
AQT-290

POWERFLO SERIES



AQUATROL™
CONTROL VALVES


SERVICE MANUAL

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Water Pressure	Minimum 25 PSI
Electrical Supply	Uninterrupted AC. Check voltage compatibility
Existing	Free of any deposits or build-ups inside pipes
Softener	Locate close to drain and connect according to plumbing codes
Bypass Valves	Always provide for bypass valve if unit is not equipped with one

CAUTION	
	Do not exceed 120 PSI water pressure
	Do not exceed 100°F water temperature
	Do not subject unit to freezing conditions

Installation Instructions

1. Place the softener tank where you want to install the unit making sure the unit is level and on a firm base. (Maximum 4 feet apart for twin units.)
2. All plumbing should be done in accordance with local plumbing codes. The pipe size for the drain line should be the same size as the drain line flow control female connection. Water meters are to be installed on soft water outlets. Twin units with (1) one meter shall be installed on common soft water outlets of units.
3. Solder joints near the drain must be done prior to connecting the Drain Line Flow Control fitting. Leave at least 6" between the DLFC and solder joints when soldering when the pipes are connected on the DLFC. Failure to do this could cause interior damage to the DLFC.
4. Teflon tape is the only sealant to be used on the drain fitting. The drain from twin units may be run through a common line.
5. Make sure that the floor is clean beneath the salt storage tank and that it is level
6. Place approximately 1" of water above the grid plate (if used) in your salt tank. Salt may be place in the unit at this time.
7. On units with by-pass, place in by-pass position. Turn on main water supply. Open a cold soft water tap nearby and let run a few minutes or until the system is free from foreign material (usually solder) that may have resulted from the installation.
8. Place the by-pass in service position.
9. Manually index the softener control into "service" position and let water flow into the mineral tank. When water flow stops, open a cold water tap nearby and let run until air pressure is relieved.
10. Electrical: All electrical connections must be connected according to codes. Use electrical conduit if applicable. See Wiring Diagram section for more information.
11. Plug into power supply

AQT-290

Timer Setting Procedures



How To Set Days On Which Water Conditioner Is To Regenerate:

Rotate the skipper wheel until the number "1" is at the red pointer. Set the days that regeneration is to occur by sliding tabs on the skipper wheel outward to expose trip fingers. Each tab is one day. Finger at red pointer is tonight. Moving clockwise from the red pointer, extend or retract fingers to obtain the desired regeneration schedule.

How To Set The Time Of Day:

Press and hold the blue button in to disengage the drive gear. Turn the large gear until the actual time of day is at the time of day pointer. Release the blue button to again engage the drive gear.

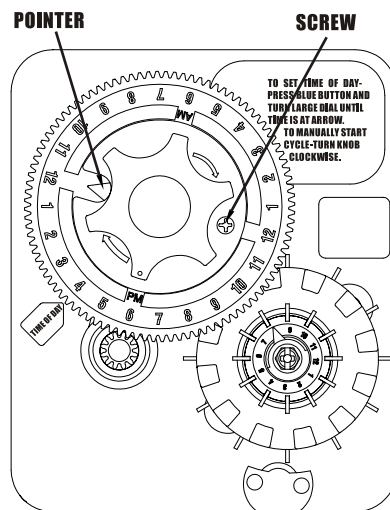
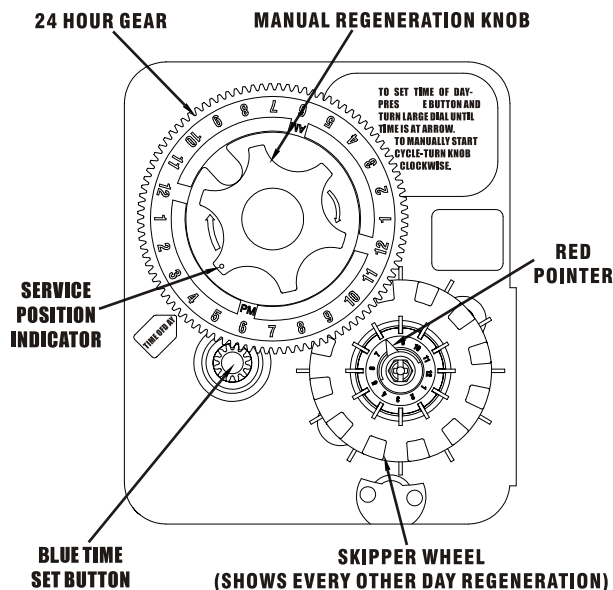
How To Manually Regenerate Your Water Conditioner At Any Time:

Turn the manual regeneration knob clockwise. This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program. The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing. Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set only one half of this time. In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

