2401S

Installation & Service Manual

Erie™

Water Treatment Controls

— A Division of Aquion Partners L.P.

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Control Specifications

Agency Approvals

The control complies with the rules of the FCC, applicable to residential water softeners.
The control meets UL and CSA requirements for residential water softeners.

Power Requirements

The control receives power from an external wall mount or plug-in transformer. The factory or the manufacturer will supply the transformer.
Voltage: The voltage supplied to the control is 24V AC.
Frequency: Line frequency is 50 Hz or 60 Hz.

Temperatures

Operating Range: The ambient air around a computer board must not exceed 50°C (122°F). The computer board operates down to 0°C (32°F).
Storage Range: The control can be stored at temperatures from -20°C (-4°F) to 70°C (158°F).
Humidity: The control operates properly with relative humidity from 10% to 95%, non-condensing.

Environmental Requirements

EMC: The control meets international standards for electromagnetic compatibility (EMC). It has been tested by an independent laboratory to be in compliance with CE requirements. It is resistant to electrical noise and will not emit levels of RFI (Radio Frequency Interference) that could disturb nearby electronic devices.
Location: The water softener and control cannot be exposed to outdoor elements, such as direct sunlight or atmospheric precipitation. The system may be installed in a covered, open-air structure such as a carport, residential or commercial building. Weather covers are also available through the Order Department, part number 72370.

Installation Instructions

1. Before You Begin

Read these instructions from beginning to end before proceeding with installation.

- Maximum working temperature is 100°F.
- Use a hand truck to transport the unit. To prevent accident or injury, do not hoist the unit over your shoulder.
- Do not lay the unit on its side.
- Wear safety glasses and work gloves.

2. Test Raw Water

Test the customer's raw water for hardness, iron, pH and/or any other element/ contaminant that could affect this system's performance.

3. Check the Water Pressure

Use a pressure gauge to confirm that the water pressure does not exceed 100 psi. If the water pressure exceeds this limit, install a pressure regulator on the inlet pipe of the unit. The minimum pressure for a conditioner is 25 psi. 60 psi is the optimum operating pressure.

4. Locate a Site for the Unit

There are two primary needs for a site:
the main water source and a drain.
Locate the conditioner as close to the main water source as possible, so that you do not miss any water outlets. If possible, bypass any outside faucets. The drain may be a floor drain, a sewer trap, utility sink, vent stack, dry well, etc., depending on local plumbing codes.

- Place the unit in the desired location on a level, smooth, clean surface.
- If located outdoors, protect the unit from direct sun or freezing temperatures, which can damage the unit.

5. Turn off the Water and Drain the Pipes

- Turn off the water at the meter or the pressure tank.
- Drain all pipes. Do not sweat pipes with water in them, steam will damage the plastic parts in the valve.
- To drain the plumbing system, open all faucets in the house including the toilets. This will allow air to enter the plumbing system. The water will drain out of the lowest faucet or outlet.

6. Bypass the Outside Faucets

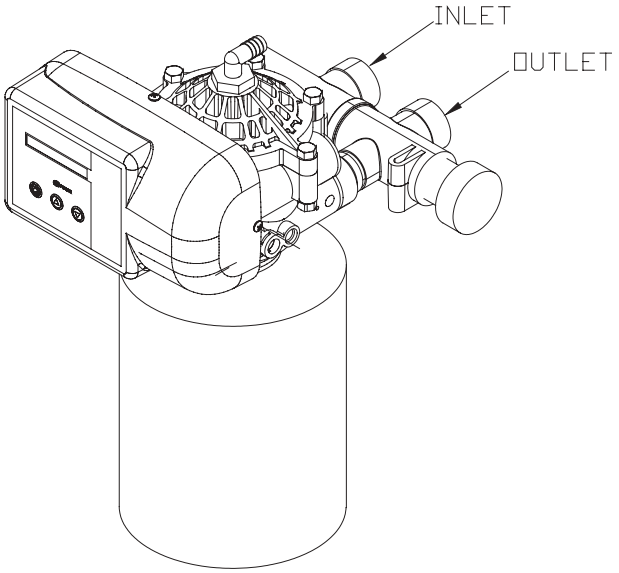
Install plumbing pipes to bypass outside faucets (if the customer requests). This may not be possible in a slab home, where the plumbing is buried in the foundation. If it is not possible, provide an untreated hose bib on the inlet pipe.

7. Connect the Plumbing to the Bypass Valve and Brine Tank

- Do not point the soldering torch directly at the system. The material will last many years, within normal operating temperatures, but will melt in a torch flame.
- To prevent hot water from backing up in the conditioner, avoid short connections of pipe between the conditioner and the hot water heater. If you can't avoid a short connection, move the equipment to another location. As a last resort, install a check valve. If this causes "water hammer", install a water hammer suppressor.

Connect the raw water pipe to the **INLET** pipe connection of the bypass valve. When looking at the front of the unit, the **INLET** is the pipe connection on the left side of the valve.

Connect the treated water pipe to the **OUTLET** pipe connection of the bypass valve. When looking at the front of the unit, the **OUTLET** is the pipe connection on the right side of the valve.



If treating only hot water, install a drain valve between the conditioner tank and hot water heater, so that the water can be tested for hardness before entering the hot water heater (especially older tanks).

8. Turn on the Water and Test for Leaks

Close all faucets that were opened in **Step 5**.

Turn the water back on at the water meter or pressure tank.

- Check for leaks.
- If there is a leak, drain the plumbing again before soldering.
- Test to confirm that the unit is softening the water.

9. Run the Remaining Hard Water from the Plumbing

To flush out the pipes, turn on all the faucets in the house and flush the toilets (approximately two to three minutes per faucet).

- To empty the hot water heater of untreated water, run hot water in the bathtub until the water runs cold.

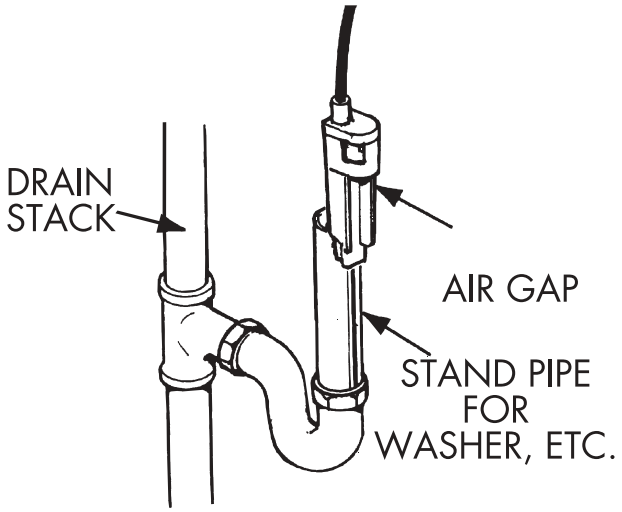
10. Test Hot and Cold Water

Test hot and cold water for hardness. Older hot water heaters may have calcium deposits in them, which could affect your test results.

- If only hot water is treated, test the water at the drain valve (installed between the unit and the hot water tank).

11. Install Drain Line and Air Gap (air gap not included with unit)

Connect the drain line to the drain outlet on the left side of the valve. This connection is a 1/2 " inch female pipe thread. To attach a drain line, a fitting is needed to connect from the female connection to the drain line. **Note: This line operates under pressure, so it may be installed higher than the conditioner.**
Run this line to the air gap/drain.



Note: A suitable air gap should be used between the end of the drain line and the drain to prevent possible back siphoning. The air gap should always be a minimum of two times the diameter of the drain line. Be sure to check local plumbing codes, area regulations may differ.

Important Control Information

Program Levels:

To enter any of the program levels featured on the 2401S, the control must display the time of day and gallons remaining (Service Mode).

The 2401S has four program levels available:

1. The Installer's Level

The Installer's Level is for trained personnel only. To access this level, you must provide the five key sequence code located on page 8. Please refer to pages 8-12 for programming information.

2. The Manufacturer's Level

The Manufacturer's Level is for trained personnel only. To access this level, you must provide the six key sequence code located on page 13. Please refer to pages 13-14 for programming information.

3. The End User's Level

This level does not require a special code to access. Please refer to page 15 for programming information.

4. The Diagnostic Level

To access this level, press and hold the up arrow for five seconds. Please refer to page 16 for information on the Diagnostic Level.

Power On LED

A green LED, near the keypad, is ON when power is applied to the control and the microprocessor is operating properly.

Service Required

If this message displays in the window of the control, a fault has occurred on the board (also know as a corrupt signal). In most cases, reprogramming the board will clear this message from the window. If the screen does not clear, other checks must be made to the switches, boards and parts.

Important Control Information (continued)

Blinking Digits or Message

Digits or a message blinking at the rate of 0.5 seconds ON and 0.5 seconds OFF indicates that these digits can be changed/edited. A message flashing at a rate of 1 second ON and 1 second OFF cannot be changed. Pressing and releasing the **UP ▲ ARROW** or **DOWN ▼ ARROW** can change the blinking digits or the message. The user can increase or decrease the values by using the two arrow keys.

Real-Time Clock

A real-time clock maintains the time of the day when line power is applied to the control. The time of day is maintained by a super capacitor for a minimum of 2 hours following the loss of line power. Corrupt Memory registers and records this error to non-volatile memory.

Corrupt Real-Time Clock

If line power is lost for an extended period, the super capacitor will lose its charge and the real-time clock will stop operating. When line power returns, the clock will blink, indicating that the clock needs to be set to the correct time. The clock will activate from 8:00 AM, until the clock is set to the correct time. After the time has been set, the colon flashes to indicate that the clock is operating properly. The corrupt memory registers and records this error to the non-volatile memory.

Non-Volatile Memory

The computer board configuration parameters are saved in non-volatile (E^2PROM) memory that has a minimum of 100,000-erase/write-cycle capability. The non-volatile memory is used for storage of information. The storage of information will stay in memory in the event of a power outage. **Example:** The Hardness, Capacity or Volume settings are the types of settings stored in the non-volatile memory.

In the occurrence of a power outage, the non-volatile memory will hold this important setting information. The time of day, however, will need to be reset if the power interruption has lasted longer than two hours. The non-volatile memory is not programmed to store the time of day and in most cases, the super capacitor will last only two hours.

Corrupt Manufacturer's Mode, Installer's Mode and Diagnostic Mode Parameters

This corrupt mode signifies that somehow the board received an incorrect signal and rejected that signal. The board is now put on notice that there was a mistake made. The corrupt memory will register and record the error to the non-volatile memory. If any of the parameters, except Valve Type, Meter Type or Duplex Type become corrupt, the default for the corrupted parameter will also be saved in the non-volatile memory. The number of corruptions can be read in the Diagnostic Level.

Measurement Units

Both English-US and Metric units can be programmed into the control. When the manufacturer selects English-US units, the volume is displayed by "GL" (gallons) and the flow rate is indicated by "GPM" (gallons per minute). "GL/d" (gallons per day) indicates the average volume and the time is displayed in a 12 hour AM/PM format. When the manufacturer selects Metric units, the volume is displayed by "L" (liters) and the flow rate is indicated by "L/m" (liters per minute). The average volume is indicated by "L/d" (liters per day) and the time is displayed in a 24 hour format.

Flow Input (Meters)

Standard Meter: The meter produces 108 pulses per one gallon of flow and 29 pulses per liter of flow. The maximum pulse rate is 54 per second, corresponding to a maximum flow rate of 30 GPM.

Secondary Meter: The control can be programmed for a non-standard meter (this is a non Hall-effect type meter) and is called a volume/pulse setting on the control (100 gal/per pulse). **Note: The factory selects a "K" factor for the meter. For English-US, the "K" factor defines the number of gallons per pulse. For Metric, the "K" factor defines the number of liters per pulse. The default setting is 100.**

Holiday Mode

Regeneration is not allowed when the control is in the holiday mode. The word HOLIDAY will blink when scrolled to on the control board. After sixty seconds, the unit will enter the holiday mode. The only way the unit will exit the holiday mode is when a flow rate greater than 1.5 gallons per minute has been detected or if an immediate regeneration has been started. You may also manually scroll out of the holiday mode as the last way to exit. After exiting the holiday mode, the unit will go into an immediate regeneration.

Override Counter

If the override parameter is set to "OFF", the days to override counter will not be used to initiate regeneration. The days to override counter is always used to initiate regeneration when "No Meter" has been selected. If days to override is programmed with a meter, the override will only initiate regeneration if the meter has not recorded enough water usage.

Regeneration Level

When a regeneration in progress is aborted, the valve is cycled to the service position. If the aborted regeneration was initiated by the control (not manually initiated), the regeneration is restarted after a 60 second delay. **Example:** A power outage is an aborted regeneration. If a manual regeneration is aborted, there is no back up regeneration.

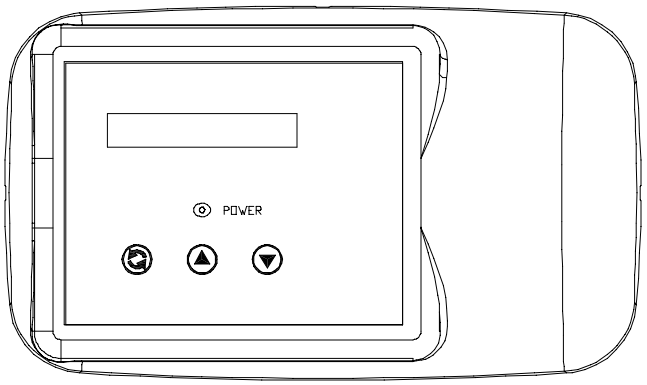
Regeneration

Once an immediate regeneration is requested, a complete regeneration must occur to clear the request. Once regeneration starts, it must finish or the board will not clear. If the regeneration is aborted and the request is not cleared, another immediate regeneration will occur. Manually walk (scroll) the control through a regeneration to clear the board.

