Water King
WATER CONDITIONING

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Technical Service Manual

for

1½" and 2"Control Valves

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I. Brine Draw Failure

A. Clogged Injector – Check the throat and nozzle (more commonly referred to as the injector). The opening should be clear of debris and build-up from iron. To clear any debris from the injector a small object, such as a welders tip cleaner, should be used to scrap any build-up that may exist. If you choose to remove the injector, be careful not to damage the threads.

Note: Threads only apply to the HF-2" Series control valve. When replacing the injector tighten to snug *only*. Do *not over tighten the throat and nozzle.*

The injector uses an "O" ring. If the "O" ring is worn, torn, or is not in place pressure (suction) will be lost. If the injector cannot be cleaned or if it is in poor condition, replace it with the appropriate replacement part.

B. Clogged Brine Valve – Check the brine valve body for debris that may have been drawn into the valve. *The brine tank may need to be emptied and cleaned.* Remove any debris from the brine valve and replace any "O" rings that are damaged. If the brine shut-off valve is closed open it fully.

C. Clogged Drain Casting – The flow control may be clogged as well. Remove any debris from the flo-et and replace the gasket if necessary.

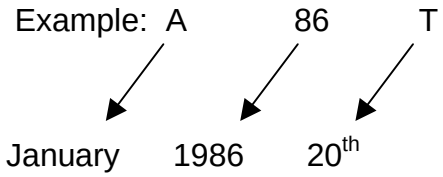
D. Low Water Pressure – Low water pressure will prevent adequate flow. The water pressure should be no less that 25 PSI.

E. Air Leaks In The Brine Valve – Salt deposits or corrosion at the joints will cause air leaks in the brine valve. Clean the joints thoroughly and use pipe dope on the threads to insure tight seals. Clean the union seats and tighten the bonnet on the brine shut-off valve.

F. Sediment Build-Up – Over time sediment will build in the bottom of the brine tank. Empty and clean the tank thoroughly.

G. Worn Piston Seals – Plunger assemblies house seals which act as barriers directing water flow during each cycle (backwash, fast rinse, brine & slow rinse & service). These seals may become worn and tear. Some of the piston assemblies have replacement seals that are made of ethylene and propylene material. Others come as complete assemblies *only* which include the piston quads.

Piston assemblies are specifically designed by the manufacturer. The date the system was built designates which piston is used in each valve body. The Serial No., which can be located in the control box, can be cross referenced to determine the date the system was built.



1½" Kit Piston Assemblies		
Part Number	From	To
514001-5 (NOT AVAIL.)	1978	June 1983
514001-6 (NOT AVAIL)	June 1983	November 1986
514001-55 Piston 514001-51 Seal Kit	November 1986	Present

2" Kit Piston Assemblies		
Part Number	From	To
514001-7 (NOT AVAIL)	1978	November 1986
514001-56 Piston 514001-52 Seal Kit	November 1986	Present

Note: If a 1 ½" or 2" valve body is ordered for replacement, the "old style" piston assembly (514001-5, 514001-6 or 514001-7) must also be replaced with the "new style" piston assembly (514001-55 or 514001-56) because the valve body bore is slightly different..

II. Hardness Bleed Through

A. Piston Seals – A common cause for hardness bleed through is worn piston seals. Replace the piston with the appropriate piston assembly. Piston SEAL kits are also available.

When replacing the seals on existing pistons, the end nut must be properly tightened to correctly expand the seals. Tighten the nut on a 2" piston until the seal diameter is 2.505" to 2.515". A 1-1/2" piston should be 1.680" in diameter.

B. Inadequate Regeneration – Check for proper setting on the back side of the timer. The factory setting are:

PIN TIME CHART

	MINUTES		
	ARC Timers	6/12 Day Timers	7 Day Timers
Backwash	12	12	14
Brine & Slow Rinse	53	53	60
Fast Rinse	12	12	14

C. Salt Level – Lack of salt in the brine tank will cause improper recharging of the resin in the mineral tank. Check the salt level (height) in the brine tank to ensure proper mixture occurs and is drawn into the mineral tank during the brine draw cycle. If a large amount of hardness is detected, a higher setting of the float is required.

D. System Regeneration Time – Hardness bypass on a twin system will occur when there is not a sufficient amount of time available between regeneration of each unit. A minimum of eight (8) hours is needed to accumulate 100% brine unless a brine maker system is being utilized.

