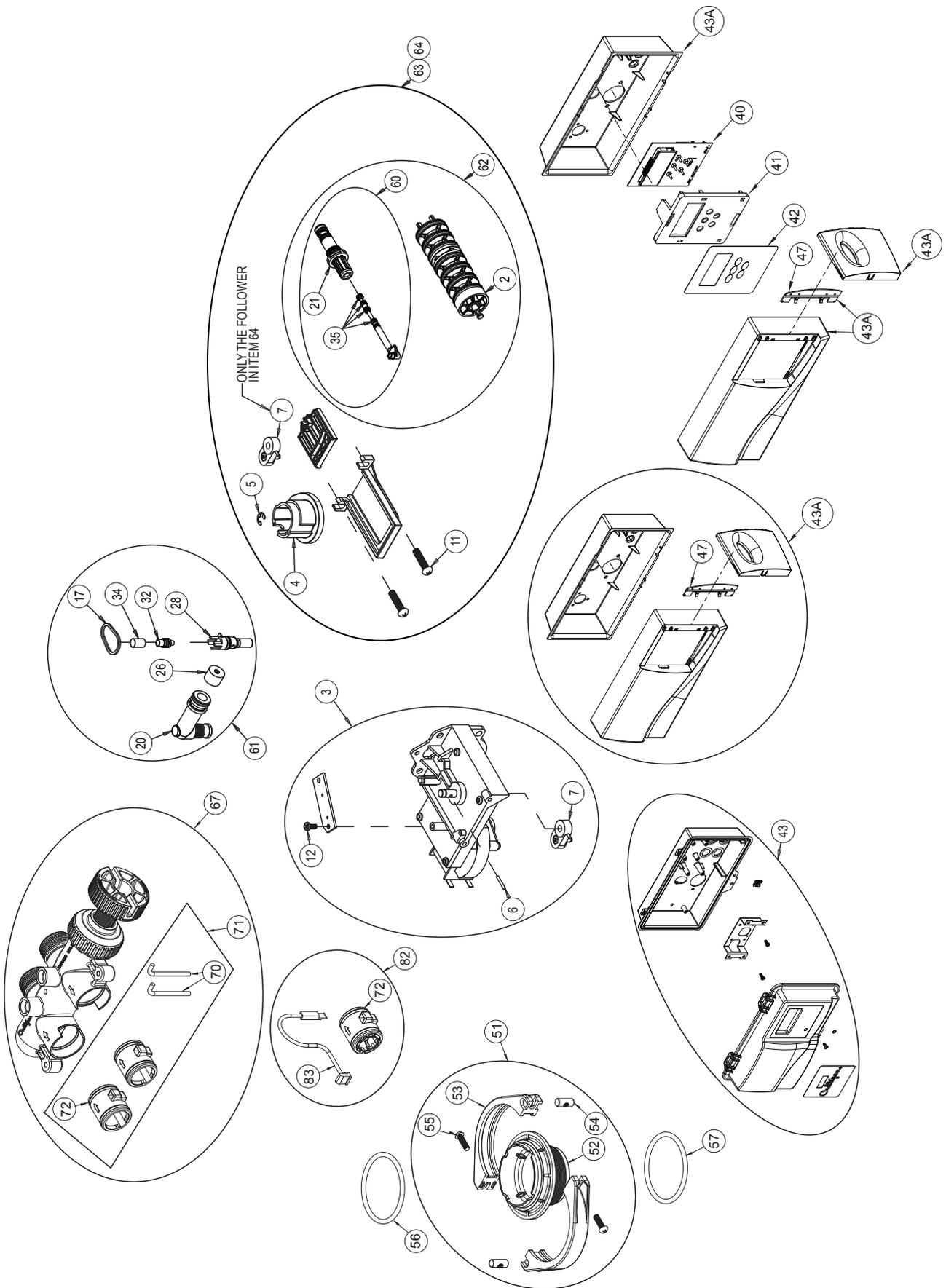


Figure 29. Gold Series Softener Valve



Power Valve Service Parts List

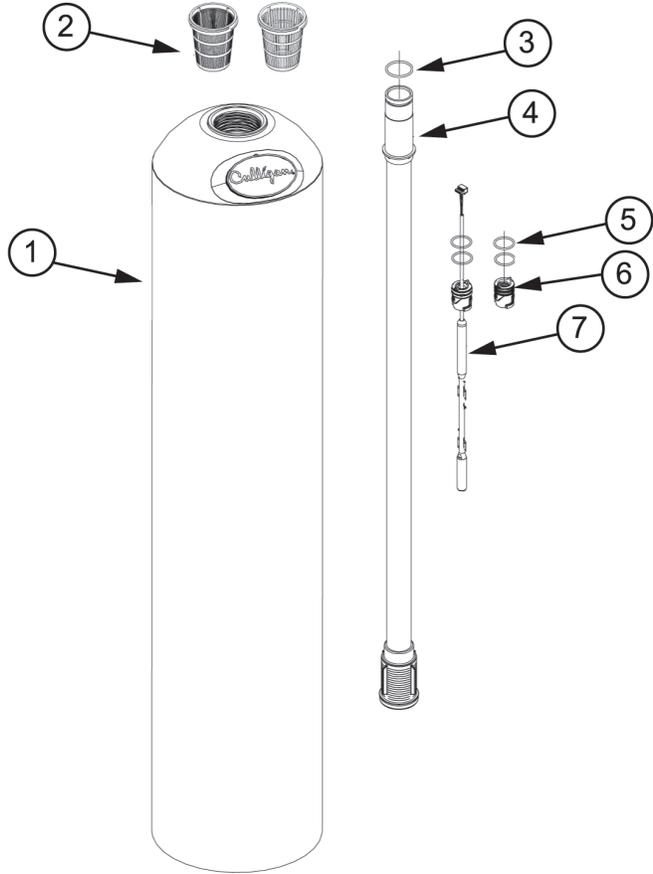
Item	Part #	DESCRIPTION	Qty/Pack
*	01018857	Gold Series Control - Complete	1 EA
*	01018920	Outdoor Gold Series Control - Complete	1 EA
1	01013976	Control Valve Body 1"	1 EA
2	01013083	Seal Pack Assembly	1 EA
3	01014179	Drive Motor Kit 24V	1 EA
4	P1013031	Drive Cam	10 EA/PK
5	P1013043	Retaining E-ring	10 EA/PK
6	P0445246	Pin	25 EA/PK
7	P1013677	Bell Crank/Follower Kit	10 EA/PK
8	P1001784	Screw, motor retaining, top	25 EA/PA
9	P1003244	Microswitch 24v	10 EA/PK
10	P0448686	Screw, Microswitch retaining	25 EA/PK
11	P0318452	Screw, Motor retaining, bottom	25 EA/PK
12	P0318455	Screw, Microswitch Plate	25 EA/PK
13	P0444914	O-ring, Rear Seal	10 EA/PK
14	P0448687	Screw, Eductor Cover	25 EA/PK
15	P0447387	Clip, Drain Elbow	25 EA/PK
16	P0401022	Eductor Cover	10 EA/PK
17	P0445797	Seal, Eductor Port	10 EA/PK
18	00448126	Plug, Body, Rear	1 EA
19	P0448128	Clip, Body, Rear	10 EA/PK
20	P1017758	Drain Elbow Assembly	10 EA/PK
