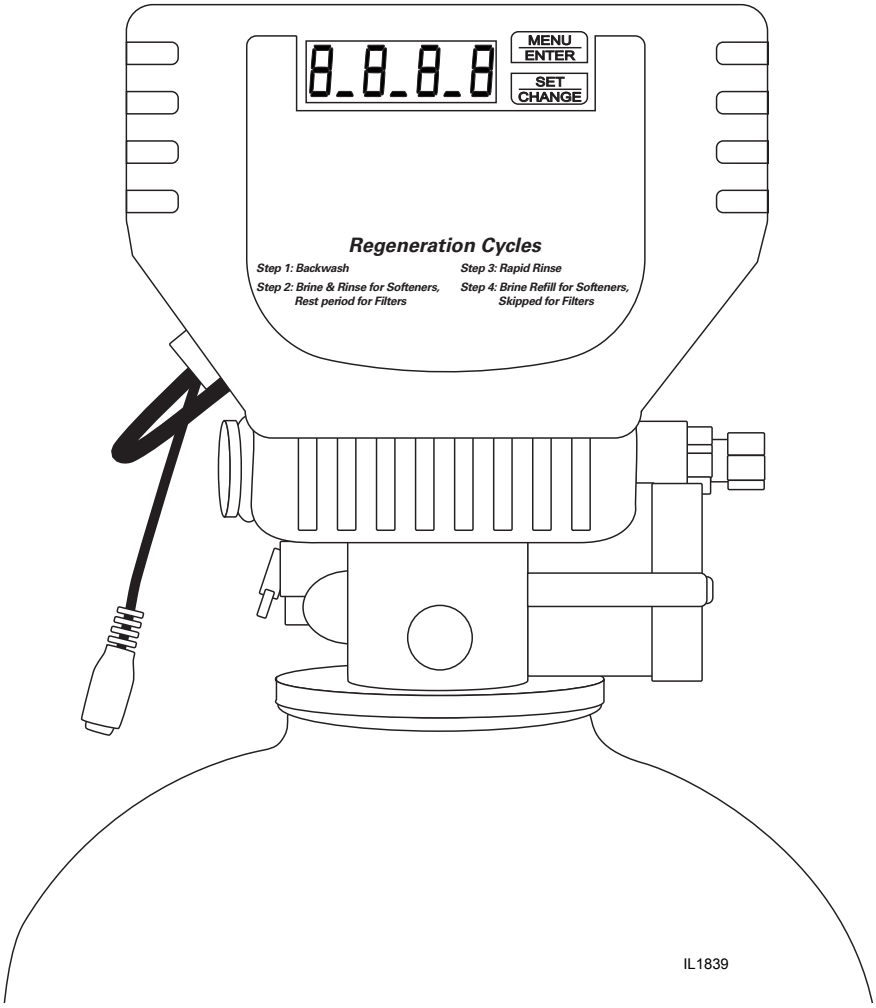
CS-2003

Service Manual



Your new CS-2003 Valve is capable of high flow rates with simple to use electronics.

95 North Oak Street · Kendallville, IN 46755
Phone: 800-345-9422 Fax: 800-848-2535

Main Menu

1. To Enter Main Menu Press the Menu/Enter Button
   (Time of Day will Flash)

2. To Set Time of Day Press the Set/Change Button
   (First Digit will begin to Flash) Example [12:00]
   - To Change Digit Value Press the Set/Change Button
   - To Accept the Digit Press the Menu/Enter Button
   - (Next Digit will Flash)
   - (Once hours is accepted all digits will Flash)

3. With all Digits Flashing Press the Menu Button to Set A.M. or P.M.
   - To Change Digit Value Press the Set/Change Button Example [A]
   - To Accept the Digit Press the Menu/Enter Button
   - (Once A.M./P.M. is Accepted the Next Menu Item will Flash)

4. (Metered Version) To Set the Hardness Press the Set/Change Button
   - To Change Digit Value Press the Set/Change Button Example [H - 10]
   - To Accept the Digit Press the Menu/Enter Button
   - (Next Digit Will Flash)
   - Once the Last Digit is Accepted all Digits will Flash
   Note: One cycle must be completed before new setting will be accepted.

5. To Exit Menu Press the Menu/Enter Button
   Note: If no Buttons are Pressed for 60 Seconds or Longer the Menu will Automatically be Exited.

Normal Operation

1. (Metered Version)
   - Normal Display Alternates Between Time of Day and Gallons of Treated Water Remaining.
   - When the display is Showing Gallons Remaining and there is Water Flow the Upper and Lower Colon Lights will Alternate.
   - As Treated Water is Used the Gallons Remaining Display will Count Down from a Maximum Value to 0.
   - Once the Count Reaches 0 a Regeneration Cycle will be Initiated at the Next Designated Regeneration Time.