High-Speed Motor Operation in the Regeneration Mode

High-speed motor operation is achieved while stepping the control through the regeneration cycle. Pressing the scroll button a second time, while in regeneration, activates the higher speed.

Programming the Control



Key Buttons:

SCROLL

UP ARROW

DOWN ARROW

The manufacturer of the system will program the control to either a **Hardness** or **Volume** setting. To change this setting or any of the system defaults, see pages 13-14 for factory programming information. If you are unsure of which setting the manufacturer has chosen (**Hardness** or **Volume**), the following steps will help you to determine which programming pages to use.

Enter the Installer's Level by pressing and holding the **DOWN ARROW** for 5 seconds. The control will display:

System Check

Within 10 seconds, enter the Installer's access code:

DOWN ARROW
DOWN ARROW
SCROLL BUTTON
DOWN ARROW

If the control displays **System**, the control is programmed for a **Hardness** setting. See pages 8-10 for programming.

If the control displays **Capacity**, the control is programmed for a **Volume** setting. See pages 11-12 for programming.

The Installer's Level

System (Hardness Setting)

Verify that the control valve is in the **Service Mode**. The control will display:

Time of Day	GL Remaining

Press the **DOWN ARROW** and hold it for 5 seconds until the control display shows:

System Check

Within 10 seconds, enter the Installer's access code, by pressing in the following key sequence:
DOWN ARROW
DOWN ARROW
SCROLL BUTTON
DOWN ARROW

The control is now in the Installer's Level. Use the **SCROLL button** to advance through the different settings.

Programming options menu:

1. System:

The control will display:

System	24000 Grn

Press the **UP ARROW** or **DOWN ARROW** to set the softening capacity, between regenerations, in increments of 1000 Grn.

Press the SCROLL ⟲ button to advance to the next setting.

2. Hardness: Enter the customer's current water hardness

Note: The hardness function is not programmable if "Metric" was selected in the Manufacturer's Level.

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the water hardness between 0 and 99 grains.

Press the SCROLL ⟲ button to advance to the next setting.

3. Reset Flow:

Note: Not available if "No Meter" was selected in the Manufacturer's Level.

The control will display:

To select YES, use the **UP ▲ ARROW** or **DOWN ▼ ARROW**. The peak flow rate is set to 0 and the average volume per day is set to 25% of the capacity.

Press the SCROLL ⟲ button to advance to the next setting.

4. Reserve Capacity:

The control will display:

To adjust the reserve, press the **SCROLL ⟲ button**. Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the reserve capacity in increments of 10 gallons; up to 40% capacity of the system.

If a **Variable Reserve** is desired press the **UP ▲ ARROW** or **DOWN ▼ ARROW**.

The control will display:

The reserve capacity will be calculated automatically, based on the registered daily water consumption.

The default setting is 25% of the capacity, + 75 gallons.

Press the SCROLL ⟲ button to advance to the next setting.

5. Time of Regeneration:

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the time of regeneration.

Press the SCROLL ⟲ button to advance to the next setting.

6. Days Override:

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the maximum number of days between regenerations from "OFF" to 30 days (max. limit).

Press the SCROLL ⟲ button to advance to the next setting.

The Installer's Level
(continued)

7. Cycle 1:

The control will display:

BACKWASH: 10 min

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the length of the backwash cycle from 0 to maximum 99 minutes. When iron or hardness is present, the backwash time should be extended 5 to 15 minutes, based on experience. **Note: In most applications, the factory settings are adequate and will not need adjustments.**

Press the SCROLL ⟳ button to advance to the next setting.

8. Cycle 2:

The control will display:

BRN/RNS: 60 min

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the length of the brine/slow rinse cycle from 0 to maximum 99 minutes.
Note: In most applications, the factory settings are adequate and will not need adjustments.

Press the SCROLL ⟳ button to advance to the next setting.

9. Cycle 3:

The control will display:

FILL/RNS: 5 min

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the length of the fast rinse/brine refill cycle from 0 to maximum 99 minutes.

The time of the fast rinse/brine refill cycle, with the brine refill flow control, will determine the quantity of refill to the brine tank, independent of the inlet pressure.
Note: This setting will need adjustments in most applications. For brine refill flow control information and salt settings, see page 19.

Press the SCROLL ⟳ button, the control will display:

Exit

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to exit the Installer's Level.

IMPORTANT NOTE: In order for these new settings to become active, it is necessary for you to execute a complete regeneration. After you step (scroll) through a manual regeneration, the new settings will become active. If you choose not to manually regenerate the system, the settings will not become active until the unit has completed its next scheduled regeneration.

Capacity (Volume Setting)

Verify that the control valve is in the **Service Mode**. The control will display:

Time of Day	GL Remaining

Press the **DOWN ▼ ARROW** and hold it for 5 seconds until the control displays:

System Check

Within 10 seconds, enter the Installer's access code, by pressing in the following key sequence:
DOWN ▼ ARROW
DOWN ▼ ARROW
SCROLL ⟳ BUTTON
DOWN ▼ ARROW

The control is now in the Installer's Level; use the **SCROLL ⟳ button** to advance through the different settings.

Programming options menu:

1. Capacity:

The control will display:

Capacity:	1000 GL

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the volume of softened water between regenerations, in increments of 100 gallons. This can be programmed from 100 to 999,999 gallons. See pages 18-19 for more information.

Press the SCROLL ⟳ button to advance to the next setting.

2. Reset Flow:

Note: This function is not available if the control was programmed for "No Meter" in the Manu facturer's level.

The control will display:

Reset Flow?	NO

Press the **UP ▲** or **DOWN ▼ ARROW** to select YES or NO.

- If YES is selected, the control will reset to O. The peak flow rate is set to 0 and the average volume per day is set to 25% of the capacity.

Press the SCROLL ⟳ button to advance to the next setting.

3. Reserve Capacity:

The control will display:

Rsrv	200 GL Fxd

To adjust the reserve, press the **SCROLL ⟳ button**. Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the reserve capacity in increments of 10 gallons; up to 40% capacity of the bed.

If a **Variable Reserve** is desired, press the **UP ▲ ARROW** or **DOWN ▲ ARROW**.

The control will display:

Rsrv:	Variable

The reserve capacity will be calculated automatically, based on the registered daily water consumption.

- The default setting is 25% of the capacity, + 75 gallons.

Press the SCROLL ⟳ button to advance to the next setting.

The Installer's Level
(continued)

4. Time of Regeneration:

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the time of regeneration.

Press the SCROLL ⟳ button to advance to the next setting.

5. Days Override:

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the maximum number of days between regenerations from "OFF" to 30 days (max. limit).

Press the SCROLL ⟳ button to advance to the next setting.

6. Cycle 1:

The control will display:

Press the UP ▲ ARROW or DOWN ▼ ARROW to set the length of the backwash cycle from 0 to maximum 99 minutes. When iron or high hardness is present, the backwash time should be extended 5 to 15 minutes, based on experience. **Note: In most applications, the factory settings are adequate and will not need adjustments.**

Press the SCROLL ⟳ button to advance to the next setting.

7. Cycle 2:

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the length of the brine/slow rinse cycle from 0 to maximum 99 minutes. **Note: In most applications, the factory settings are adequate and will not need adjustments.**

Press the SCROLL ⟳ button to advance to the next setting.

8. Cycle 3:

The control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to set the length of the fast rinse/brine refill cycle from 0 to maximum 99 minutes. The time of the fast rinse/brine refill cycle, with the brine refill flow control, will determine the quantity of refill to the brine tank, independent of the inlet pressure. **Note: This setting will need adjustments in most applications.** For brine refill flow control information and salt settings, see page 19.

Press the SCROLL ⟳ button, the control will display:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to exit the Installer's Level.

IMPORTANT NOTE: In order for these new settings to become active, it is necessary for you to execute a complete regeneration. After you step (scroll) through a manual regeneration, the new settings will become active. If you choose not to manually regenerate the system, the settings will not become active until the unit has completed it's next scheduled regeneration.

The Manufacturer's Level

Verify the control valve is in the **Service Mode**. The control will display the time of day and gallons remaining:

Time of Day	GL Remaining

Press the **DOWN ▼ ARROW** and hold it for 5 seconds until the control displays:

System Check

Within 10 seconds, enter the Manufacturer's access code by pressing in the following key sequence:

DOWN ▼ ARROW
SCROLL ⟳ BUTTON
UP ▲ ARROW
UP ▲ ARROW
SCROLL ⟳ BUTTON

The control is now in the Manufacturer's Level. Use the **SCROLL ⟳ button** to advance through the different settings.

Programming options menu:

1. Units:

The control will display:

Units:	English-US

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to program the control from English -US (Gallons) to Metric (Liters).

Press the SCROLL ⟳ button to advance to the next setting.

2. Flow Meter Type:

Standard meter: This is the standard Erie meter.
No meter: When no meter is selected, the installer must activate the calendar override. The calendar override will be used as a day setting for regeneration.
Volume/Pulse setting: Whenever a non-Erie meter is used, the pulse factor must be programmed in this field.

The control will display:

Std Meter

To program no meter or choose a pulse factor for a non-Erie meter continue below:

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to program the flow meter from Std Meter to No Meter or Vol/Pulse.

If Vol/Pulse is selected, push the **UP ▲ ARROW** or **DOWN ▼ ARROW** to program the pulse factor from 1 to 1000.

The control will display:

Vol/Pulse = 100

Press the SCROLL ⟳ button to advance to the next setting.

3. Capacity

Note: The hardness function is not programmable if "Metric" was selected in Step 1.

The control will display:

Capacity:	Volume

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to program the capacity from a volume to a hardness setting.

- If Volume is selected, the installer will program the amount of water to be used.
  Note: This is the only option as a capacity setting, if "Metric" was selected in Step 1.

The Manufacturer's Level
(continued)

If Hardness is selected, the installer will program the capacity in grains and hardness amount.

Note: To activate any change, with either volume or hardness, advance (scroll) the control through a manual regeneration. The program change will take affect after the unit has completed a full regeneration.

Press the SCROLL ⟲ button to advance to the next setting.

4. Regeneration Type:

Delayed/Immediate: In this program the unit will regenerate immediately if the capacity reaches 0. If the system still has a reserve capacity, the regeneration will be delayed until the programmed regeneration time.

Immediate: In this program the unit will regenerate immediately if the capacity reaches 0.

Delayed: In this program the unit will not regenerate when the capacity reaches 0. The unit will wait until the programmed regeneration time.
Note: If "No Meter" was selected in Step 2, delayed regeneration is the only option.

The control will display:

Regen: Delayed

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to program the regeneration type from Delayed to Dlyd/Immd or Immediate.

Press the SCROLL ⟲ button, the control will display:

Exit

Press the **UP ▲ ARROW** or **DOWN ▼ ARROW** to exit the Manufacturer's Level.

The End User's Level

Verify the control valve is in the **Service Mode**. The control will display the time of day and gallons remaining before regeneration:

Time of Day	GL Remaining

Press the SCROLL button to advance to the next setting.

Available Programming Parameters:

1. Time of Day Setting:

The control will display:

Set	Time of Day

Press the **UP ARROW** or **DOWN ARROW** to program the time of day.

Press the SCROLL button to advance to the next setting.

2. Holiday Mode:

The control will display:

Holiday	Time

When the control valve is left in this position for 60 seconds, the holiday mode will become active and the unit will not regenerate.

The holiday program ends when a flow rate greater than 1.5 gallons is measured with the meter or when the **SCROLL button** is pushed. In either case, the unit will start an immediate regeneration.

Press the SCROLL button to advance to the next setting.

3. Immediate Regeneration Mode:

The control will display:

Regen in 10 sec

If the control valve is left in this position, the timer will countdown to 0, starting a regeneration at 0.

To avoid an Immediate Regeneration, push the **SCROLL button** before the timer has reached 0.

Press the SCROLL button to advance to the next setting.

4. Delayed Regeneration Mode:

Note: This function will not be available if the control was programmed for "Immediate" in the Manufacturer's level.

The control will display the programmed regeneration time:

Regen @ (current setting)

If the control valve is left in this position, the unit will regenerate at the programmed time.

- The display will remain in the delayed regeneration mode until the regeneration has started.

To cancel this mode, push the **SCROLL button**.

The Diagnostic Level

Checking the Diagnostics (Viewing Only)

Press the **UP ▲ ARROW** and hold it for 5 seconds. The diagnostics menu will display REGEN DAYS AGO. Use the **SCROLL ⟲ button** to advance to each diagnostic. If no button is pressed within 60 seconds, the display will return to the time of the day (Service Mode).

Regen _ Days Ago: Displays how many days ago the unit last regenerated.

In Srvc: Displays how many days the control has been in service.

# of Regens: Displays the number of regenerations that have taken place since the control was installed.

Tot Vol: Displays the total volume of water used since installation.

Last Rgn @: Displays the amount of water used before the last regeneration.

Peak Flow: Displays the peak flow rate since the last regeneration. This function resets back to 0 after every regeneration. **Note: Will not display when control is programmed for Volume/Pulse.**

Avg Vol: Displays the average daily water consumption.