III. Piston Assembly Calibration

After determining the injector, brine assembly, and drain assemblies are not the cause of hard water bypass, then check the plunger for proper calibration.

In order to calibrate the piston assembly, first advance the timer to the brine draw/slow rinse position (refer to O & M for valve positioning) stopping at the backwash position before moving on to the next position. The drive link assembly should be positioned at 90° relative to the lower cap assembly. Check the brine inlet for vacuum. If the brine inlet *does not* have a vacuum, then follow the instruction below for adjusting the plunger.

Forward Adjustment – In order to advance the drive link, return the plunger to the service position. Disconnect the power supply. Using a ¼" drive, loosen the cam nut, reconnect the power supply and turn it on. Advance the plunger to the brine draw/slow rinse position. Check the brine line for vacuum. If there is not a vacuum in the brine line, the process may need to be repeated. The rotation of the cam may need to be in the opposite direction.

Reverse Adjustment – In order to reverse the plunger assembly, loosen the cam nut in the service position with the power supply turned off. Move the cam counter clockwise so that the cam ledge is against the micro switch arm. Tighten the cam nut. Advance the plunger to the brine draw/slow rinse position. Check the brine inlet for vacuum. If there is no vacuum on the line, the process may need to be repeated. The rotation of the cam may need to be in the opposite direction.

Note: In order to prevent misarranging the plunger and cam, do *not* adjust the cam assembly more than 1/8" at a time.

If the alignment of the plunger and cam are at different cycles, turn off the power supply and loosen the cam nut. Move the cam to a position where all three (3) micro switches are depressed. Reconnect the power supply. The drive motor will be engaged and will begin to move the plunger assembly. Disconnect the power supply when the plunger reaches the service position. Moving the cam counter-clockwise, stop the cam when all three (3) micro switch arms have disengaged. Tighten the cam nut and cycle the plunger for proper positioning. Adjust the cam assembly in the proper direction for calibration.

If the calibration procedure does not solve the lack of brine draw on the system, replace the plunger assembly or consult a factory service technician.

IV. Salt Water In The Service Lines

A common cause for having salt in the service line is the lack of the slow rinse and fast rinse cycles. This problem can be caused by a clogged injector, a clogged brine valve, and/or a clogged drain casting (refer to Part I., Item's A., B., and C. of this manual for instruction).

A *clogged injector* will not allow enough brine to enter into the mineral tank during the brine draw/slow rinse cycle. It should take approximately 20 minutes to extract all of the brine from the brine tank. After the brine has been drawn from the brine tank the slow rinse cycle begins, yet the piston position does not advance. Clean water rinses the brine from the mineral tank throughout the fast rinse cycle. The brine tank will refill after the completion of the fast rinse cycle.

A *clogged brine valve* will slow the brine draw as well. Check the brine valve for obstructions. Remove any debris that is in the valve.

A *clogged drain casting* will not allow adequate water flow across the injector to create a vacuum. This will not allow the system to regenerate and/or it will create salt in the service line.

This manual was written for the purpose of assisting with technical service and is not intended to replace the technical staff at Water King, Inc. If at any point during the repair you are not sure of the proper steps for maintaining your system, please contact our technical service staff at Water King.

Conditioner Start Up

1. Close all inlet and outlet valves.
2. Close brine line valve if used.
3. Supply electrical power to unit(s). Fill brine tank(s) with water to a point 1 inch (2.5 cm) above grid using a hose or bucket. **Do not add salt to brine tank at this time.**

> ⚠ **Caution**
> **Keep hands away from drive linkage area when operating.**

4. Push in red knob on timer, turn **COUNTERCLOCKWISE** until arrow points to the **START** position to move the piston to the **BACKWASH** position (Figure 8).
5. **Partially open inlet valve until a steady stream of water, free of air, is produced at the drain.** Open inlet valve fully.

   Note: If top cover of conditioner tank can be removed to vent air, the tank may be filled more quickly.
6. Open brine line valve. Allow the unit to run to drain until the timer moves the valve to the next position in approximately 12 minutes.
7. After the timer has moved the valve out of the **BACKWASH** position, it will move to the **BRINE/ SLOW RINSE** position (Figure 9). Watch the level of water in the brine tank, it should move down at a steady rate. A drawdown of 2 to 3 inches is sufficient for checkout.
8. As in step 4, manually rotate the timer **COUNTERCLOCKWISE**, slowly, until the piston moves into the **FAST RINSE** position (Figure 10).
9. Allow the valve to remain in the **FAST RINSE** position until the timer automatically moves the piston to the **SERVICE** position (Figure 11) in approximately 11 minutes.