21	P0448853	Repl Eductor Sleeve (Softener)	10 EA/PK
22	P0447986	O-ring, Eductor Sleeve, Small	25 EA/PK
23	P0308407	O-ring, Eductor Sleeve, Large	25 EA/PK
24	P0448750	Screen, Eductor Sleeve	10 EA/PK
25	P0451701	Hose Clamp, Drain	25 EA/PK
26	P0331634	FC Washer, 1.2 GPM Black	10 EA/PK
	P0331635	FC Washer, 2.0 GPM Brown	10 EA/PK
	P0331636	FC Washer, 3.5 GPM Green	10 EA/PK
	P0401031	FC Washer, 5.5 GPM Black (not included in Item 61)	10 EA/PK
28	P0401248	Eductor Throat, Brown (9"10"12") w/O-rings	10 EA/PK
	P1014142	Eductor Throat, Blue (14") w/O-Rings	10 EA/PK
30	P0308437	O-Ring, Eductor Throat/Plug, Large	25 EA/PK
31	P0308438	O-Ring, Eductor Throat, Small	10 EA/PK
32	P1013894	Eductor Nozzle, Blue (9", 10") w/O-ring	10 EA/PK
	P1013895	Eductor Nozzle, Beige (10", 12") w/O-ring	10 EA/PK
	P1024333	Eductor Nozzle, Green (14") w/O-ring	10 EA/PK
33	P0308438	O-ring, Eductor Nozzle	10 EA/PK
34	P0445269	Eductor Screen	10 EA/PK
35	P0447987	O-ring, brine piston	10 EA/PK
36	P1018776	Connector, Brine Line, 3/8"	25 EA/PK
	00447915	Connector, Brine Line, 1/2"	1 EA