Capacity/System: If the control is programmed for **Volume**, the display will read **CAPACITY** along with the maximum volume of water to be used. When the control is programmed for **Hardness**, the display will read **SYSTEM** along with the maximum grain capacity of the system.

Hardness: Displays the amount of hardness programmed into the control. **Note: Will not display when control is programmed for Volume.**

Rsrv: Displays whether the control is programmed for **Fixed** or **Variable Reserve**.

Note: Will not display when programmed for Immediate Regeneration.

Regen @: Displays the time of day the unit will regenerate.

Override: Displays the override mode by reading “OFF” or the number of days programmed into the control.

Backwash: Displays the minutes of backwash programmed into the control. If the control is programmed for Metric units this position will display as **CYCLE 1**.

BRN/RNS: Displays the minutes of brine and rinse programmed into the control. If the control is programmed for Metric units, this position will display as **CYCLE 2**.

FILL/RNS: Displays the minutes of fast rinse programmed into the control. If the control is programmed for Metric units, this position will display as **CYCLE 3**.

Units: Displays the mode of measurement, **ENGLISH-US** or **METRIC**.

Meter: Displays whether the control is programmed as a **Standard Meter**, **No Meter** or **Volume/Pulse** setting.

Capacity Volume/Hardness: Displays whether the control is programmed for a **Capacity Volume** or **Capacity Hardness** setting.

Regen: Displays the programmed regeneration type - **Delayed**, **Immediate** or **Delayed/Immediate**.

Valve Type: Displays the type of valve the factory programmed into the control.

M P Resets: Displays how many times the programs have been reset.

Corrupt Memory: For factory information only.

4000 VTL REV: For factory information only.

To exit the diagnostic level, press the up or down arrow at the exit display.

Start Up/System Check Instructions

1. Turn the main shutoff valve until it is just barely open (this will allow the unit to release the air trapped inside, without agitating the mineral, when you manually regenerate the system).

2. Verify that the control is in the service position. The control will display the time of day and gallons remaining.

3. Manually advance (scroll) the control to the regeneration position. The display will count down from 10 to 0. The first step will be back-wash. Allow the water to flow from the drain until all the air has purged. After all the air has purged, open the main valve.

4. Advance (scroll) the control valve to the brine cycle. The system will draw water from the brine tank. Remove the brine line and check for suction. If no suction occurs, refer to the troubleshooting section on page 23.

5. Advance (scroll) the control to fill/rinse. Allow the system to fill the brine tank.

6. Use the scroll button to advance the control back to the service position.

7. The installation is now complete. Please refer to pages 8-15 for programming information.

IMPORTANT: SANITIZING WATER CONDITIONERS IS RECOMMENDED BY THE WATER QUALITY ASSOCIATION

After the installation is complete, including setting the computer and putting water in the brine tank, the following procedure can be used to sanitize the water conditioner: Mix about a 3/4 cup of common (unscented) 5.25% household bleach with about 1 quart of water and pour this solution into the brine well. **Note: Do not pour undiluted bleach into the water conditioner.** Initiate a manual regeneration. The bleach solution will be drawn into the water conditioner during the regeneration process. When the regeneration process is complete, the water conditioner has been sanitized. **Note: The unit may be sanitized with or without salt in the brine tank.**

Injector Selection

Injector

The injector determines the brine concentration (ratio between brine suction and rinse water) and the brine flow through the resin bed. Injector performances vary significantly with inlet pressure.

Note: The following table is only an indication and is valid for an inlet pressure of 40 psi/3 bar, with a bed depth of 30 inches.

Note: The following injector recommendations are based on general tank sizes.

Tank		Injector	
inch	**mm**	**#**	**Color**
7	178	4	PURPLE
8	203	4	PURPLE
9	229	4	PURPLE
10	254	1-4	RED-PURPLE
12	305	1	RED
13	330	1	RED
14	356	2-1	YELLOW-RED
16	406	5-2	GREEN-YELLOW

Flow Control Selection

Backwash Flow Control

The backwash flow control determines the resin bed expansion during the backwash, independent of the inlet pressure.

Note: The following flow control recommendations are based on general tank sizes.

Tank		Backwash Flow Control		
inch	**mm**	**#**	**Gal/min**	**(L/min)**
7	178	E	1.6	(6.1)
8	203	E	1.6	(6.1)
9	229	G	2.0	(7.6)
10	254	J	2.6	(9.8)
12	305	K	3.5	(13.2)
13	330	L	4.0	(15.1)
14	356	M	5.0	(18.9)
16	406	N	6.0	(22.7)

Brine Refill Flow Control Selection

Your system will come with one of the following flow controls:

0.25 GPM - A Each minute in the refill cycle is equal to 0.75 pounds of salt.

0.5 GPM - B Each minute in the refill cycle is equal to 1.5 pounds of salt.

1.0 GPM - D Each minute in the refill cycle is equal to 3.0 pounds of salt.

To verify the size of your flow control, put (scroll) the unit into the refill cycle and measure the refill flow rate.

Note: The fast rinse/brine refill cycle can only be set in increments of one minute.

Note: One gallon of water will dissolve three pounds of salt. The amount of water in the tank will determine the amount of salt that the system will use during each regeneration.

Note: The following flow control recommendations are based on general tank sizes.

Tank inch	Brine Refill Flow Control #
7	A-B
8	A-B
9	B
10	B-D
12	D
13	D
14	D
16	-

Cycles of the System

1. SERVICE:

Untreated water flows down through the resin bed and up through the riser tube; the water is conditioned when passing through the resin. The throughput is dependent on the maximum permissible pressure drop for the complete water softener and the maximum permissible specific load of the resin.

2. BACKWASH:

Water flows down through the riser tube and up through the resin bed to drain; the resin bed is fully expanded and all foreign materials are thoroughly washed from the resin, allowing a good brine cycle to occur.

3. BRINE:

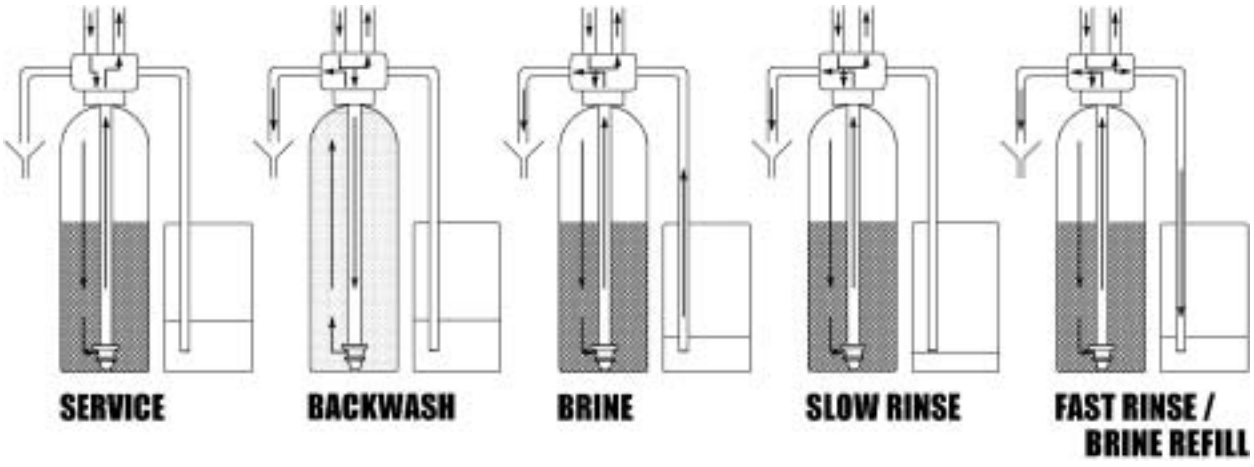
Salt brine, drawn from the brine tank by the injector, slowly flows down through the resin bed and up through the riser tube to drain; the resin is being regenerated when the salt brine passes through the bed. The brine cycle is terminated when the air check seats in the brine valve.

4. SLOW RINSE:

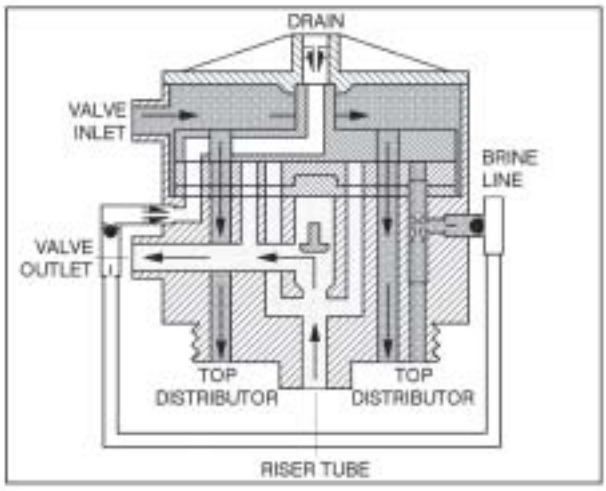
Slow rinse continues for the remainder of the brine cycle; the water slowly flows down through the resin bed and up through the riser tube to drain, slowly washing the brine from the resin tank.

5. FAST RINSE/BRINE REFILL:

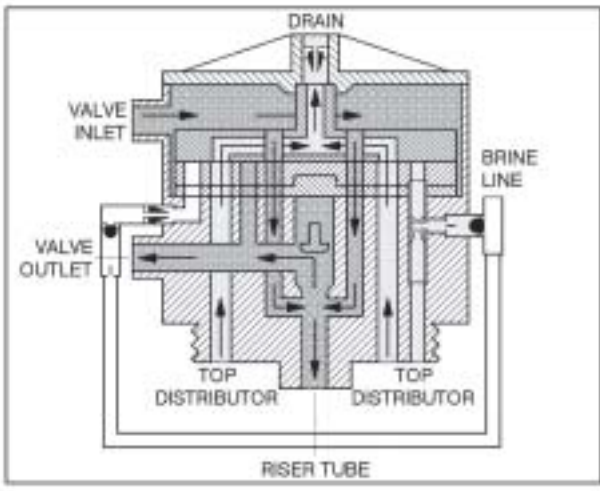
Water flows to the brine tank and at the same time down through the resin bed and up through the riser tube to drain, ensuring that all traces of brine are washed out and that the resin bed is compacted. The resin bed is now ready for the next service cycle.



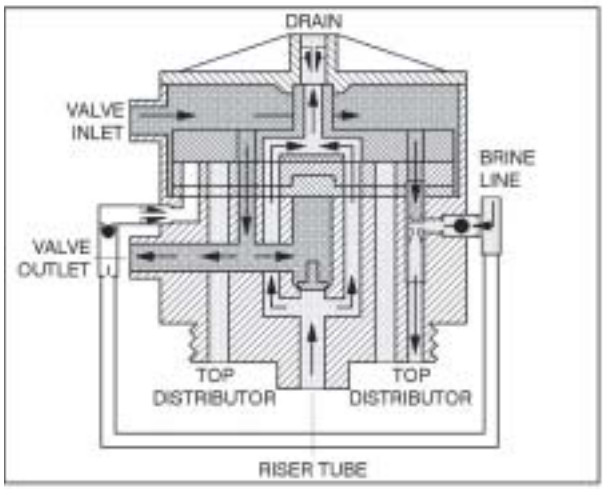
Water Flow Diagrams



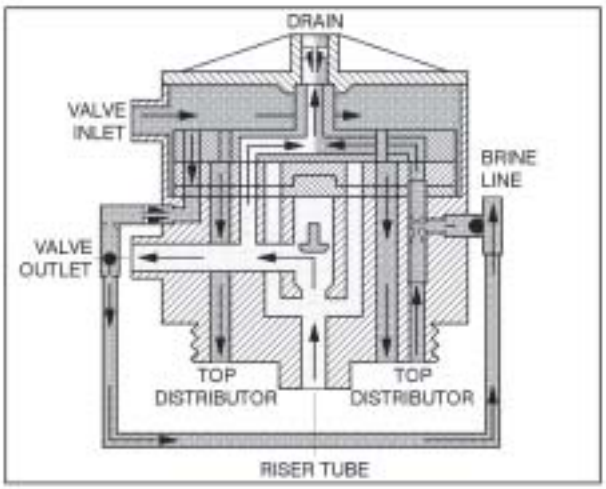
SERVICE



BACKWASH



BRINE/ SLOW RINSE



FAST RINSE/ BRINE REFILL

SOFT WATER

BRINE / RINSE WATER

HARD WATER

Troubleshooting

SYMPTOM	CAUSE	SOLUTION
Hard (untreated) water to service	1. Open or defective bypass	1. Close or verify bypass
	2. Loss of Resin	2. Refer to symptom **“**Loss of Resin”
	3. Valve in regeneration	3. Wait for regeneration to complete
	4. Excessive water use	4. Check regeneration frequency
	5. Change in raw water hardness	5. Adjust programming accordingly
	6. Unit fails to regenerate	6. Refer to symptom “Unit fails to regenerate”
	7. Valve fails to draw brine	7. Refer to symptom “Valve fails to draw brine”
	8. Decreasing exchange capacity of resin	8. Clean or replace resin bed
	9. No salt in brine tank	9. Add salt
	10. Leak at riser tube	10. Verify that the riser tube is seated correctly and is not cracked
	11. Leak between rotor and seal disk	11. Verify or replace rotor and seal disk
	12. Valve body and timer out of synchronization	12. Synchronize valve body and timer
Unit fails to regenerate	1. Faulty electrical supply	1. Verify electrical service (fuse, transformer)
	2. Control not set properly	2. Verify the correct regeneration schedule and reset the control
	3. Defective drive motor	3. Replace drive motor
	4. Defective flow meter	4. Clean and/or replace flow meter
	5. Defective computer board	5. Replace computer board
	6. Defective microswitch(es)	6. Replace microswitch(es)