The unit is now ready to be put on line. Open the outlet valve, close the bypass valve and load the brine tanks with salt.

Note: If installation consists of multiple tanks, use steps 1 through 9 for each conditioner.

Loading the Brine Tank (Grid System)

1. The brine valve (located in the brine tank) will automatically fill and maintain the water level in the brine tank. The water level must be 1 to 2 inches above the salt platform. If that level is not achieved, remove the brine valve (after shutting off the manual brine line valve) and adjust the float on the float rod.
2. Fill the brine tank with salt to a level even with the top of the brine well. Use a clean grade of softener salt, (pellet salt or equivalent). Rock salt is not recommended. Rock salt contains impurities that can cause malfunction of the brine valve.

Valve Positions

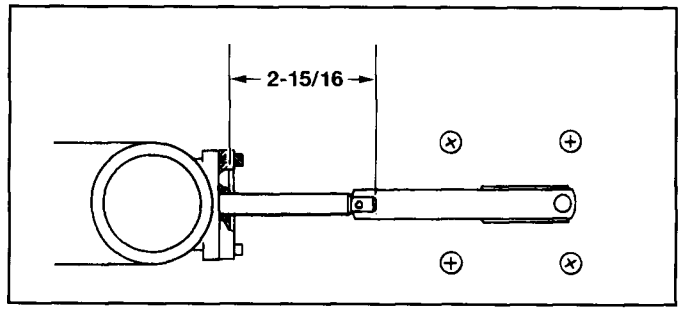


Figure 8 Backwash Position

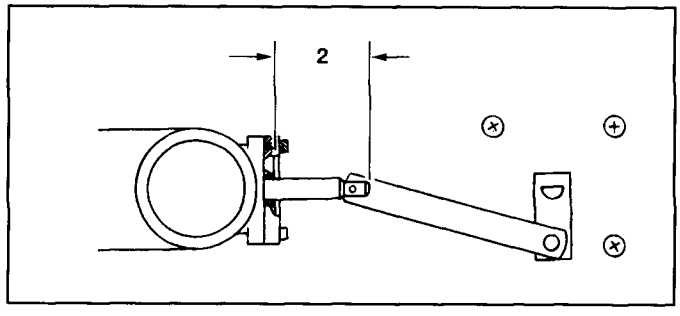


FIgure 9 Brine and Slow Rinse Position

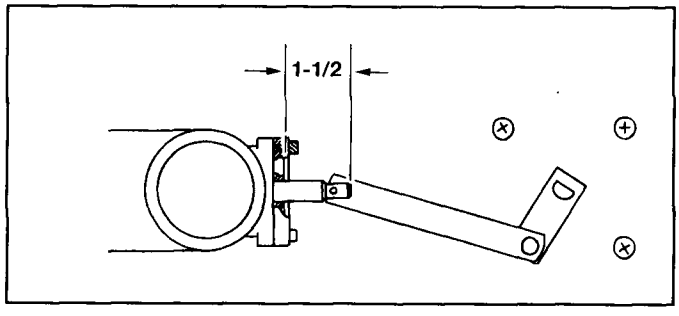


Figure 10 Fast Rinse Position

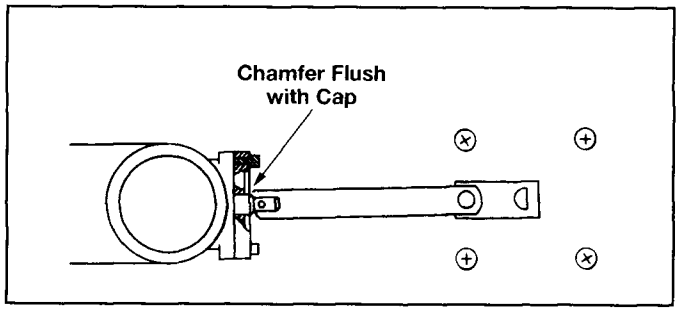


Figure 11 Service Position