2. Battery Back-Up (This Unit Uses a Standard 9 volt Alkaline Battery)
   - Installing the Battery
     - To Install the Battery the Back-Cover Must be Removed by Removing the Two Back-Cover Screws.
     - Next Insert the Battery into the Battery Holding Clip and Snap the 9 volt Battery Connector onto the Battery.
     - Replace Back-Cover

   - Features of Battery Back-Up
     - The Battery Back-Up Maintains the Time of Day During Power Failures.
     - The Battery Back-Up Continues to Count Down Gallons Remaining During Power Failure (Metered Version)

   Note: During Power Failure to Conserve Battery Power the Display is turned off. However, to Confirm that the Battery is Working you can Press Either Button and the Display will Turn on for Five Seconds.

   * Menus can not be Accessed During Power Failure
   * If a Power Failure Occurs while the Valve is in Regeneration the Regeneration will Resume Operation Once the Power is Restored

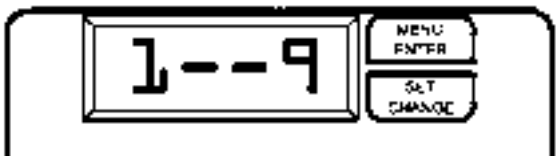
Starting Extra Regeneration Cycle

1. Starting Delayed Extra Cycle
   -If Gallons Remaining is not Already at 0 Press and Hold the Set/Change Button
   -After 3 Seconds the Gallons Remaining Display will Read 0 Example [0000]
   -Regeneration Cycle will be Initiated at the Next Designated Regeneration Time

2. Starting Immediate Extra Cycle - First, Complete Above Delayed Cycle Steps
   -With Gallons Remaining at 0, Press and Hold the Set/Change Button
   -After 3 Seconds the Regeneration Cycle will Begin

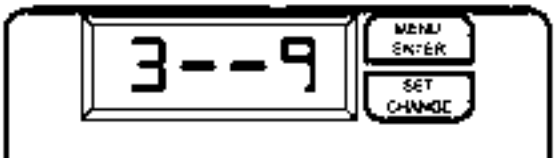
3. Fast Cycling Thru Regeneration
   -First Complete Above Immediate Cycle Steps
   -Press and Hold the Set/Change Button
   -After 3 seconds the Valve will Start to Advance to the Next Step

Sample Regeneration Cycle Displays

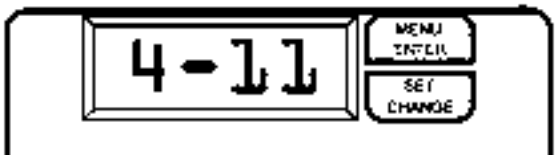


Step 1: Less Than 9 Minutes Remaining in the Backwash Step

Step 2: Less Than 59 Minutes Remaining in the Brine/Rinse Step (For Filters & Reactr, this is a Rest Period)



Step 3: Less Than 9 Minutes Remaining in the Rapid Rinse Step



Step 4: Less Than 11 Minutes Remaining in the Brine Refill Step (For Filters, this Step is Skipped)

Step 5: Valve is In Service

Notes:

-When the Valve is Between Positions the Display will Flash the Number of the Step it is Moving towards.

-To Fast Cycle Thru Regeneration Press and Hold the Set/Change Button Until the Valve Starts to Advance to the Next Step.

Final Set-Up

With Proper Valve Operation Verified:

1. Add water to the top of the air check. Manually step the valve to the Brine Draw Position and allow the valve to draw water from the brine tank until it stops. Note: The air check will check at approximately the mid point of the screened intake area.

2. Next, manually step the valve to the Brine Refill Position and allow the valve to return to Service automatically.

3. With the valve in Service, check that there is about 3.0” to 5.0” of water above the grid in the brine tank, if used.

4. Fill the brine tank with salt.

5. Set-Up is now finished, the control can now be left to run automatically.

Error Codes

There are four (4) error codes that could indicate a possible problem with the control valve:

Error 2 - Homing slot expected. Valve will start looking for home. (Normal operation continues)

Error 3 - Encoder is not sending a signal (Valve requires service to continue)

Error 4 - Unable to find homing slot (Valve requires service to continue)

Error 5 - Motor overload (stalled position or shorted motor) (Valve requires service to continue)