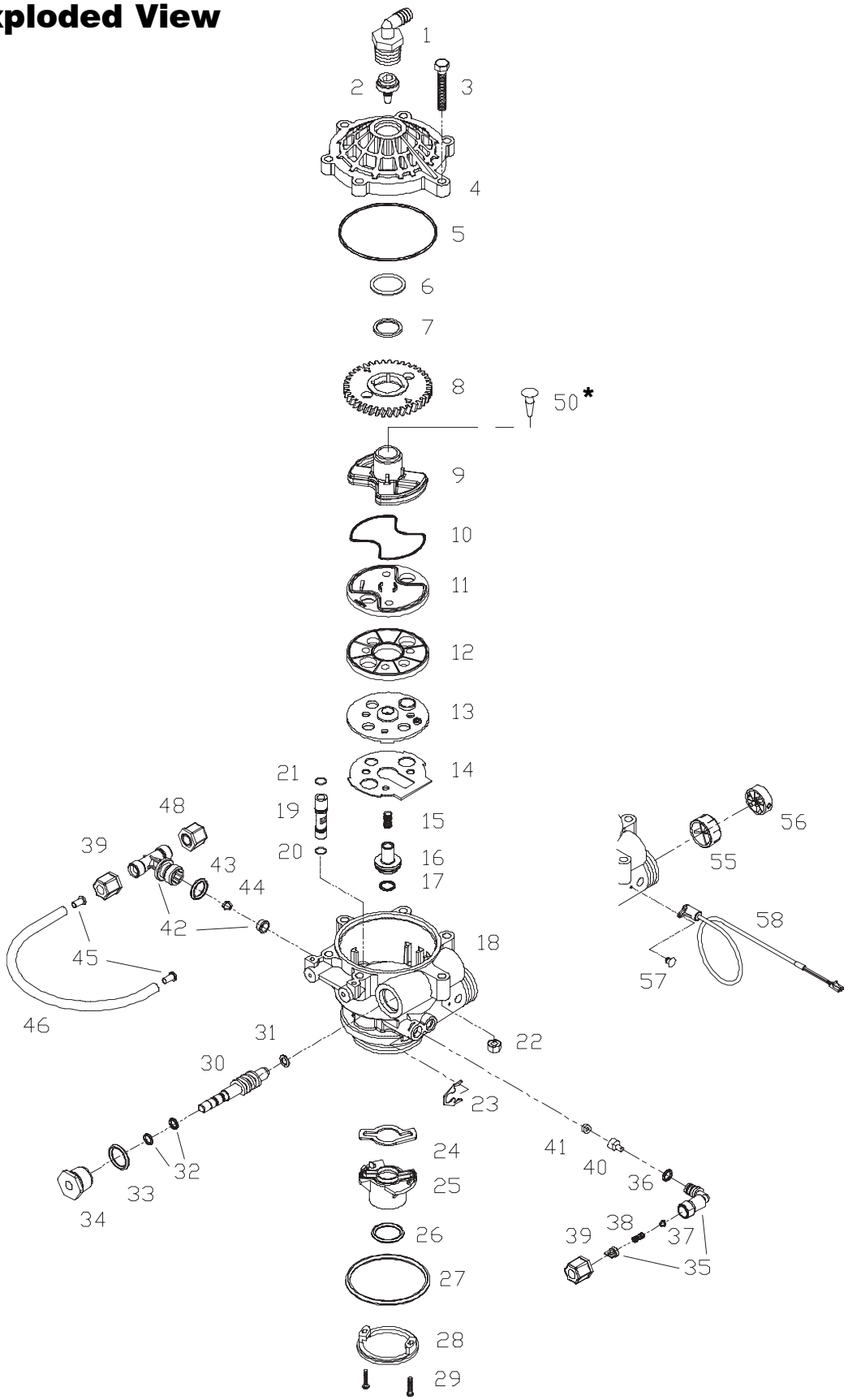
SYMPTOM	CAUSE	SOLUTION
Valve fails to draw brine	1. Low operating pressure	1. Verify operating pressure
	2. Plugged injector	2. Clean injector
	3. Plugged injector filter	3. Clean injector filter
	4. Restricted drain line	4. Check drain line for kinks or restrictions. Verify backwash flow control is free of debris
	5. Restricted brine line	5. Check brine line for kinks or restrictions
	6. Leak in brine line	6. Check brine line and connections for air leakage
	7. Not enough water in the brine tank	7. Refer to the symptom “Valve fails to refill brine tank”
Valve cycles continuously	1. Defective or shorted microswitch(es)	1. Replace microswitch(es)
Excessive water in brine tank	1. Valve fails to draw brine	1. Refer to symptom **“**Valve fails to draw brine”
	2. Improper fast rinse/brine refill time setting	2. Verify that fast rinse/brine refill time corresponds to the proper salt level and amount of resin
	3. Improper or missing brine refill flow control	3. Verify that the flow control is installed and properly sized
	4. Leak between the rotor and seal disk	4. Verify or replace rotor and seal disk
Valve fails to refill brine tank	1. Blockage in brine line or brine valve	1. Remove blockage
	2. Improper fast rinse/brine refill time setting	2. Verify that the fast rinse/brine refill time corresponds to salt level and amount of resin
	3. Improper refill flow control	3. Verify that the flow control is properly sized
	4. Plugged refill flow control	4. Verify that the flow control is free of debris

Troubleshooting (continued)

SYMPTOM	CAUSE	SOLUTION
Unit uses too much salt	1. Excessive water in brine tank	1. Refer to symptom “Excessive water in brine tank”
	2. Unit regenerates too frequently	2. Check capacity, reserve capacity and calendar override
Salt water to service	1. Excessive water in brine tank	1. Refer to symptom “Excessive water in brine tank”
	2. Low water pressure	2. Check injector selection and adjust rinse time
	3. Improper brine/slow rinse time setting	3. Verify that the brine/slow rinse time corresponds to the proper salt level and the proper amount of resin
	4. Improper fast rinse/brine refill time setting	4. Verify that the fast rinse/brine refill time corresponds to the proper salt level and amount of resin (See page 19)
Loss of resin through drain line	1. Excessive backwash/fast rinse flow	1. Verify that the backwash flow control is installed and sized correctly
	2. Lower and/or upper distributor damaged	2. Replace distributor(s)
	3. Leak between riser tube and upper distributor	3. Verify that the riser tube is seated correctly and not cracked
Loss of water pressure	1. Mineral or iron build up in resin tank	1. Clean the resin bed and control valve; increase the regeneration frequency
	2. Plugged lower and/or upper distributor	2. Verify that the distributor(s) are free of debris
	3. Crushed lower and/or upper distributor	3. Replace distributor(s)
	4. Plugged outlet manifold	4. Remove and clean outlet

SYMPTOM	CAUSE	SOLUTION
Constant flow to the drain	1. Drive motor failure	1. Replace drive motor
	2. Defective computer board	2. Replace computer board
	3. Defective microswitch(es)	3. Defective microswitch(es)
	4. Valve body and timer out of synchronization	4. Synchronize valve body and timer
	5. Leak between the rotor and seal disk	5. Verify or replace rotor and seal disk

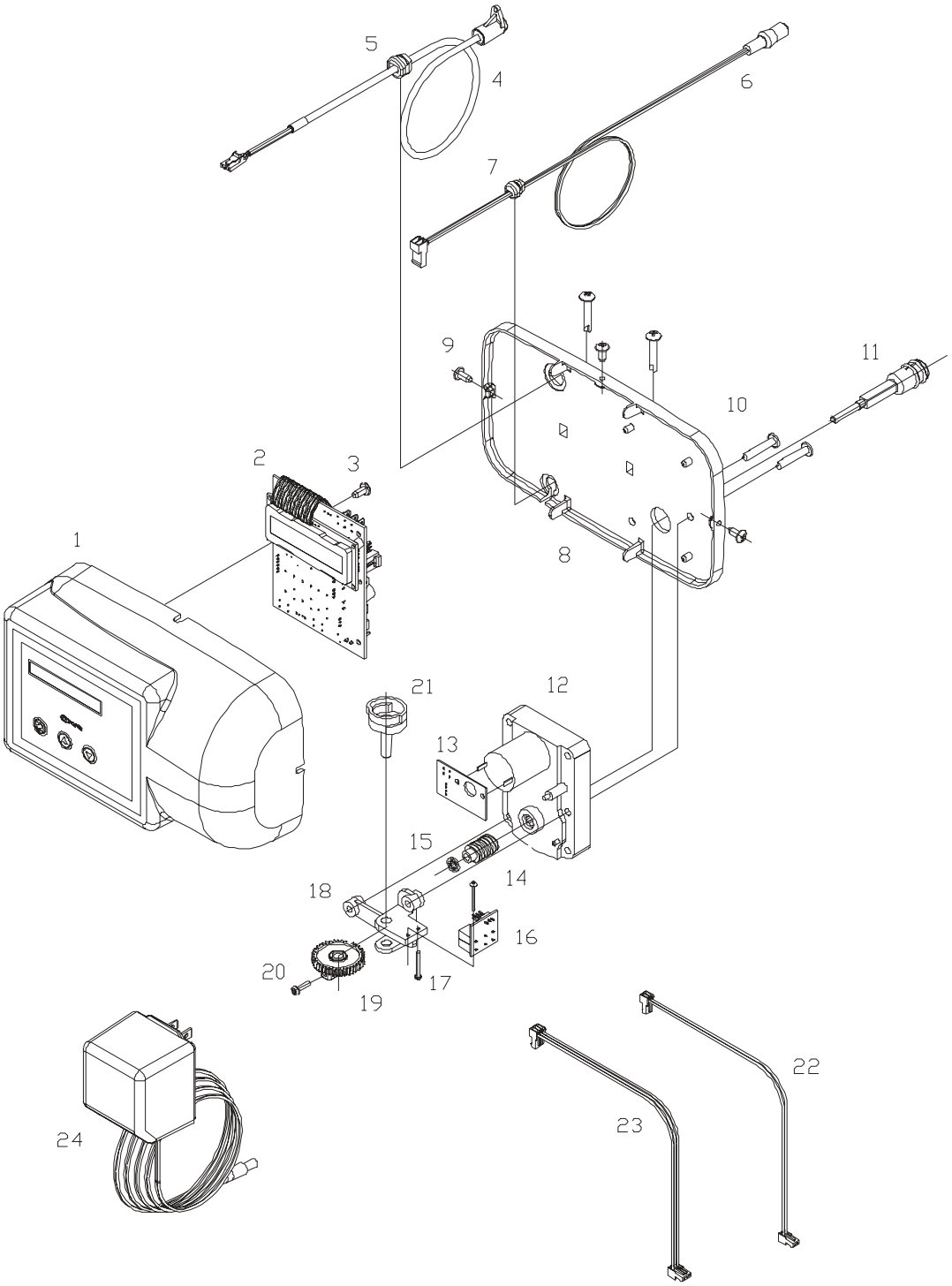
Valve Exploded View



Rotary Parts List

Item	Qty	Aquion Part #	Description
1	1	70793	1/4 NPTF TO 1/2 I.D. HOSE MALE DRAIN ELBOW
2	1	71099, 72173 - 72175	BACKWASH FLOW CONTROL 3.0, 10.0, 2.0, 3.5
		75050 - 75053	BACKWASH FLOW CONTROL 1.6, 1.8, 2.2, 2.6
		75074 - 75078, 75265	BACKWASH FLOW CONTROL 5.0, 6.0, 7.0, 8.0, 9.0, 4.0
3	6	71070	HEX HEAD BOLT, 5/16-18 X 2” LG, SS
4	1	71083	VALVE BODY COVER
5	1	70658	VALVE COVER O-RING
6	1	72327	WASHER
7	1	70665	TEFLON O-RING
8	1	71089	WORM GEAR
9	1	71087, 71088	STANDARD CAM SHAFT***(use with 70932)** **or** SPOKELESS CAM SHAFT
10	1	70656	ROTOR O-RING
11	1	71132	ROTOR PLATE, COATED
12	1	71084	SEAL DISK, COATED
13	1	71182	INSERT PLATE
14	1	71183	GASKET
15	1	71006	FLOAT VALVE SPRING
16	1	71127	FLOAT VALVE
17	1	70660	FLOAT VALVE O-RING
18	1	71202	VALVE BODY
19	1	71063, 71064	INJECTOR #2, #3
		71067, 71068	INJECTOR #4, #5
20	1	70655	INJECTOR O-RING, LOWER
21	1	70664	INJECTOR O-RING, UPPER
22	6	71071	HEX NUT, 5/15-18, SS
23	1	71947	SPRING CLIP
24	1	71344	RISER INSERT GASKET
25	1	71118	RISER INSERT
26	1	70662	RISER TUBE O-RING
27	1	70663	TANK O-RING
28	1	71010	ADAPTER RING
29	2	71512	SCREW #6-20 X 21/32” LG, SS
30	1	71060	WORM DRIVE SHAFT
31	1	70616	WORM DRIVE SHAFT WASHER
32	2	70666	WORM DRIVE SHAFT O-RING
33	1	70661	PACKING GLAND O-RING
34	1	71069	PACKING GLAND NUT
35	1	71124	BRINE REFILL ELBOW
36	1	70667	O-RING
37	1	71961	REFILL ELBOW CHECKBALL, 1/4” DIA
38	1	70984	REFILL ELBOW SPRING
39	2	13490	COMPRESSION NUT FOR 3/8” TUBE, JACO 0-6
40	1	71184	BRINE REFILL FLOW CONTROL
41	1	71728	FLOW CONTROL WASHER .25 GPM
		70994	FLOW CONTROL WASHER 0.5 GPM
		70995	FLOW CONTROL WASHER 1.0 GPM
42	1	71129	BRINE TEE
43	1	70659	O-RING
44	1	70871	BRINE TEE CHECK BALL, 3/8” DIA
45	2	12625	3/8 TUBE SUPPORT
46	1	13604	BRINE REFILL TUBE, 3/8” O.D. X .250” I.D. X 12” L
48	1	70797	COMPRESSION NUT FOR 3/8” TUBE, JACO PG-6
50*****	1	70932	UMBRELLA CHECK VALVE **(OPTIONAL)FOR OVERHEAD DRAINS**
55	1	72050	IMPELLER HUB
56	1	70469	IMPELLER ASSY
57	1	70621	SCREW #4-20 X 3/16” LG
58	1	70980	SENSOR HOUSING, POTTED CABLE ASSY