Item	Part #	DESCRIPTION	Qty/Pack
37	P1018871	Insert, Brine Line Connector, 3/8"	25 EA/PK
	00440516	Insert, Brine Line Connector, 1/2"	1 E
38	P1002205	Nut, Brine Line Connector, 3/8"	25 EA/PK
	00440402	Nut, Brine Line Connector, 1/2"	1 EA
40	01018852	Circuit Board Kit	1 EA
41	01016476	Circuit Board Holder - Indoor	1 EA
42	P1016478	Circuit Board Decal - Indoor	5 EA/PK
43	01019709	Enclosure Kit - Outdoor	1 EA
43A	01019707	Enclosure Kit - Indoor	1 EA
*	P1014734	Wire Harness - CB Gold/Medallist	5 EA/PK
*	01017134	Power Cord - Indoor	1 EA
*	P1000372	Cord Grip (Power Cord) - Indoor	25 EA/PK
*	01018403	Cord Grip (Power Cord) - Outdoor	1 EA
47	P1014030	Hinge - Indoor	10 EA/PK
51	01014153	Adapter Assy, 1" valve to tank w/o O-ring	1 EA
52	01013958	Tank Adapter, 1" Valve	1 EA
53	P1013959	Tank Clamp, 1" Valve	10 EA/PK
54	P1013669	Tank Clamp Pin, 1" Valve	10 EA/PK
55	P0318383	Tank Clamp Screw, 1" Valve/3/4" bkt	10 EA/PK
56	P1014848	O-ring, Large, 1" Valve to Tank Adapter	25 EA/PK
57	P0440052	O-ring, 3/4"/1" Valve Adapter to ACME Tank	25 EA/PK
60	01013606	Brine Piston & Sleeve Kit	1 EA
61	01016266	Eductor Rebuild Kit (Softeners)	1 EA
62	01016267	Rebuild Kit - Brine Piston/Seal Pack	1 EA
63	01016269	Seal Pack/Bell Crank Kit	1 EA
64	01013033	Seal Pack/Brine/Cam (Softeners)	1 EA
67	01018760	Bypass Valve - 1"/1-1/4" Rotary	1 EA
*	01018249	1 1/4" Straight Through Adapter	1 EA
*	01018755	Rebuild Kit - 1"/1-1/4" Rotary Bypass	1 EA
*	P1016467	Bypass O-Ring	50 EA/PK
70	P1009075	Retaining Clip, 1" Bypass valve	10 EA/PK
71	01014033	Coupling Kit - 1" Bypass	1 Kit
72	P1009099	O-ring, 1" Couplings/Meters	50 EA/PK
*	01010783	1" Copper Adapter Kit, (1" Bypass)	1 EA
*	01016564	3/4" Copper Adapter Kit (1" Bypass)	1 Pair
*	01016565	3/4" Elbow Copper Adapter Kit (1" Bypass)	1 Pair
*	P1018757	1" NPT Female Elbow Kit (1" Bypass)	5 Pair/PK
*	P1018758	1" NPT Kit (1" Bypass)	5 Pair/PK
*	P1009856	Gasket, Copper Plumbing Adapters	25 EA/PK
82	01011188	Meter Kit - 1" w/wire harness	1 EA
83	01008070	Wire Harness, 3/4"/1" Meters	1 EA
*	01018133	Transformer, Dual Output	1 EA
*	01013839	Backup Battery, Gold	1 EA