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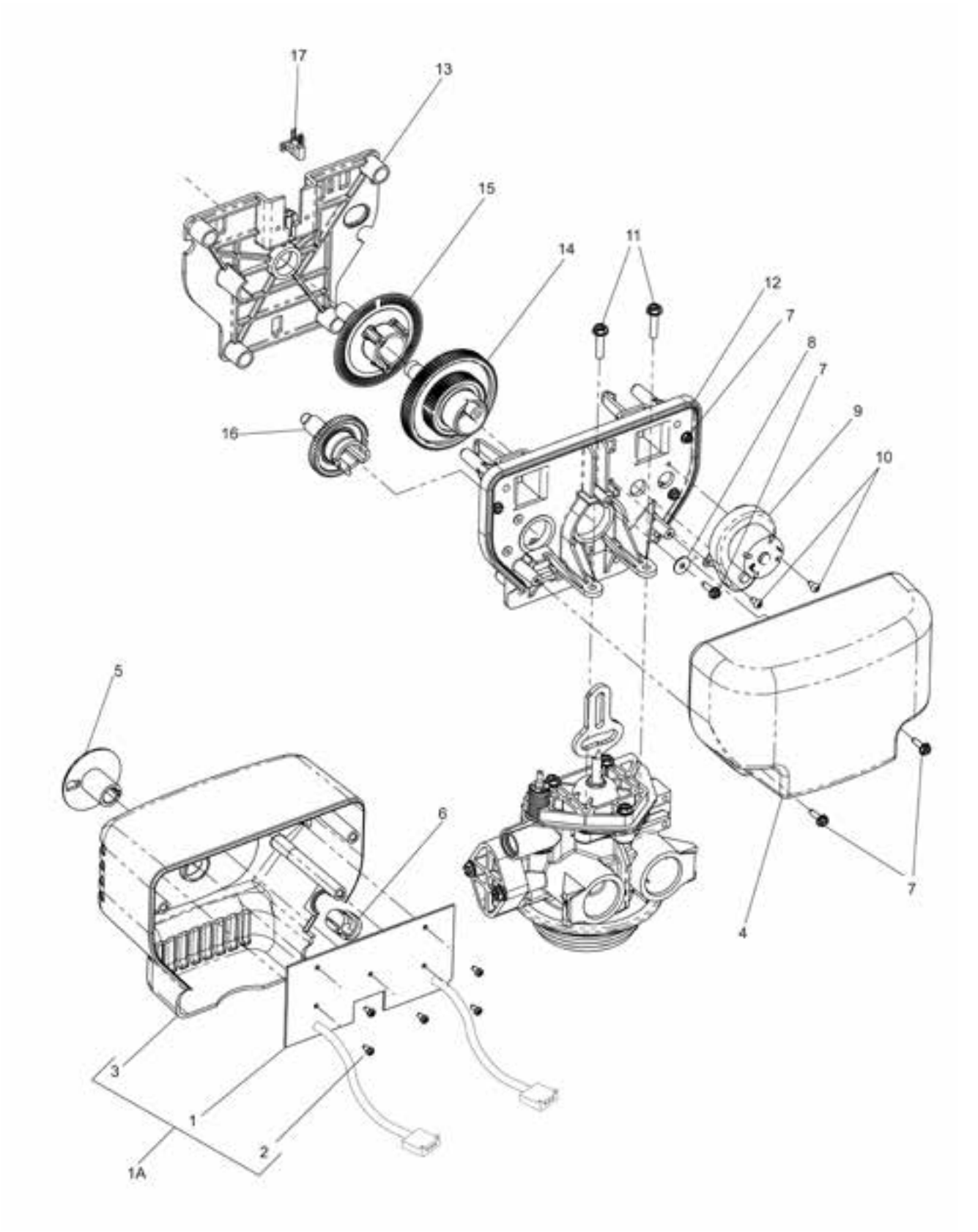
Valve Powerhead Assembly



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Valve Powerhead Assembly Parts List

Ref. No.	Quantity	Part No.	Description
0	1	20001X100	Powerhead Assembly Complete (Timeclock Softener)
0	1	20002X100	Powerhead Assembly Complete (Filter)
0	1	20003X100	Powerhead Assembly Complete (Metered Softener w / meter)
0	1	20003X101	Powerhead Assembly Complete (Metered Softener w/o meter)
0	1	20005X100	Powerhead Assembly Complete (Reactr)
1A	1	20001X101	Circuit Board Assembly Includes (1) Ref. #1, (5) Ref. #2 & (1) Ref. #3
1	1	N/S	Circuit Board
2	5	N/S	Screw
3	1	N/S	Front Cover and Label
4	1	20001X106	Rear Cover
5	1	20001X109	Indicator Dial
6	1	20001X110	Hayco Fitting
7	1	20001X111	Screw
8	3	20001X112	Washer
9	1	20001X113	Drive Motor 12 VDC
10	1	20001X114	Screw
11	1	20001X116	Screw
12	1	20001X118	Back Plate
13	1	20001X119	Front Plate
14	1	20001X120	Main Gear
15	1	20001X121	Encoder Wheel
16	1	20001X122	Brine Cam
17	1	20001X124	Encoder
18	1	20001X125	Power Supply (not pictured)