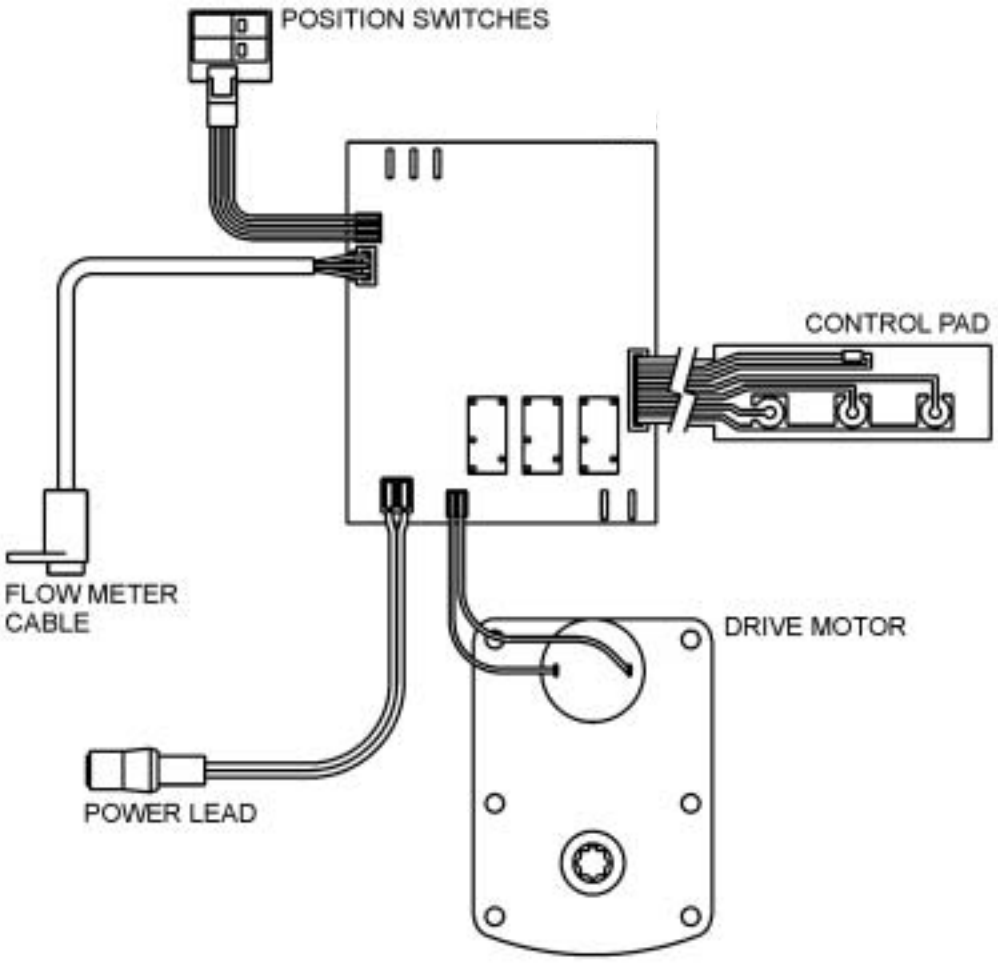
Control Exploded View



Control Parts List

Item	Qty	Aquion Part #	Description
1	1	72252	FRONT COVER SUBASSEMBLY
2	1	70966	BOARD ASSEMBLY, NGC DRIVE MOTOR, PROGRAMMED **Softener demand:** Program Code R1SDa - Aquion factory programmed board part #72264 **Filter Demand**: Program Code R1FDa - Aquion factory programmed board part #72265
3	1	70618	SCREW #4-24 X 3/8 LG SELF-THREADING
4	1	70980	FLOW METER SENSOR HOUSING, POTTED CABLE ASSEMBLY
5	1	72134 (70873)	HEYCO BUSHING, SR 5P-4 (HEYCO PLUG DP-500)
6	1	70971	POWER LEAD
7	1	70312	HEYCO BUSHING, SR 2P-4
8	1	70962	ELECTRONIC CONTROL BACKPLATE
9	3	71502	SCREW #8-18 X 3/8 LG, SELF-THREADING
10	4	71497	SCREW #10-16 X 1 LG, TYPE BT SS, SELF-THREADING
11	1	70720	DRIVE SHAFT
12	1	71656	MOTOR, 24VCD WITH INTERNAL CAPACITORS
13	1	71677	DRIVE MOTOR EMC CIRCUIT ASSEMBLY, MASTER
14	1	71075	WORM
15	1	70668	RETAINING RING
16	1	72049	POSITION INDICATING BOARD & MICROSWITCH ASSEMBLY
17	2	70622	SCREW #2-28 X 3/4 LG, SELF-THREADING
18	1	71185	BRACKET
19	1	71106	HUB AND GEAR
20	1	70625	SCREW #6-32 X 7/16 LG
21	1	70965	CAM SHAFT
22	1	71679	MOTOR LEAD
23	1	70970	CAM SWITCH ASSEMBLY LEAD
24	1	72138	TRANSFORMER 120VAC .5 A

Wiring Diagram



Disassembly Instructions

Before Servicing the Equipment:

- Make sure the control valve is in the service position. The control will display the time of day and gallons remaining.
- Disconnect all electrical power to the unit.
- Bypass or disconnect the water supply.
- Relieve the water pressure.
- Familiarize yourself with the part replacement procedures and components before attempting any repairs.

Required Tools:

- Phillips screwdriver
- Needle nose pliers
- Adjustable wrench
- Small standard screwdriver
- 3/8” Allen wrench

Important Notes:

Brine Refill Flow Control

If the spring clip seems loose after installation, remove the clip and squeeze it back on with pliers, to create a secure fit.

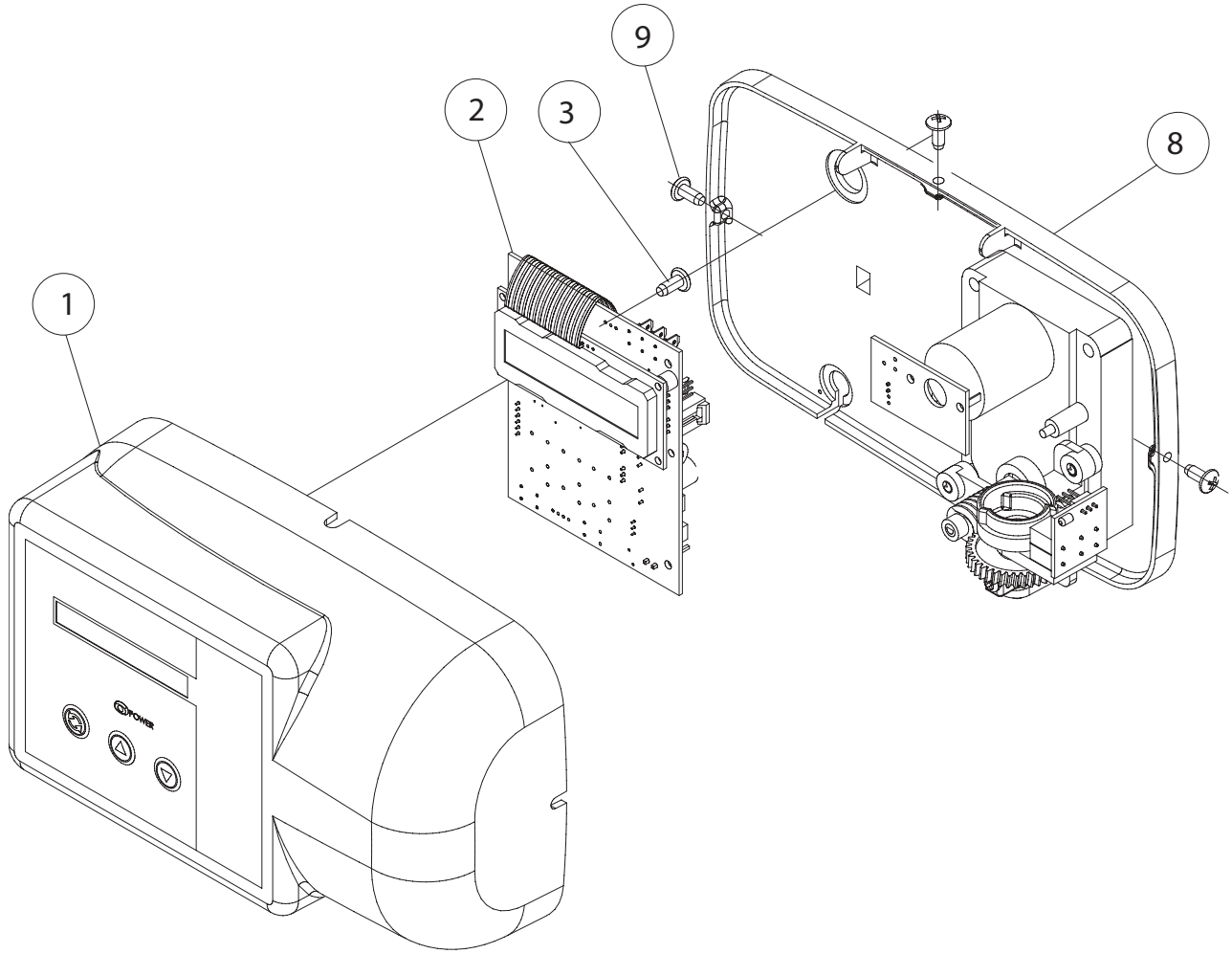
Annual Maintenance:

- Clean out the injector.
- Clean the brine refill flow control.
- Clean the backwash flow control.
- Verify that the flow meter is functioning correctly. Clean the impeller, if necessary.
- Verify the programming of the control. Reprogram the control, if necessary.
- Verify the minimum and maximum pressure. Install a pressure reducer, if necessary.