* not shown

Tank Assembly

Item	Part No.	Description	Qty.
1	01016617	Tank Assembly, 9" w/ Fillport, Complete	
	01016618	Tank Assembly, 10" w/ Fillport, Complete	
	01017192	Tank Assembly, 12" w/ Fillport, Complete, Less Media	
	01017194	Tank Assembly, 14" w/ Fillport, Complete, Less Media	
	01016351	Tank Assembly, 9" w/o Fillport, Complete	
	01016352	Tank Assembly, 10" w/o Fillport, Complete	
	01016349	Tank Replacement, 9", w/ Fillport, Empty	
	01016350	Tank Replacement, 10", w/ Fillport, Empty	
	01016347	Tank Replacement, 9", w/o Fillport, Empty	
	01016348	Tank Replacement, 10", w/o Fillport, Empty	
2	P1009847	Top Strainer - Fine Slot (10 ea/Pack)	
	P1011195	Top Strainer - Wide Slot (10 ea/Pack)	1
3	P1009099	O-Ring, Manifold (50 ea/Pack)	1
4	01016176	Outlet Manifold - 9"	1
4	01014539	Outlet Manifold - 10"	1
4	01018846	Outlet Manifold - 12"	1
4	01016429	Outlet Manifold - 14"	1
5	P1017434	O-Ring, Plug and Sensor (10 ea/Pack)	2
6	01015122	Plug	1
7	01018763	Aqua-Sensor® Probe	1