N/S = Non Stocked Item
Bold Ref. No. Indicates Assembly or Kit

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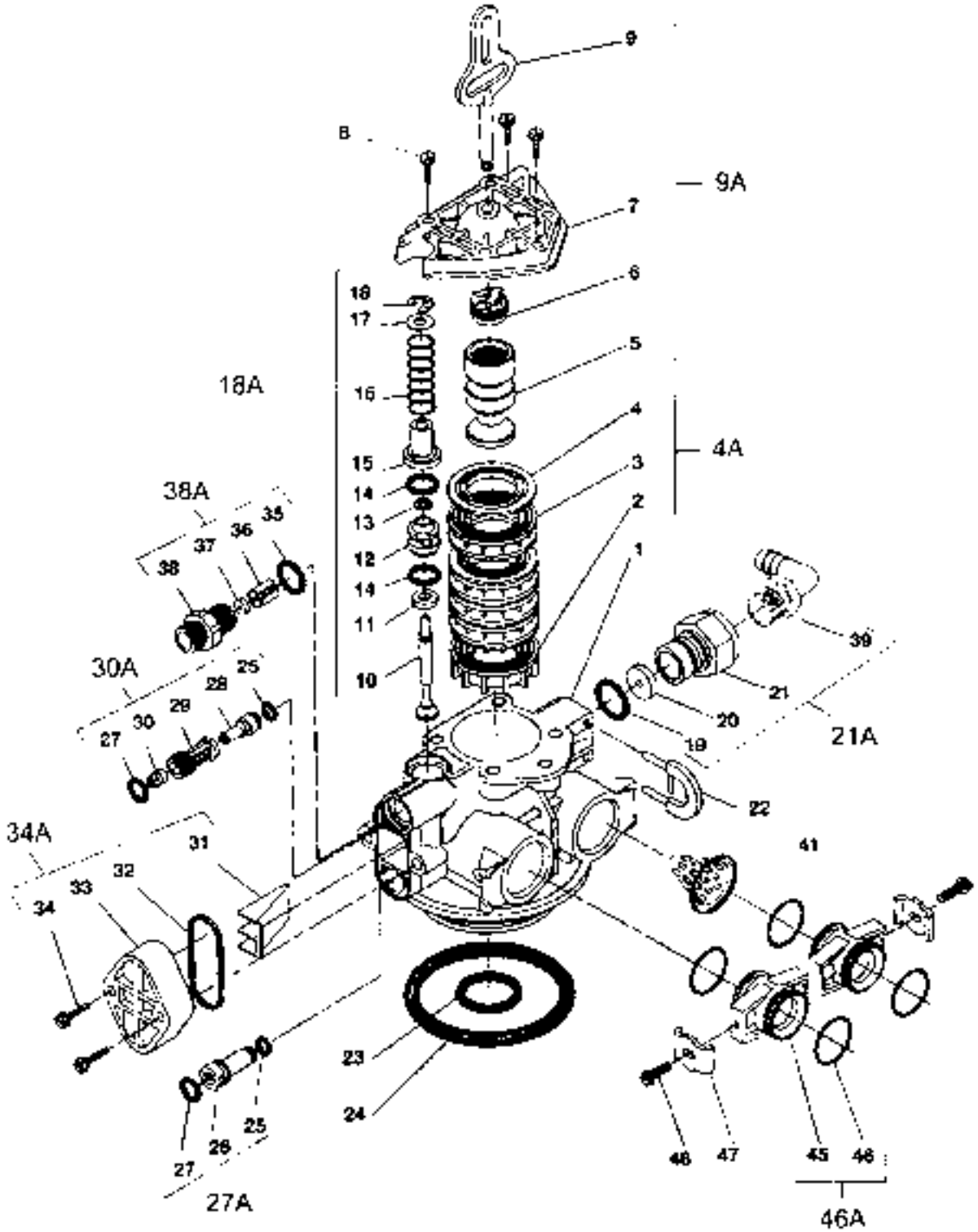
Control Valve Assembly



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Control Valve Assembly Parts List