Computer Board Replacement

PLEASE REFER TO THE CONTROL PARTS LIST FOR REPLACEMENT PART NUMBERS

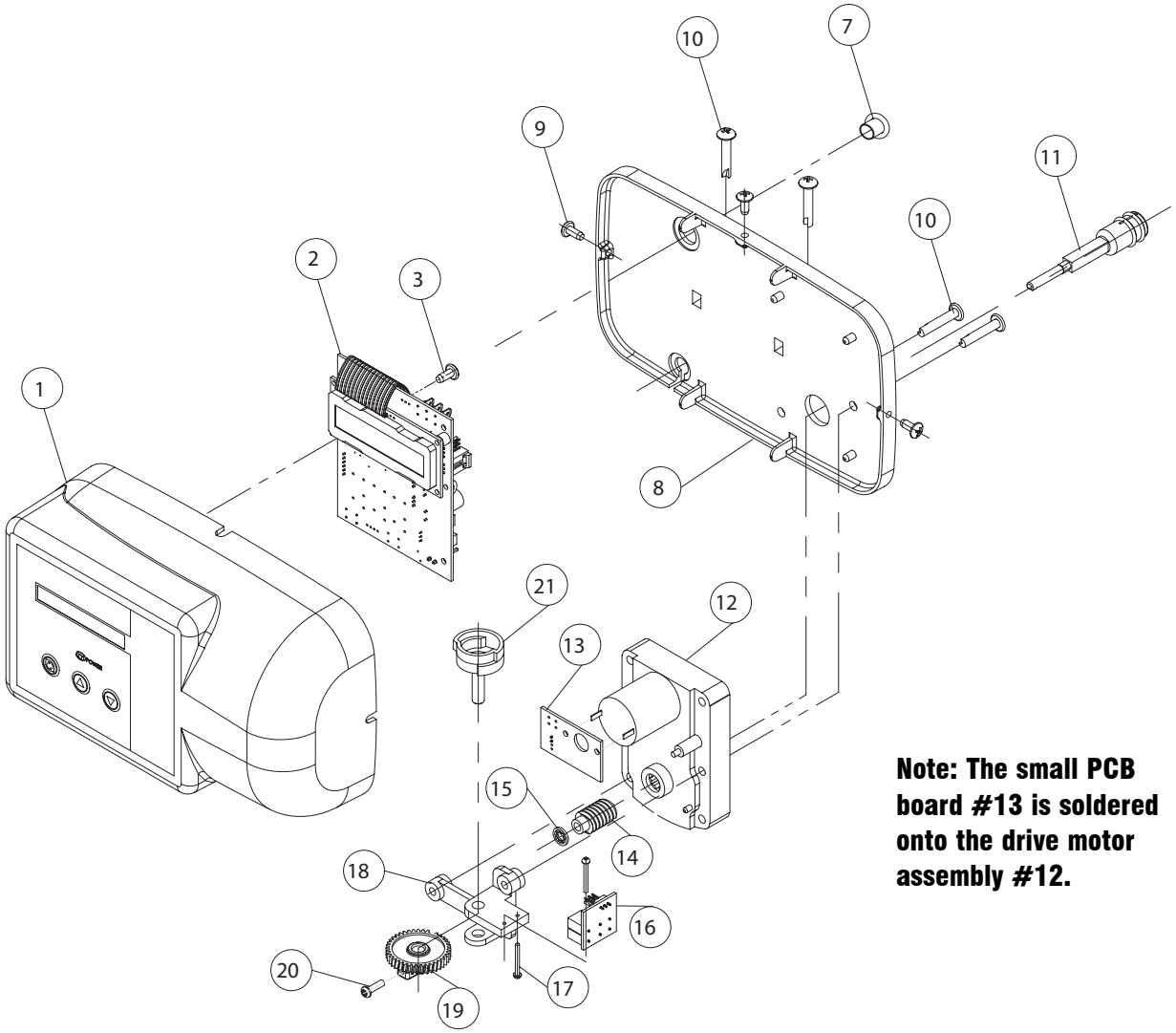
1. Disconnect all electrical power to the unit.
2. Loosen the 3 front cover screws **#9** and remove the front cover **#1** with computer board **#2**.
3. Disconnect all wire connections from the computer board **#2**.
4. Remove the clear zebra strip from the push-in connection on the computer board **#2**.
5. Remove the one screw **#3** holding the computer board in place.
6. Push aside the clips holding the computer board **#2** in place and remove the computer board **#2**.
7. Reverse the procedure for reassembly; refer to the wiring diagram on page 30 for proper lead connections.



Drive Motor Replacement

PLEASE REFER TO THE CONTROL PARTS LIST FOR REPLACEMENT PART NUMBERS

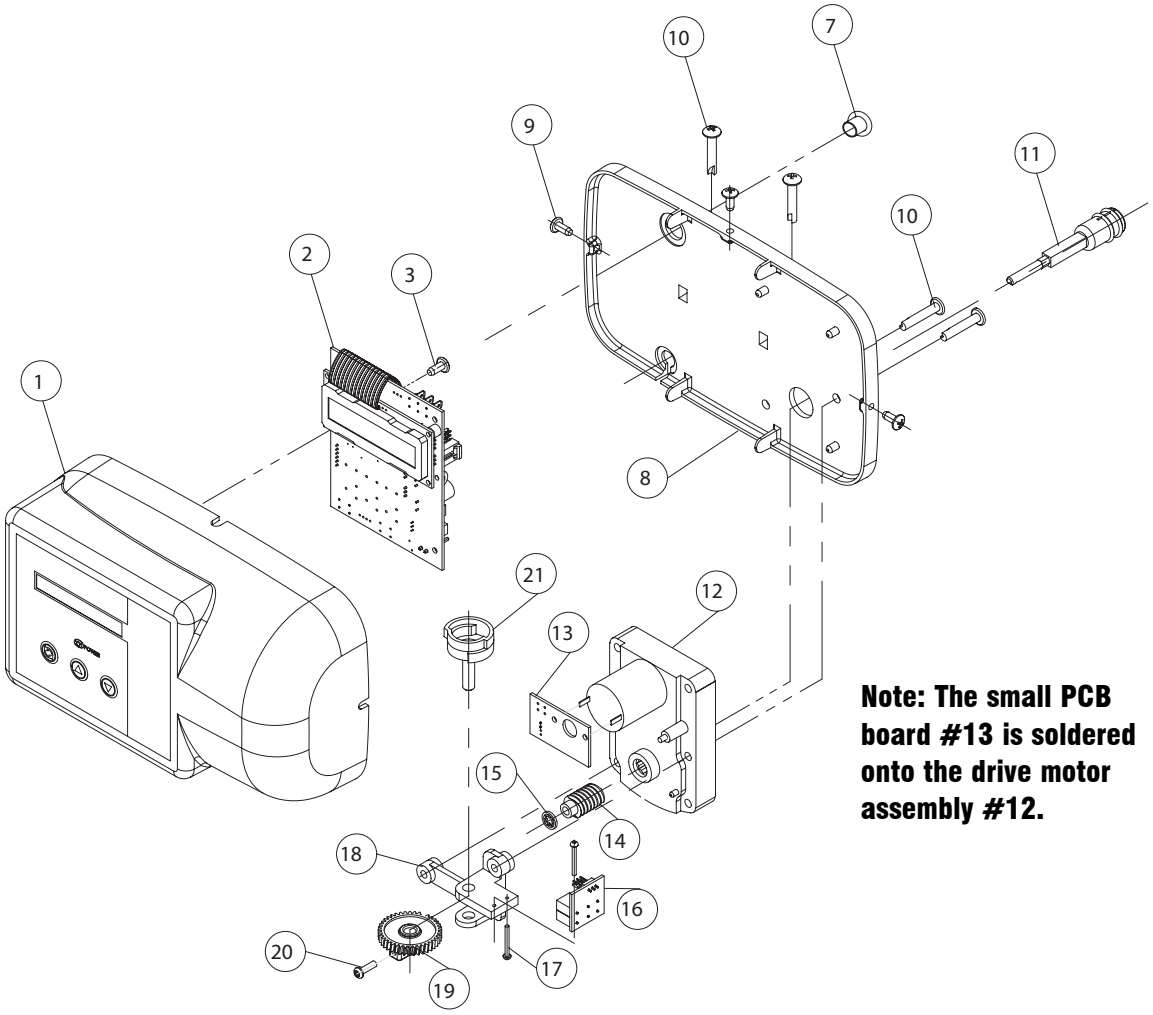
1. Disconnect all electrical power to the unit.
2. Remove the screw holding the flow meter sensor **#4** in place and remove the flow meter sensor **#4**.
3. Remove the 2 backplate mounting screws **#10** and take away the control head assembly **#1**.
4. Loosen the 3 front cover screws **#9** and remove the front cover **#1**.
5. Disconnect the wires **#22** and **#23** from the drive motor assembly **#12** and microswitch assembly **#16**.
6. At the back of the backplate **#8**, remove the 2 screws **#10** holding the drive motor assembly **#12** in place and remove the microswitch assembly **#16** and drive motor assembly **#12.**
7. Remove the retaining ring **#15** securing the worm **#14** and remove the worm **#14** from the drive shaft **#11**.
8. Pull the drive shaft **#11** out of the drive motor assembly **#12**.
9. To replace the cam shaft **#21** and/or hub gear **#19,** loosen screw **#20** and lift out and remove **#21** and **#19**. **Instructions continued on page 34**



Note: The small PCB board #13 is soldered onto the drive motor assembly #12.

Drive Motor Replacement (continued)

10. To replace the microswitch assembly **#16,** remove the 1 small screw on the bottom of the assembly.
11. Reverse the procedure to reassemble the cam shaft **#21**, hub gear **#19** and microswitch assembly **#16**.
12. Reinstall the drive shaft **#11** into the drive motor assembly **#12**, with the flat side on the drive shaft pointing down (mark on the drive shaft pointing up).
13. Reinstall the worm **#14** on the drive shaft **#11** and install the retaining ring **#15** to secure the worm **#14**.
14. Put the microswitch assembly **#16** onto the drive motor assembly **#12**; make sure the microswitch assembly and cam shaft are in the service position.
15. Install the microswitch assembly **#16** and drive motor assembly **#12** on the backplate **#8** and secure it with the 2 screws **#17**.
16. Connect the wires **#22** and **#23** to the drive motor assembly **#12** and microswitch assembly **#16**; refer to the wiring diagram on page 30 for proper connection.
17. It is now necessary to check the synchronization of valve body and control head; refer to “Synchronizing the Valve Body and Control Head" on page 43.
18. Reverse the remaining steps for reassembly.

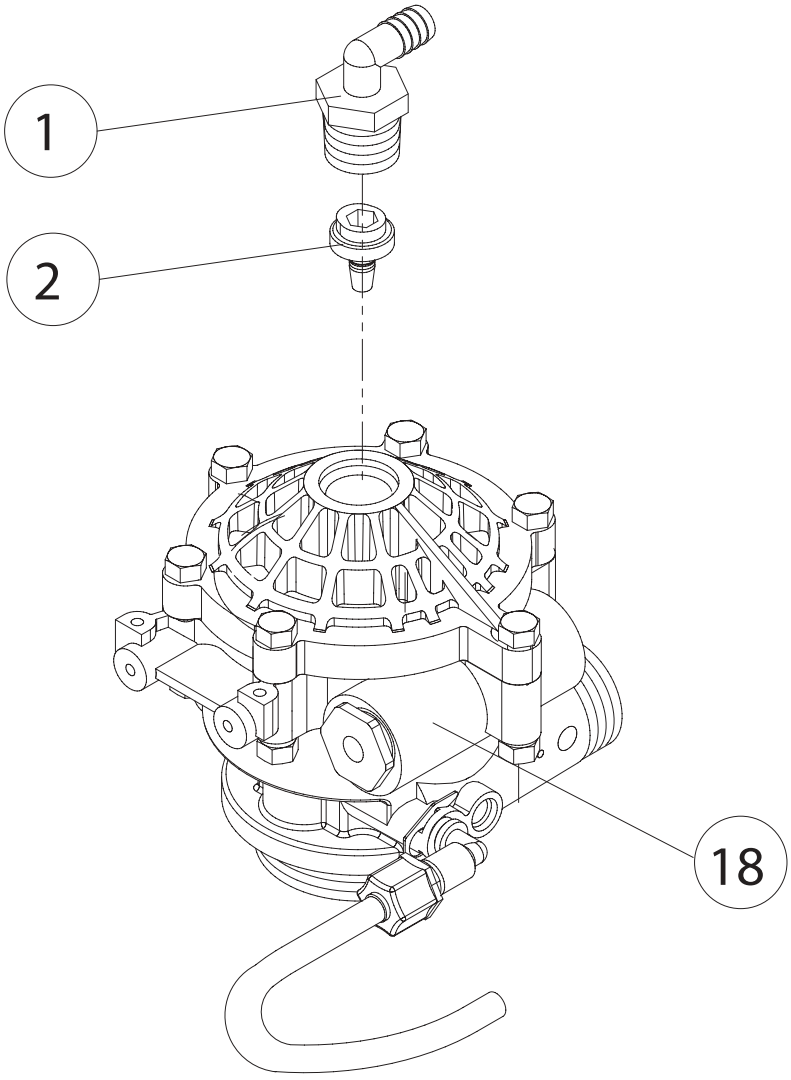


Note: The small PCB board #13 is soldered onto the drive motor assembly #12.

Backwash Flow Control Replacement

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

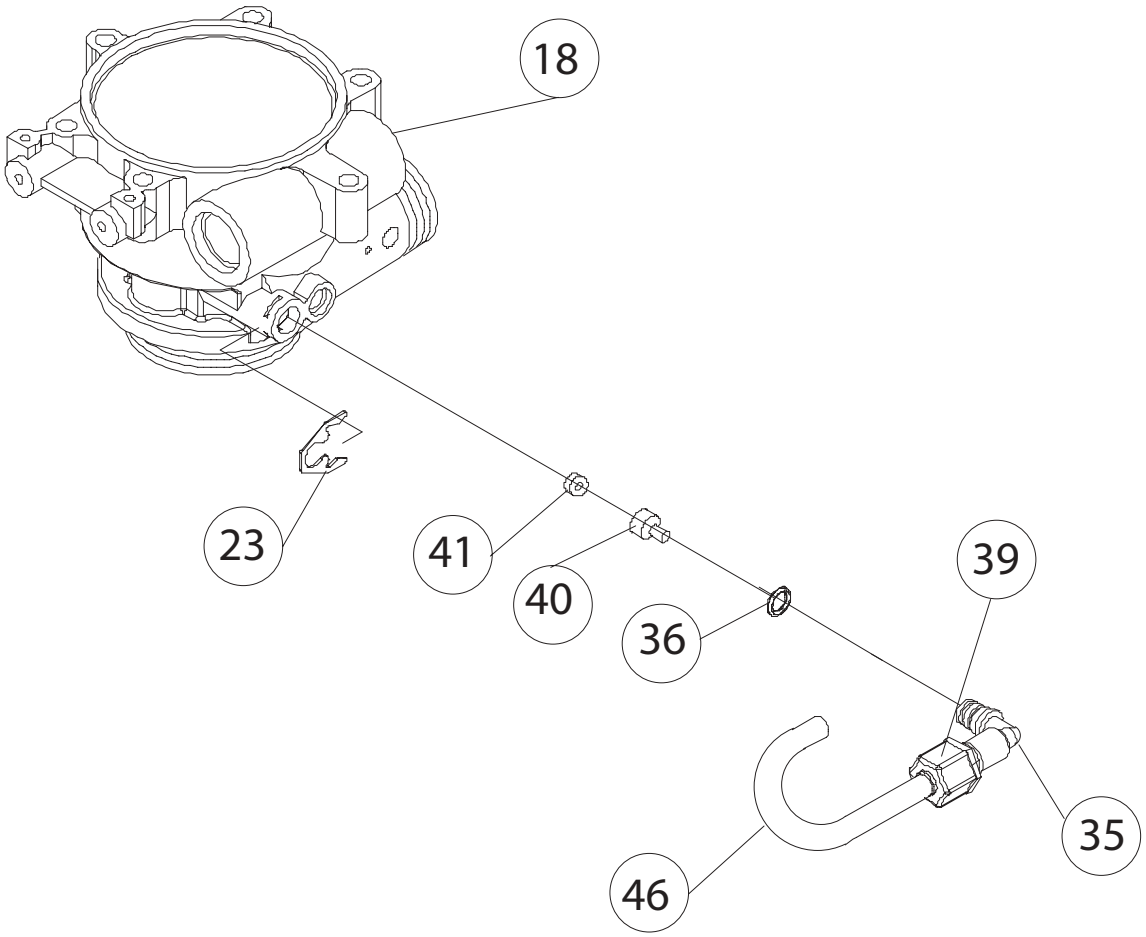
1. Remove the drain hose from the drain elbow **#1** and unscrew and remove the drain elbow **#1**.
2. Unscrew the backwash flow control **#2** using a 3/8” Allen wrench.
3. Reverse the procedure for reassembly.