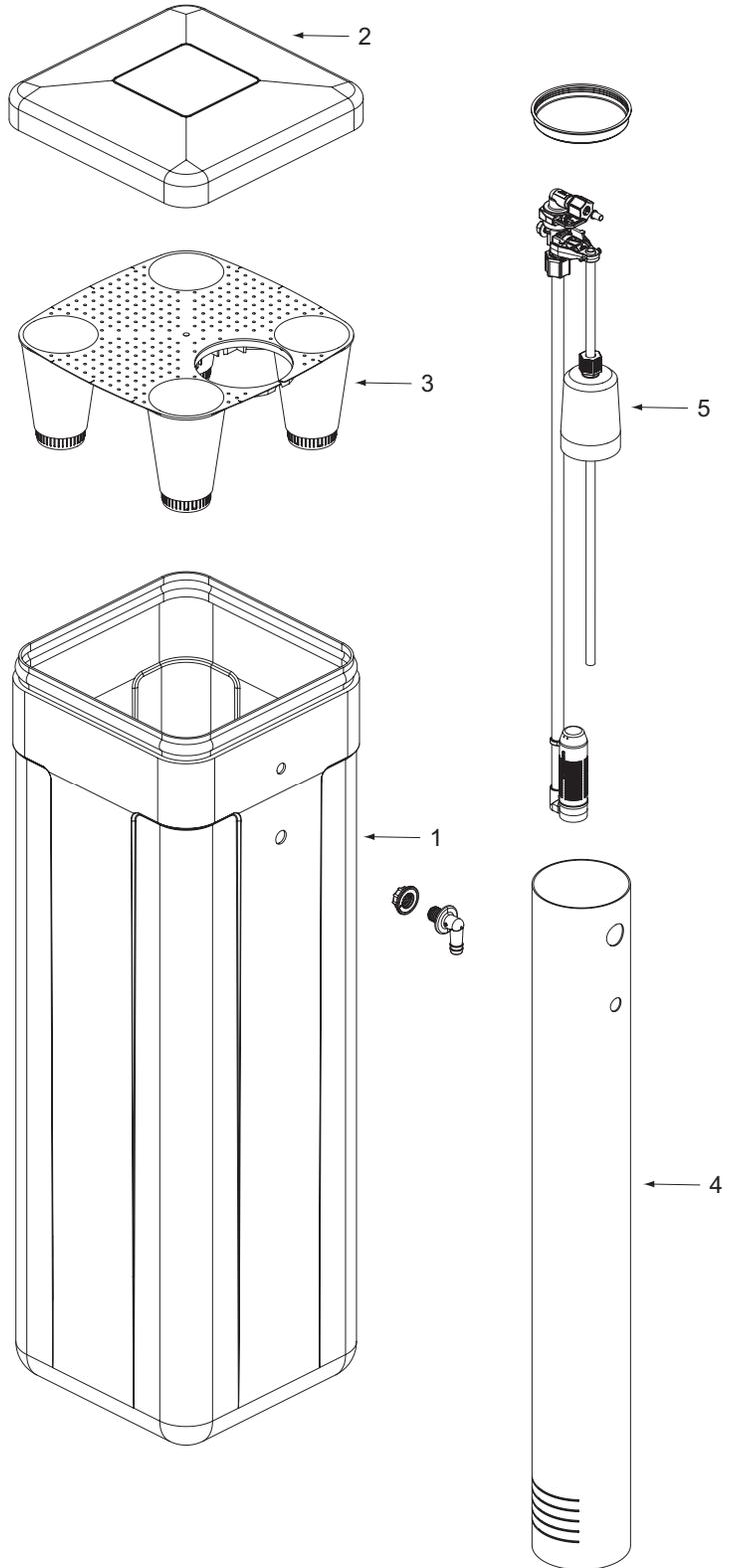


Total Home Advanced Replacemnt Media Packs (Includes, underbedding, Cullex, and Carbon)

Part Number	Description	Media Quantity		
		Cullex	Carbon	Cullsan
01019848	Culligan Total Home Advanced Media Replacement Kit for 9" Tanks (2 boxes)	0.8 ft3	6 lbs	12 lbs
01019849	Culligan Total Home Advanced Media Replacement Kit for 10" Tanks (2 boxes)	1.0 ft3	8 lbs	15 lbs
01019850	Culligan Total Home Advanced Media Replacement Kit for 12" Tanks (2 boxes)	1.5 ft3	12 lbs	20 lbs
01019851	Culligan Total Home Advanced Media Replacement Kit for 14" Tanks (3 boxes)	2.3 ft3	18 lbs	25 lbs