Ref. No.	Quantity	Part No.	Description
0	1	20001X200	Valve Body Complete
1	1	20001X201	Valve Body Only
2	1	N/S	End Spacer
3	4	N/S	Spacer
4	5	N/S	Seal
4A	1	20001X232	Seal & Spacer Kit Includes (1) Ref. #2, (4) Ref. #3 & (5) Ref. #4
5	1	N/S	DownFlow Piston
6	1	N/S	Piston Rod Retainer
7	1	N/S	End Plug Assembly
8	3	N/S	Hex Washer HD. 10-24 X 13/16” Screw
9A	1	20001X231	Piston Assembly Includes (1) Ref. #5, (1) Ref. #6, (1) Ref. #7, & (1) Ref. #9
10	1	N/S	Brine Valve Stem
11	1	N/S	Brine Valve Seat
12	1	N/S	Brine Valve Spacer
13	1	N/S	Quad Ring
14	1	N/S	O-Ring
15	1	N/S	Brine Valve Cap
16	1	N/S	Brine Valve Spring
17	1	N/S	Plain Nylon Washer
18	1	N/S	Retaining Ring
18A	1	20001X210	Brine Assembly Includes Ref. #10 Thru 18
19	1	20251X254	O-Ring
20	1	20251X266	Flow Control Button 1.5 GPM
		20251X267	Flow Control Button 2.0 GPM
		20251X268	Flow Control Button 2.4 GPM
		20251X269	Flow Control Button 3.0 GPM
		20251X270	Flow Control Button 3.5 GPM
		20251X271	Flow Control Button 4.0 GPM
		20251X272	Flow Control Button 5.0 GPM
		20251X274	Flow Control Button 7.0 GPM
21	1	N/S	Plastic Flow Control Housing
21A	1	Flow Control Assembly - Specify GPM on Order. Includes (1) #19, (1) #20, (1) #21, & (1) #39	
		20251X256	Flow Control Assembly 1.5 GPM - PVC
		20251X257	Flow Control Assembly 2.0 GPM - PVC
		20251X258	Flow Control Assembly 2.4 GPM - PVC
		20251X259	Flow Control Assembly 3.0 GPM - PVC
		20251X260	Flow Control Assembly 3.5 GPM - PVC
		20251X261	Flow Control Assembly 4.0 GPM - PVC
		20251X262	Flow Control Assembly 5.0 GPM - PVC
		20251X264	Flow Control Assembly 7.0 GPM - PVC
22	1	20001X214	Drain Retainer
23	1	20561X204	O-Ring
24	1	20001X215	O-Ring
25	2	N/S	O-Ring
26	1	N/S	Injector Plug
27	2	N/S	O-Ring
27A	1	20001X217	Injector Plug & O-Ring Assembly Includes (1) #25, (1) #26, & (1) #27
28	1	N/S	Injector Throat
29	1	N/S	Injector Nozzle
30	1	N/S	Vortex Generator
30A	1	20001X219	Injector Assembly - Specify Size. Includes 1 Each of Ref. #25, 27, 28, 29, & 30
31	1	20001X222	Injector Screen
32	1	20001X224	Injector Seal
33	1	20001X223	Injector Cap
34	2	20001X226	10-24 X 1 Hex Washer HD Screw
34A	1	20001X220	Injector Kit - Specify Size. Includes 1 Each of Ref. #30A, 31, 32, 33, & (2) of Ref. #34
35	1	20561X239	O-Ring
36	1	20561X240	BLFC Button Retainer
37	1	20251X318	5 GPM BLFC Button
38	1	20561X241	BLFC Adapter
38A	1	20001X228	BLFC Assembly .5 GPM. Includes 1 Each of Ref. #35, 36, 37, & 38
39	1	20251X255	Drain Line Fitting 90 Degree Elbow 1/2” NPT X 1/2” Tubing

Items 45 Thru 48 Used Only With Clock Regen.

45	2	N/S	Adapter Coupling
46	4	20561X216	O-Ring
46A	1	20561X215	Adapter Coupling & O-Ring Assembly. Includes Ref. (1) #45 & (2) #46
47	2	20561X201	Mounting Clip
48	2	20561X217	8-18 X 5/8” Hex Washer HD Screw

N/S = Non Stocked Item
Bold Ref. No. Indicates Assembly or Kit

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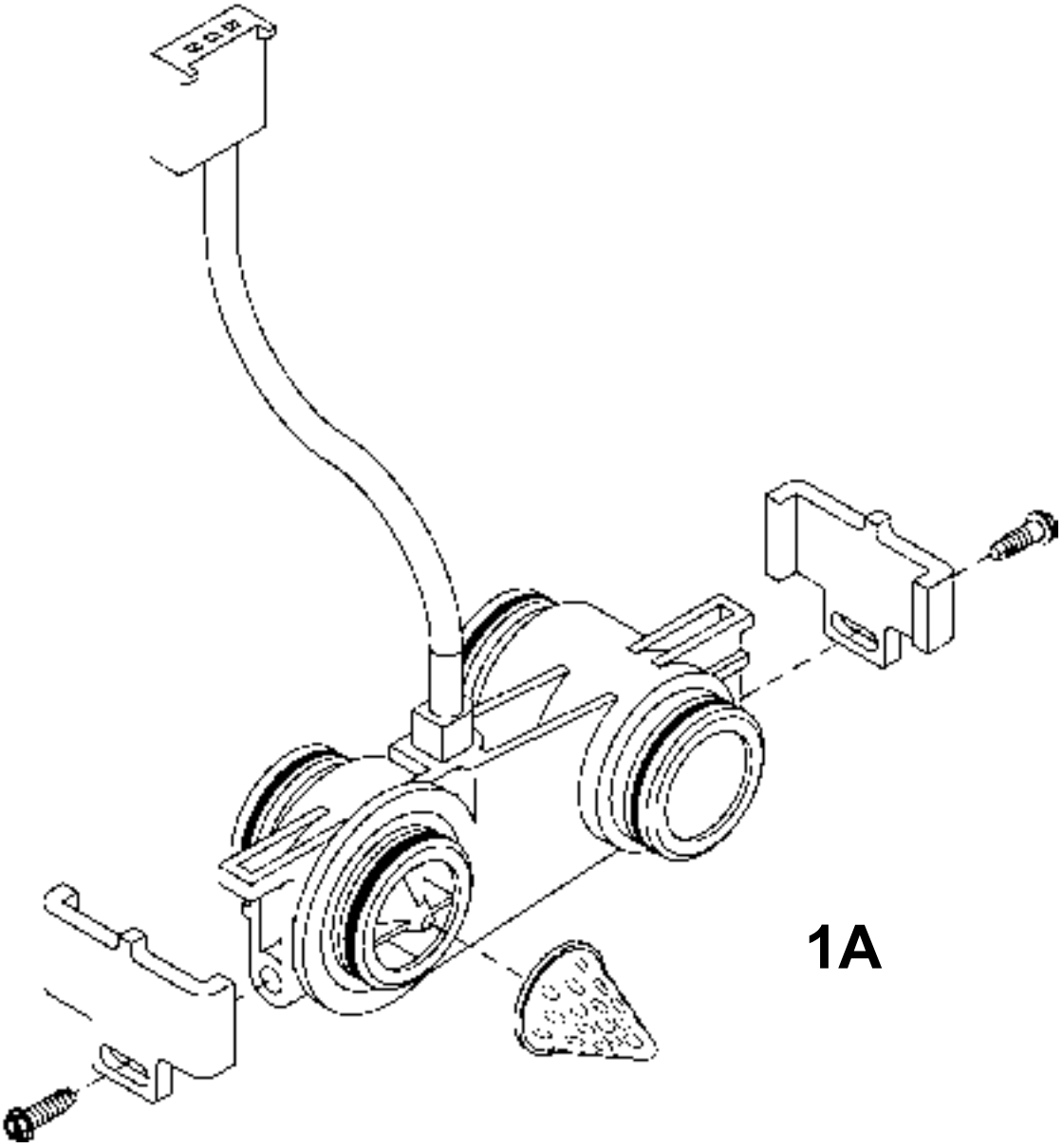
3/4” Turbine Meter Assmebly