Brine Refill Flow Control Replacement

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

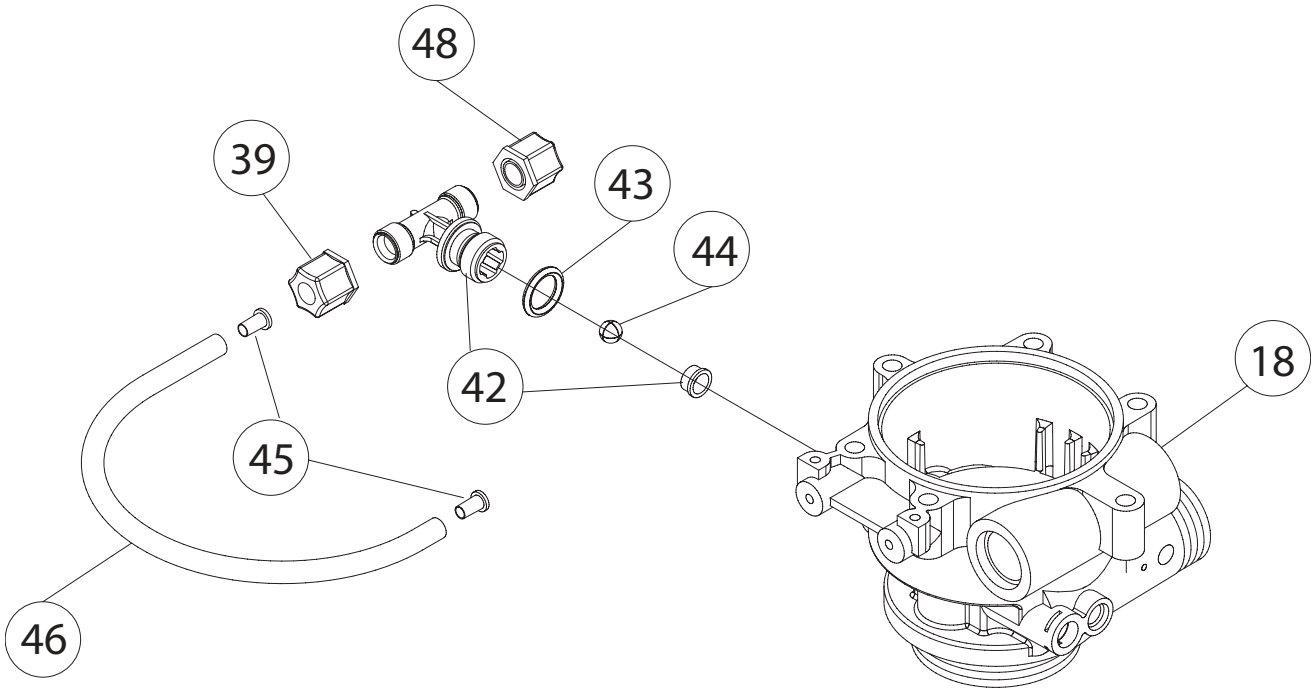
1. Remove the spring clip **#23** securing the brine refill elbow **#35**.
2. Remove the brine refill flow control **#40** from the brine refill elbow **#35**. Inspect the flow control **#40** and flow control washer **#41** for blockage and/or debris. Clean or replace, if necessary. **Note: If the spring clip #23 seems loose after installation, remove the clip #23 and squeeze it back on with pliers, to create a secure fit.**
3. Reverse the procedure for reassembly.



Brine Tee Replacement

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

1. Remove the compression nut **#39** and brine refill tube **#46** from the brine tee **#42**.
2. Remove the brine tee **#42** by turning it counter clockwise.
3. Remove the brine tee retainer **#42**, O-ring **#43** and check ball **#44** from the brine tee **#42**. Inspect the parts for wear and/or debris; replace if necessary.
4. Reverse the procedure for reassembly.

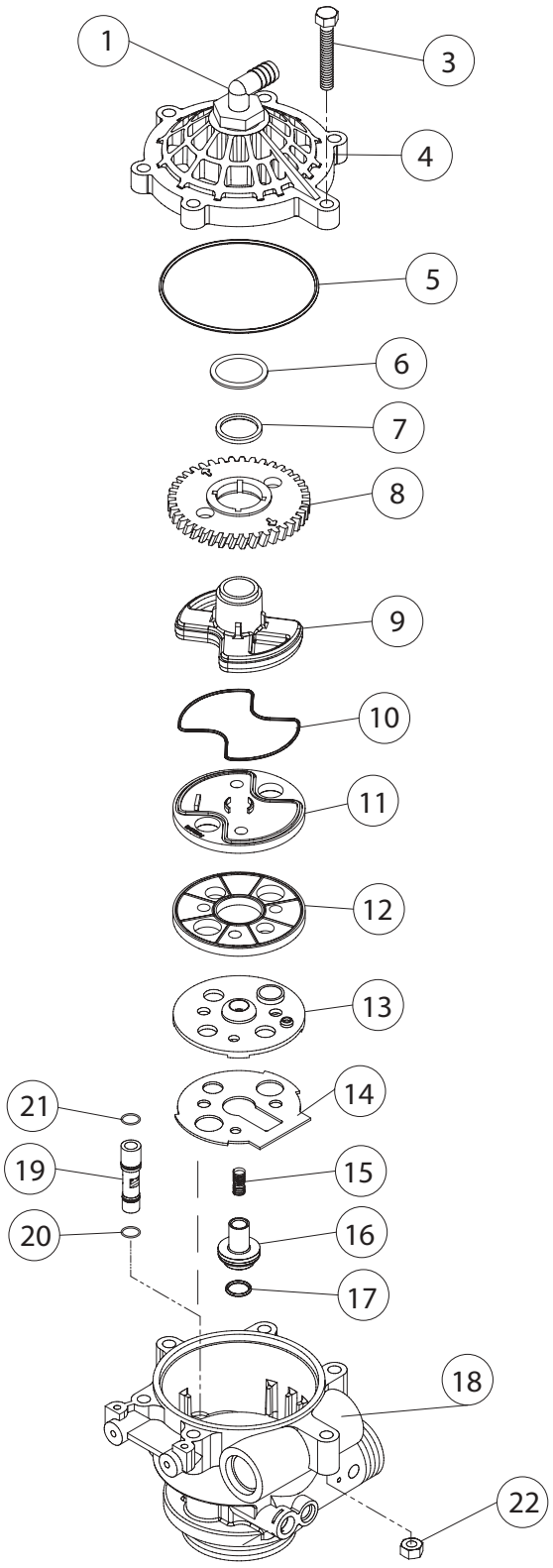


Rotor, Seal Disk, Float Valve, Gasket and Injector Replacement

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

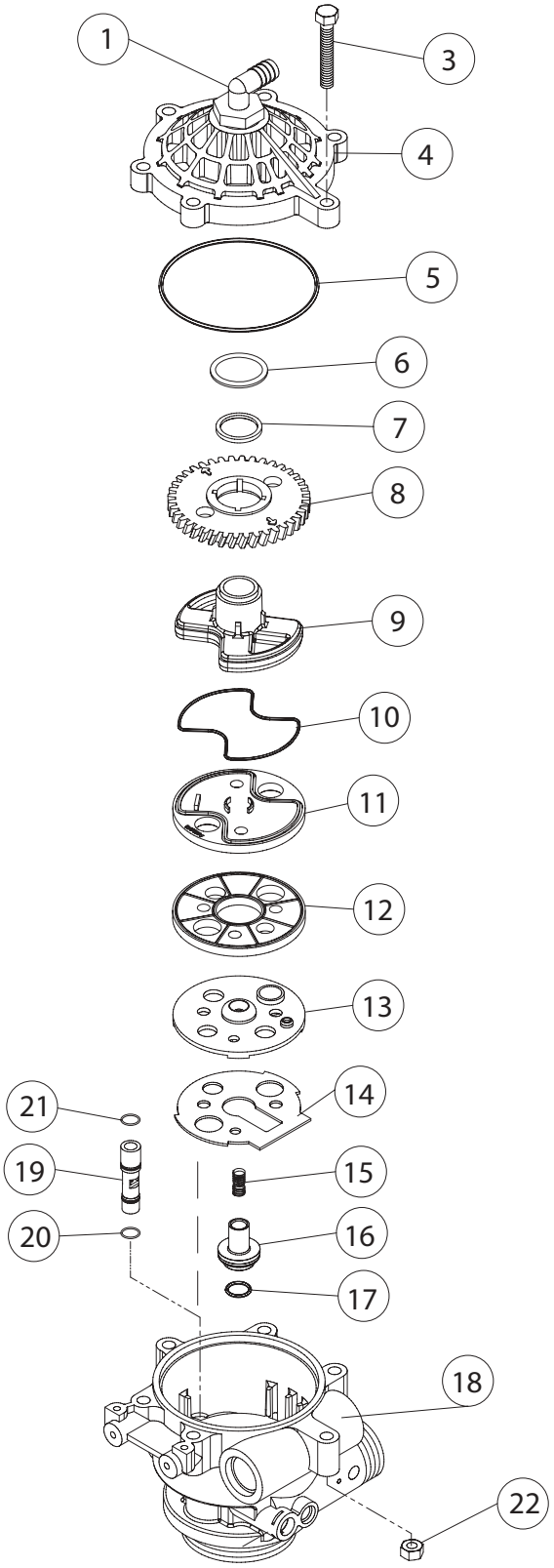
1. Remove the drain hose from the drain elbow **#1**.
2. Remove the 6 bolts **#3** and nuts **#22** holding the valve body **#18** and cover **#4** together.
3. Lift the valve cover **#4** away from the valve body **#18**.
4. Remove the worm gear **#8** and cam shaft **#9** from the valve cover **#4**; the white Teflon O-ring **#7** will remain in the valve cover **#4**.
5. Remove the rotor plate **#11** from the valve body **#18** and inspect the surface. The rotor plate's **#11** surface should be smooth and free of any circular grooves or scratches; replace if necessary.
6. Remove the seal disk **#12** from the valve body **#18**. Inspect the seal disk **#12**; make sure the raised ribs are intact. The green Teflon coating may be worn off of the ribs, but this will not affect the sealing performance of the disk. Replace the seal disk, if necessary.
7. Use a silicone base lubricant to lubricate the green side of the seal disk **#12**.
8. Remove the insert plate **#13** from the valve body **#18**. Inspect the insert plate **#13**; make sure the ribs are intact. Replace the insert plate, if necessary.
9. Remove the gasket **#14** from the valve body **#18**. Inspect the gasket **#14** for wear or damage; replace if necessary.
10. Using needle nose pliers, grasp one side of the injector **#19** and pull it straight out of the valve body **#18**.
11. Clean the surface of the valve body **#18**.
12. Lift the float valve **#16** straight out of the float valve chamber of the valve body **#18**.
13. Remove the spring **#15** from the float valve shaft.
14. Clean all sealing surfaces inside the float chamber.
15. Make sure the float valve **#16** is straight up in the float chamber of the valve body **#18**.

Instructions continued on page 39



Rotor, Seal Disk, Float Valve, Gasket and Injector Replacement (continued)

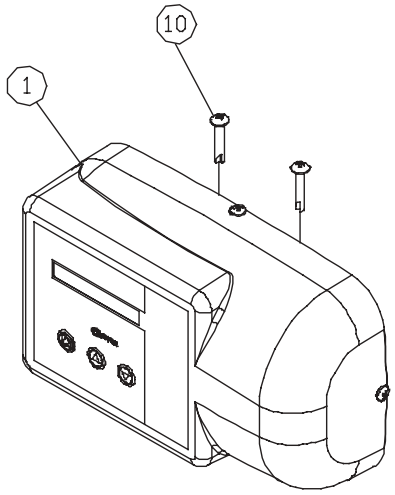
16. Reinstall the gasket **#14** and insert plate **#13** into the valve body **#18**.
17. Lightly lubricate the O-rings **#20** and **#21** of the new injector with a soapy water solution.
18. Install the injector **#19**. One of the rectangular openings on the injector should be facing directly towards the center of the valve body **#18**. Push the injector **#19** down firmly.
19. Reinstall the seal disk **#12** into the valve body **#18,** with the green side facing up.
20. Reinstall the rotor assembly **#11**, **#10**, **#9** and **#8** into the valve body **#18**, ensuring that the arrow on the worm gear **#8** is pointing directly towards the second tooth on the worm drive shaft **#30** (facing the front of the control valve). The 2 holes in the rotor assembly should now be exactly aligned with the corresponding holes in the seal disk **#12**.
21. Center the washer **#6** onto the worm gear **#8**.
22. Make sure the valve cover O-ring **#5** is clean and securely installed around the raised rib on the valve cover **#4**.
23. Lower the valve cover **#4** straight down onto the valve body **#18** and press down firmly and evenly to seat the valve cover **#4**.
24. Reinstall the 6 bolts **#3** and nuts **#22** and tighten them in a cross pattern.
25. Reinstall the drain hose to the drain line elbow **#1**.