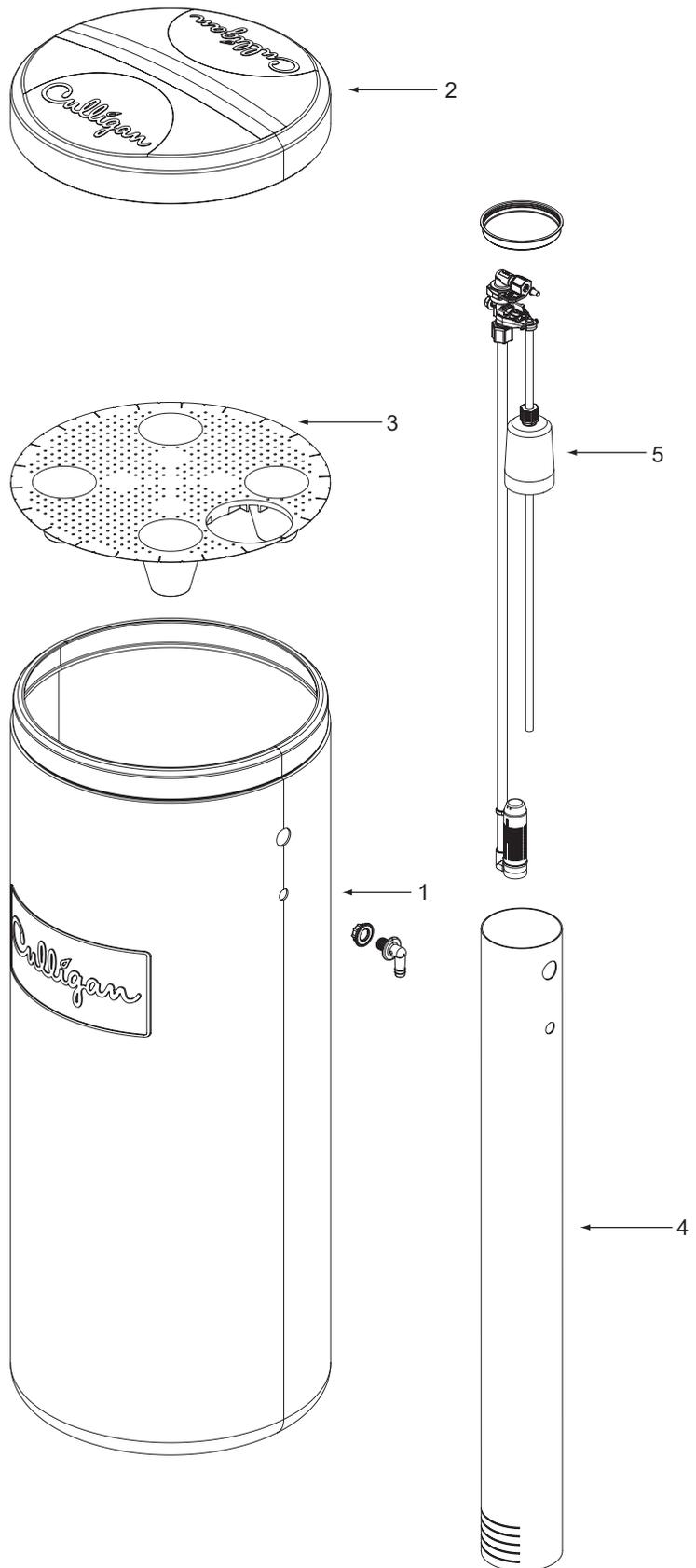
11" Brine System

Item	Part Number	Description
-	01018770	Brine System, 156 lb
1	01018769	Replacement Tank, 156 lb
2		Cover, 156 lb
3	01018764	Salt Plate, 156 lb
4		Brine Chamber, 156 lb
5	01018706	Brine Valve
6	P1020190	Overflow Fitting w/Nut (24 Each/Pack)