Ref. No.	Quantity	Part No.	Description
1A	1	20564X200	Meter Assembly, Turbine Complete

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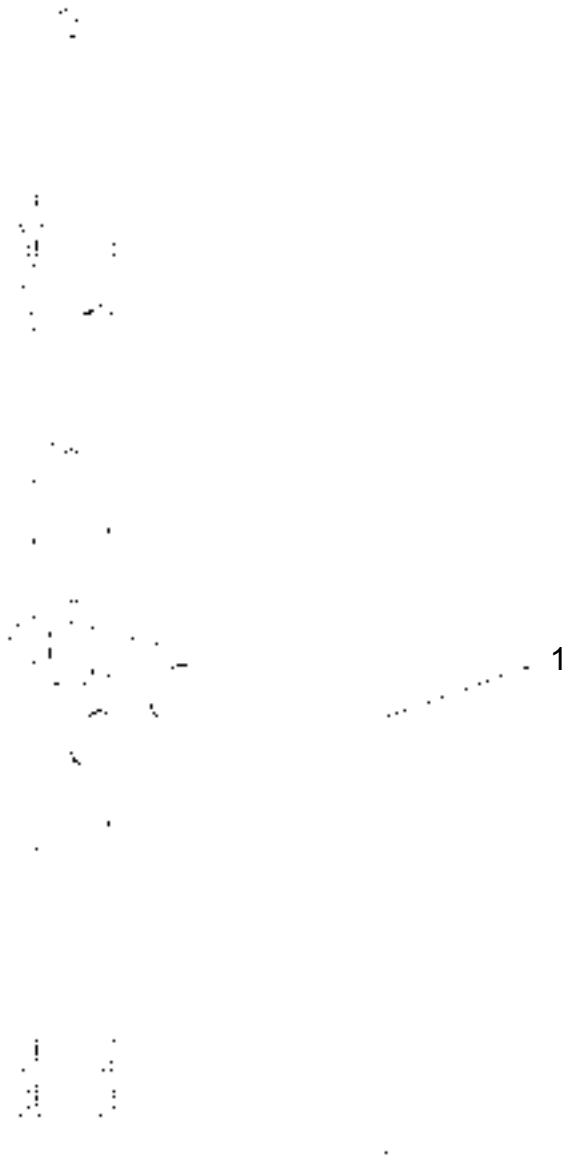
By-Pass Valve Assembly, Stainless Steel



Parts List

Ref. No.	Quantity	Part No.	Description
1	1	20561X270	Bypass Valve ¾” Stainless Steel
	1	20561X283	Bypass Valve 1” Stainless Steel

A. To REPLACE BRINE VALVE, INJECTORS, AND SCREEN

1. Turn off water supply to conditioner:
   a. If the conditioner installation has a “three valve” by-pass system, first open the valve in the by-pass line, then close the valves at the conditioner inlet and outlet.
   b. If the conditioner has an integral by-pass valve, put it in the by-pass position.
   c. If there is only a shut-off valve near the conditioner inlet, close it.
2. Relieve water pressure in the conditioner by stepping the control into the backwash position momentarily. Return the control to the service position.
3. Unplug electrical cord from outlet.
4. Disconnect brine tube and drain line connections at the injector body.

5A. To Replace Brine Valve.