Worm Drive Shaft Replacement

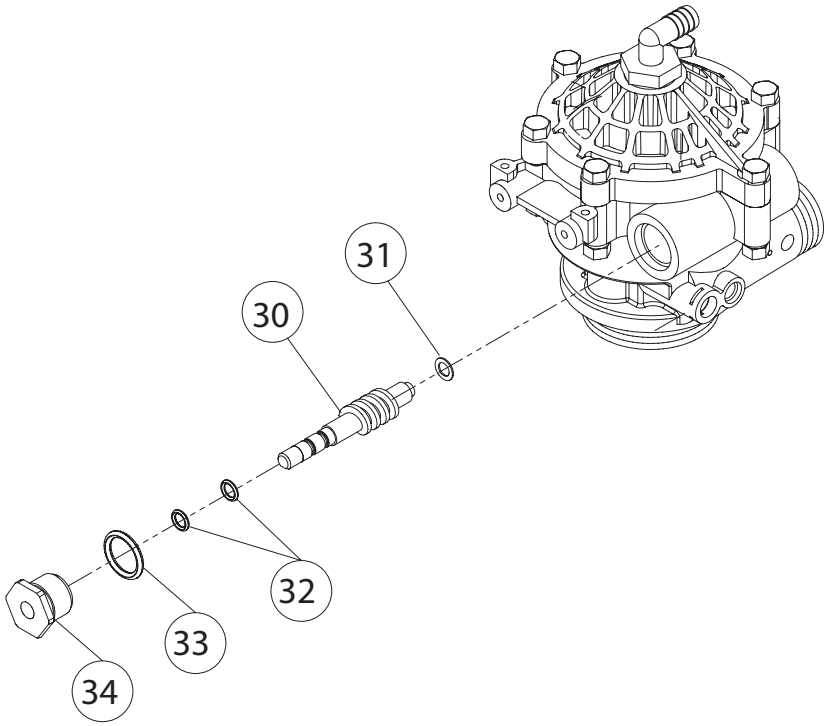
FOR STEPS 1-3 PLEASE REFER TO THE CONTROL PARTS LIST FOR REPLACEMENT PART NUMBERS

1. Disconnect all electrical power to the unit.
2. Remove the screw holding the flow meter sensor **#4** in place and remove the flow meter sensor **#4**.
3. Remove the 2 base mounting screws **#10** and take away the control head assembly.



FOR STEPS 4-13 PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

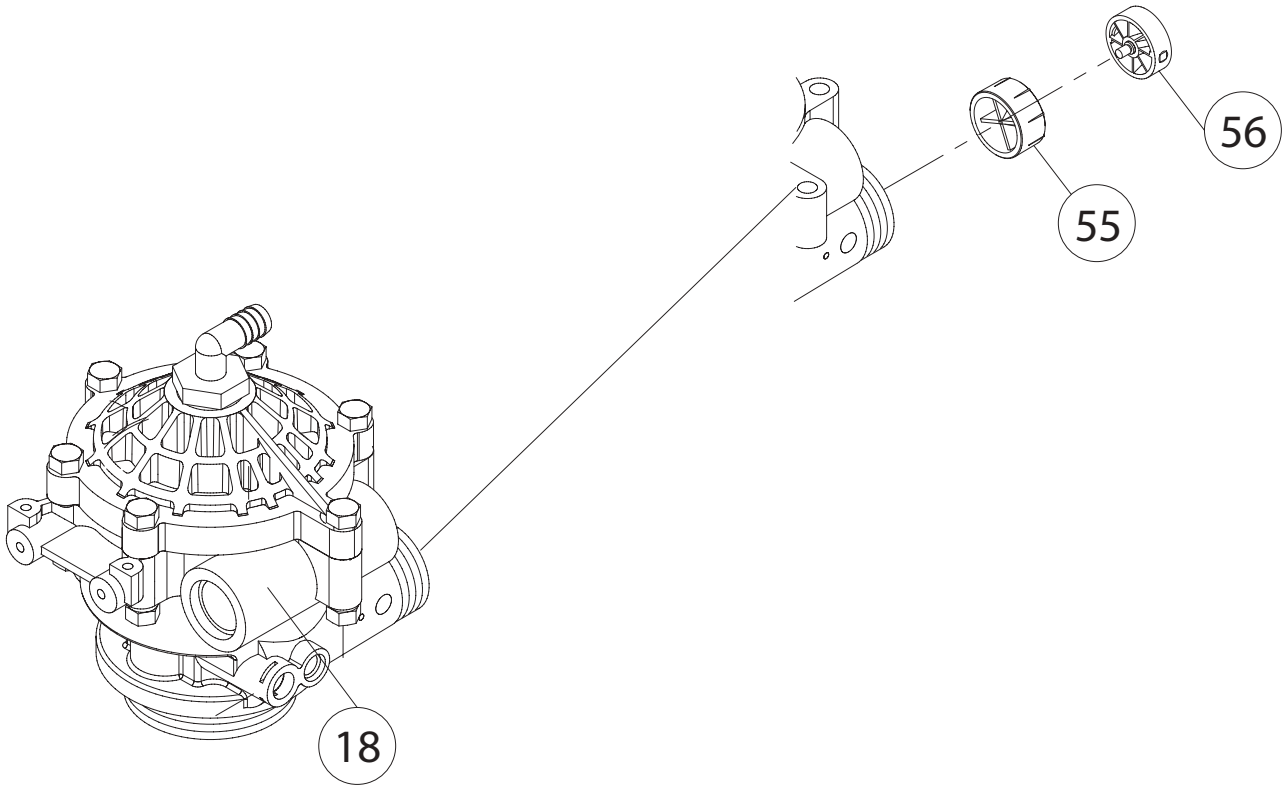
4. Unscrew the packing gland nut **#34**.
5. Remove the packing gland nut **#34**/worm drive shaft **#30** from the valve body **#18**.
6. Separate the packing gland nut **#34** from the worm drive shaft **#30**.
7. Inspect the worm drive shaft **#30**. The threads on the worm drive shaft **#30** should not be deformed or damaged; replace if necessary.
8. Check the worm drive shaft washer **#31** for wear and/or damage; replace if necessary.
9. Lubricate the O-rings **#32**.
10. Install the worm drive shaft **#30** into the valve body, by turning it clockwise, as far as possible.
11. Install the packing gland nut **#34** over the worm drive shaft **#30** and screw it into the valve body **#18**.
11. Reinstall the control head assembly onto the valve body and tighten the 2 base mounting screws **#10**.
12. Reinstall the flow meter sensor **#4**.
13. It is now necessary to check the Synchronization of the Valve Body and Control Head; refer to “Synchronization of the Valve Body and Control Head” on page 43.



Impeller Replacement

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

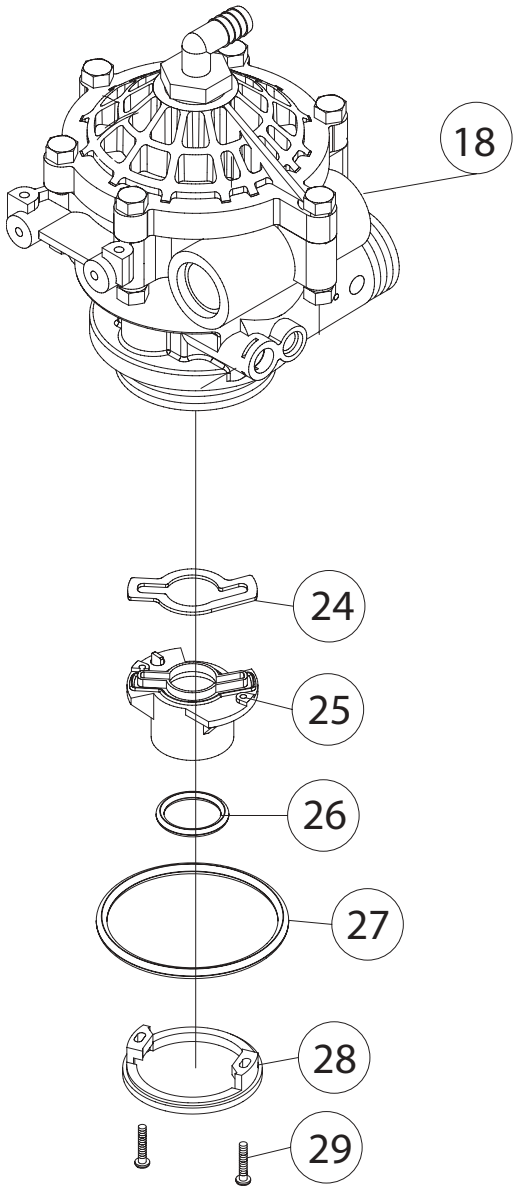
1. Remove the bypass valve assembly from the control valve.
2. Using a slot screwdriver, separate the impeller assembly **#56** from hub **#55**. The impeller hub **#55** will remain pressed into the valve body **#18**.
3. Inspect the impeller assembly **#56**; replace if necessary.
4. Reverse the procedure for reassembly.



Riser Replacement

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS

1. Place the bypass valve into the “bypassed” position.
2. Relieve the system pressure.
3. Disconnect the unit from the bypass connections.
4. Remove the unit from the resin tank. **Note: Do not use the control assembly as a handle while rotating the valve.**
5. Remove the two adapter screws **#29** and remove the adapter ring **#28**.
6. Separate the riser assembly **#24**, **#25**, **#26** and **#27** from the valve body **#18**.
7. Clean the 2 riser O-rings **#26** and **#27** and wipe out the valve body cavity.
8. Use Dow 111 Silicone based lubricant or equivalent to lightly lubricate the riser O-rings **#26** and **#27** and the valve body cavity **#18**.
9. Reverse the procedure for reassembly.



Synchronizing the Valve Body and Control Head

To ensure the proper operation of the control valve, the valve body and control head should be synchronized in the service position. Proceed as follows:

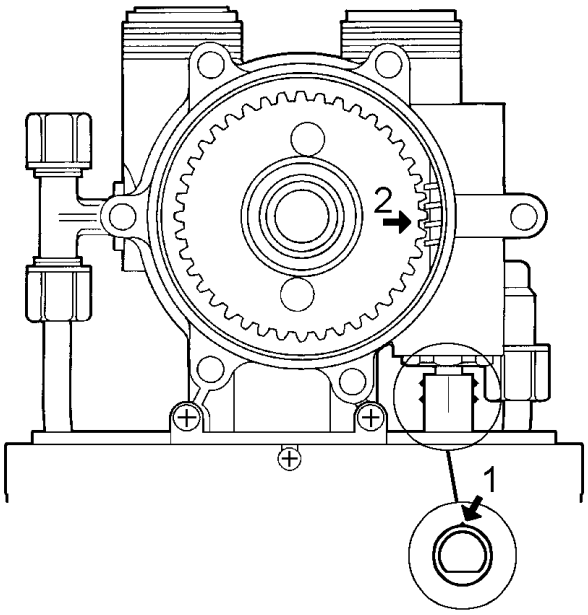
Step 1: Control Head

PLEASE REFER TO THE CONTROL HEAD PARTS LIST FOR REPLACEMENT PART NUMBERS

1. Make sure that the control valve is in the service mode; if the control valve is in regeneration, push the scroll button, to manually advance the unit through the regeneration cycles, until the display shows the time of day and gallons remaining.
2. The flat side on the drive shaft **#11** should be pointing down (mark on the drive shaft pointing up; see fig. 1). If this is not the case, please refer to "Drive Motor Replacement" on pages 33-34.

Step 2: Valve Body

PLEASE REFER TO THE ROTARY PARTS LIST FOR REPLACEMENT PART NUMBERS



1. Remove the drain hose from the drain elbow **#1**.
2. Remove the 6 bolts **#3** and nuts **#22** holding the valve body **#18** and cover **#4** together.
3. Lift the valve cover **#4** away from the valve body **#18**.
4. Make sure the arrow on the worm gear **#8** is pointing directly towards the second tooth on the worm drive shaft **#30** (facing the front of the control valve; see fig. 2). The 2 holes in the rotor assembly should now be exactly aligned with the corresponding holes in the seal disk **#12**.
5. Make sure the valve cover O-ring **#5** is clean and installed securely around the raised rib on the valve cover **#4**.
6. Lower the valve cover **#4** straight down onto the valve body **#18** and press down firmly and evenly to seat the valve cover.
7. Reinstall the 6 bolts **#3** and nuts **#22** and tighten them in a cross pattern.
8. Reinstall the drain hose to the drain line elbow **#1**.

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