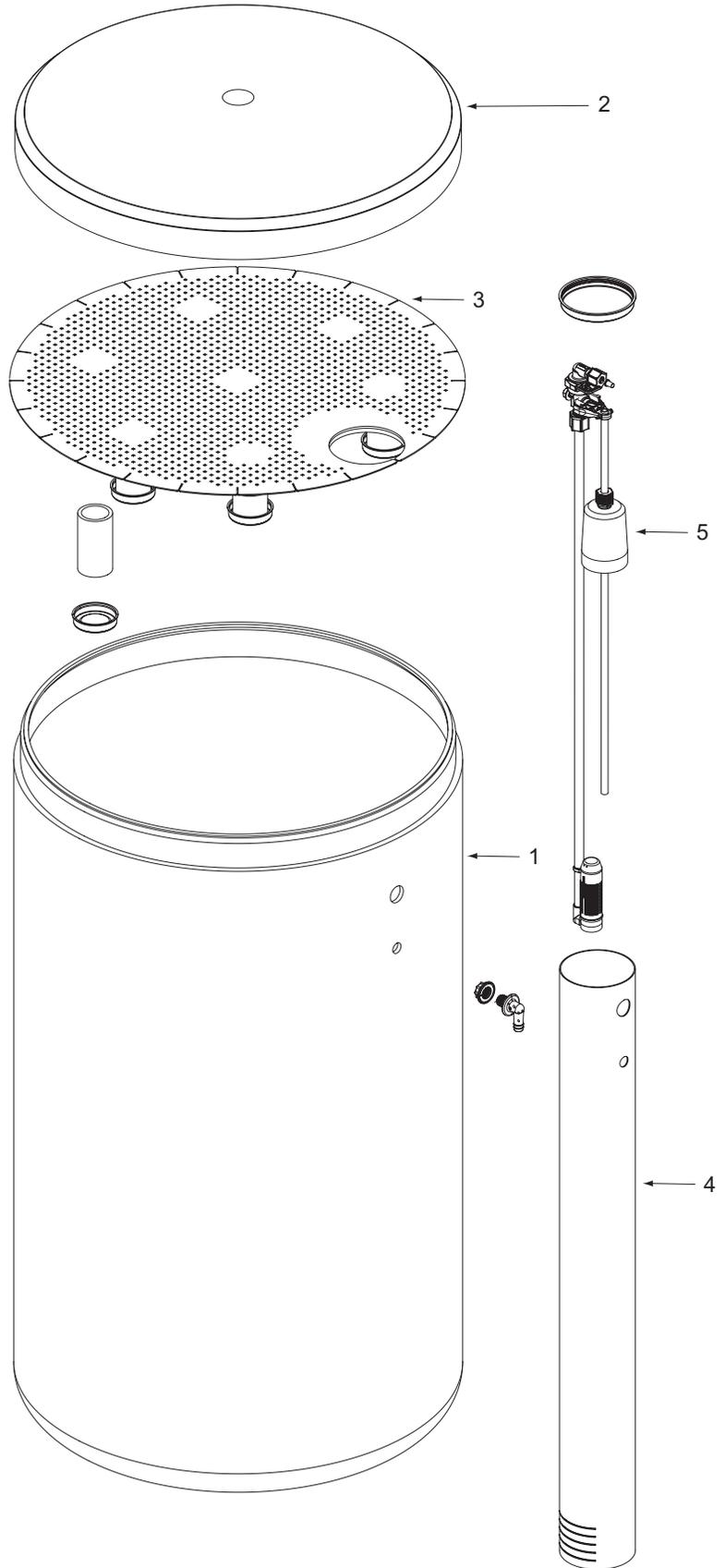
16" and 18" Brine Systems

Item	Part Number	Description
-	01018705	Brine System, 250 lb
-	01018715	Brine System, 375 lb
1	01018709	Replacement Tank, 250 lb
	01018716	Replacement Tank, 375 lb
2		Cover, 250 lb
	01018717	Cover, 375 lb
3	01018707	Salt Plate, 250 lb
	01018713	Salt Plate, 375 lb
4	01018708	Brine Chamber, 250 lb & 375 lb
5	01018706	Brine Valve
6	P1020190	Overflow Fitting w/Nut (24 Each/Pack)



24" Brine System

Item	Part Number	Description
-	01018720	Brine System, 650 lb
1	01018718	Replacement Tank, 650 lb
2	01018719	Cover, 650 lb
3	01018714	Salt Plate, 650 lb
4	01018708	Brine Chamber
5	01018706	Brine Valve
6	P1020190	Overflow Fitting w/Nut (24 Each/Pack)



Brine Valve

Item	Part No.	Description
-	01018706	Brine Valve
1	01018710	BLFC Elbow - 0.45 gpm
	01018711	BLFC Elbow - 0.8 gpm
2	P1020194	Brine Well Cap - 24 Pack
3	P1020196	3/8" Compression Nut - 24 Pack
4	P1018871	3/8" Insert - 25 Pack
5	P1020191	Retaining Clip - 24 Pack
6	P1020192	Pin - 24 Pack
7	P1020193	5/16" Nut - 24 Pack
8	P1020190	Overflow Fitting w/ Nut - 24 Pack
9	P1020195	3/8" Nut - 24 Pack
10	P1020198	Air check Assembly - 24 Pack
11	P1020197	Float - 24 Pack