1. Remove the control valve back cover. Disconnect the meter signal wire from the meter.
2. Remove screw and washer at drive yoke. Remove powerhead mounting screws. The entire powerhead assembly will now lift off easily.
3. Remove piston retaining plate screws and Pull upward on end of piston yoke until assembly is out of valve.
4. Pull brine valve from injector body, also remove and discard O-ring at bottom of brine valve hole.
5. Apply silicone lubricant to new O-ring and reinstall at bottom of brine valve hole.
6. Apply silicone lubricant to O-ring on new Brine valve assembly and press into brine valve hole, shoulder on bushing should be flush with injector body.

5B. To Replace Injectors and Screen.

1. Remove injector cap screws, remove cap & discard gasket. Remove vortex generator from end of the injector assembly.
2. Remove injector assembly. Apply silicone lubricant to new injector assembly o-rings and install. Be sure to push injector assembly in tightly so o-rings are seated. Replace vortex generator. Install a new screen.
3. Apply silicone lubricant to new gasket and install around oval extension on injector cap.
6. Insert screws thru injector cap and into mating holes in the valve body. Tighten screws.
7. Reconnect brine tube and drain line.
8. Return by-pass or inlet valving to normal service position. Water pressure should now be applied the conditioner, and any by-pass line shut off.
9. Check for leaks at all seal areas. Check drain seal with the control in the backwash position.
10. Plug electrical cord into outlet.
11. Set time of day and cycle the control valve manually to assure proper function. Make sure control valve is returned to the service position.
12. Make sure there is enough salt in the brine tank.
13. Start regeneration cycle manually if water is hard.

B. To Replace Powerhead

1. Remove the control valve back cover. Remove the three screws along the outer edge of the back plate and remove the front cover. Disconnect the power supply and the circuit board signal wire from the motor and feed them back through the control. Disconnect the optical sensor signal wire. Disconnect the meter signal wire from circuit board and feed back through the control.
2. Remove screw and washer at drive yoke. Remove powerhead mounting screws. The entire powerhead assembly will now lift off easily.
3. Put new powerhead on top of the valve. Be sure the drive pin on main gear engages slot in drive yoke (wide side of drive yoke upright must face to the left away from the motor).
4. Replace powerhead mounting screws. Replace screw and washer at drive yoke.
5. Reconnect meter signal, optical sensor, power supply, and circuit board signal wires.
6. Reinstall front cover and back cover.

C. To Replace Piston Assembly

1. Follow Steps A.1 through A.3.
2. Remove control valve back cover. Disconnect the meter signal wire from the meter.
3. Remove screw and washer at drive yoke. Remove powerhead mounting screws. The entire powerhead assembly will now lift off easily.
4. Remove piston retaining plate screws.
5. Pull upward on end of piston yoke until assembly is out of valve.

TO REPLACE PISTON ASSEMBLY (Cont'd.)

6. Inspect the inside of the valve to make sure that all spacers and seals are in place, and that there is no foreign matter that would interfere with the valve operation.
7. Take new piston assembly as furnished and push piston into valve by means of the end plug. Twist drive yoke carefully in a clockwise direction to properly align it with drive gear. Reinstall piston retaining plate screws.
8. Place powerhead on top of valve. Be sure drive pin on main gear engages slot in drive yoke (wide side of drive yoke upright must face to the left away from the motor).
9. Replace powerhead mounting screws. Replace screw and washer at drive yoke.
10. Reconnect brine tube and drain line.
11. Return by-pass or inlet valving to normal service position. Water pressure should now be applied to the conditioner, and any by-pass line shut off.
12. Replace the control valve back cover.
13. Follow Steps A.9 through A.13.

D. TO REPLACE SEALS AND SPACERS

1. Follow Steps A.1 through A.3.
2. Remove the control valve back cover. Disconnect the meter signal wire from the meter
3. Remove screw and washer at drive yoke. Remove powerhead mounting screws. The entire powerhead assmebly will now lift off easily. Remove piston retaining plate screws.
4. Pull upward on end of piston rod yoke until assembly is out of valve. Remove and replace seals and spacers.
5. Take piston assembly and push piston into valve by means of the end plug. Twist yoke carefully in a clockwise direction to properly align it with drive gear. Reinstall piston retaining plate screws.
6. Place powerhead on top of valve. Be sure drive pin on main gear engages slot in drive yoke (wide side of drive yoke upright must face to the left away from motor).
7. Replace powerhead mounting screws. Replace screw and washer at drive yoke.
8. Return by-pass or inlet valving to normal service position. Water pressure should now be applied to the conditioner, and any by-pass line shut off.
9. Replace the control valve back cover.
10. Follow Steps A.9 through A.13.

E. TO REPLACE METER

1. Follow Steps A.1 through A.3.
2. Remove two screws and clips at by-pass valve or yoke. Pull resin tank away from plumbing connections.
3. Remove signal wire from meter.
4. Remove two screws and clips at meter and pull the meter out of the control valve.
5. Apply silicone lubricant to four new O-rings and assemble to four ports on new meter.
6. Assemble meter to control valve. Note, meter portion of module must be assembled at valve outlet. Install two screws and clips.
7. Install signal wire into new meter.
8. Push resin tank back to the plumbing connections and engage meter ports with by-pass valve or yoke.
9. Attach two clips and screws at by-pass valve or yoke. Be sure clip legs are firmly engaged with lugs.
10. Return by-pass or inlet valving to normal service position. Water pressure should now be applied to the conditioner, and any by-pass line shut off.
11. Check for leaks at all seal areas.
12. Follow steps A.9 through A.13.

F. TO CHECK DRIVE MOTOR OPERATION

1. Remove the control valve back cover.
2. To verify drive motor operation, push service button located on back of motor. Motor should run. Release button. After 1 minute the control should automatically advance to Rapid Rinse (cycle #3) Position. It will remain in Rapid Rinse for 5 minutes and then advance to Service Position.

Troubleshooting Guide

SYMPTOM	PROBABLE CAUSE	CORRECTION
1. Softener fails to regenerate automatically.	A. Power supply plugged into intermittent or dead power source.	A. Connect to constant power source.
	B. Disconnected meter cable.	B. Reconnect cable.
	C. Improper control valve programming.	C. Reset program settings.
	D. Defective power supply.	D. Replace power supply.
	E. Defective circuit board or meter.	E. Replace or Repair
	F. Defective drive motor.	F. Check motor operation by activating the service button on back of motor.
2. Regeneration at wrong time.	A. Time of day improperly set, due to power failure.	A. Reset time of day programming and install 9 volt battery.
	B. Regeneration time set improperly.	B. Reset Regeneration time programming.
3. Loss of capacity.	A. Increased raw water hardness.	A. Reset unit to the new capacity.
	B. Brine concentration and/or quantity.	B. Keep brine tank full of salt at all times. Clean it yearly. Salt may be bridged. If using a salt grid plate ensure refill water is over it.
	C. Resin fouling.	C. Call dealer, find out how to confirm it, clean the resin and prevent future fouling.
	D. Poor distribution, Channeling (uneven bed surface).	D. Call dealer. Check distibutors and backwash flow.
	E. Internal valve leak.	E. Call dealer. Replace spacers, seals and/or piston.
	F. Resin age.	F. Call dealer. Check for resin oxidation caused by Chlorine. Mushy resin.
	G. Resin Loss.	G. Call dealer. Check for correct bed depth. Broken distibutors. Air or gas in bed: Well gas eliminator. Loose brine line.
4. Poor water quality.	A. Check items listed in #1, #2, & #3.	
	B. Bypass valve open.	B. Close by-pass valve.
	C. Channeling.	C. Check for too slow or high service flow. Check for media fouling.
5. High salt usage.	A. High salt setting.	A. Adjust brine tank refill time.
	B. Excessive water in brine tank.	B. See symptom No. 7.
	C. Constant flow through the unit.	C. Indicates plumbing leak (ie. toilet tank).
	D. Improperly set hardness, Regeneration frequency or regeneration day override programming.	D. Reset programming

Troubleshooting Guide (Cont'd.)

SYMPTOM	PROBABLE CAUSE	CORRECTION
6. Loss of water pressure.	A. Scaling/Fouling of inlet pipe.	A. Clean or replace pipeline. Pretreat to prevent.
	B. Fouled resin.	B. Clean resin. Pretreat to prevent.
	C. Improper backwash.	C. Too many resin fines and/or sediment. Call dealer, reset backwash flow rate, and/or adjust time
7. Excessive water in brine tank and/or salty water to service.	A. Plugged Drain Line.	A. Check flow to drain. Clean flow control.
	B. Dirty or damaged brine valve.	B. Clean or replace brine valve.
	C. Plugged Injector.	C. Clean injector and replace screen.
	D. Low inlet pressure.	D. Increase pressure to allow injector to perform properly (20psig minimum).
	E. Excessive brine refill cycle time.	E. Reset brine refill cycle time.
8. Softener fails to use salt.	A. Check items listed in #1.	
	B. Improper control valve programming.	B. Check and reset programming.
	C. Plugged/restricted drain line.	C. Clean drain line and/or flow control.
	D. Injector is plugged.	D. Clean or replace injector and screen.
	E. No water in brine tank.	E. Check for restriction in BLFC. Ensure safety float is not stuck. Check brine tank for leaks.
	F. Water pressure is too low.	F. Line pressure must be at least 20 psi.
	G. Brine line injects air during brine draw.	G. Check brine line for air leaks.
	H. Internal control leak.	H. Call dealer, Check piston, seals and spacers for scratches and dents.
9. Control cycles continuously.	A. Faulty circuit board.	A. Replace circuit board.
10. Continuous flow to drain.	A. Foreign material in control.	A. Call dealer. Clean valve, rebuild unit.
	B. Internal control leak.	B. Same as above.
	C. Valve jammed in backwash, brine, or rapid rinse position.	C. Same as above
	D. Motor stopped or jammed.	D. Replace motor.