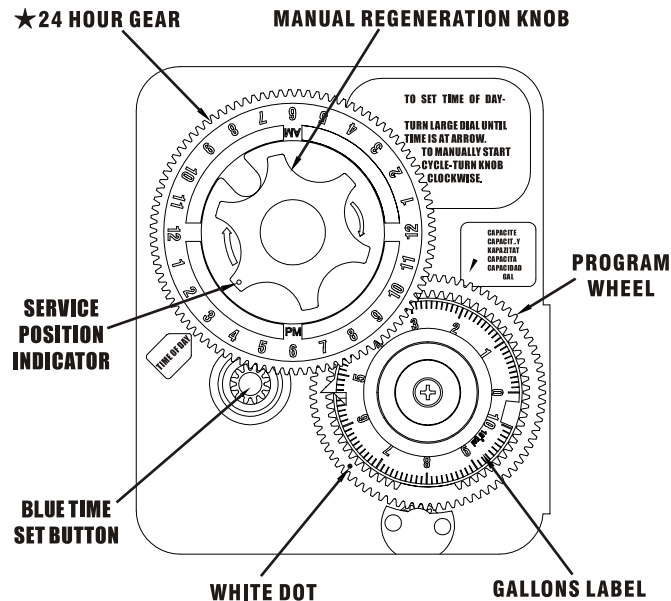
How To Adjust Regeneration Time:

1. Disconnect the power source.
2. Locate the three screws behind the manual regeneration knob by pushing the blue button in and rotating the 24 hour dial until each screw appears in the cut out portion of the manual regeneration knob.
3. Loosen each screw slightly to release the pressure on the time plate from the 24 hour gear.
4. Locate the regeneration time pointer on the inside of the 24 hour dial in the cut out.
5. Turn the plate so the desired regeneration time aligns next to the raised arrow.
6. Push the blue button in and rotate the 24 hour dial. Tighten each of the three screws.
7. Push the blue button and locate the pointer one more time to ensure the desired regeneration time is correct.
8. Reset the time of day and restore power to the unit.

IMPORTANT:
SALT LEVEL MUST ALWAYS BE ABOVE WATER
LEVEL IN BRINE TANK.



13200 ADJUSTABLE REGENERATION TIMER



NOTE:
To set meter capacity rotate manual knob 1-360° revolution to set the gallons.

★ Immediate regeneration timers do not have 24 hour gear. No time of day can be set.

Typical Programming Procedure

Calculate the gallon capacity of the system, subtract the necessary reserve requirement and set the gallons required by lifting the gallon dial and rotating it so that the number of gallons required is aligned with the white dot on the program wheel gear. Release and check for firm engagement with gear.

Note: To set meter capacity at initial start-up, either:

1. Rotate the manual regeneration knob one full revolution.
 - or
 2. Rotate the program wheel manual clockwise and align white dot with capacity arrow.
- This procedure must be followed any time the program wheel setting is changed.

How To Set The Time Of Day:

Press and hold the white button in to disengage the drive gear.
Turn the large gear until the actual time of day is opposite of the time of day pointer.
Release the white button to again engage the drive gear.

How To Manually Regenerate Your Water Conditioner At Any Time:

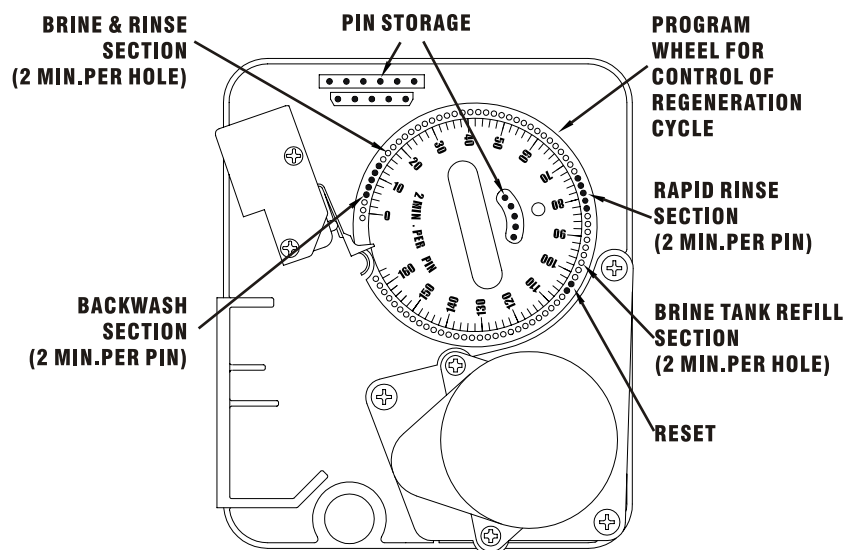
Turn the manual regeneration knob clockwise one "click".
This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.
The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.
Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set for only on half of this time.
In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

Immediate Regeneration Times:

These timers do not have a 24 hour gear. Setting the gallons on the program wheel and manual regeneration procedure are the same as previous instructions.

Regeneration Cycle

Program Setting Procedures



How To Set The Regeneration Cycle Program:

The regeneration cycle program on your water conditioner has been factory preset, however, portions of the cycle or program may be lengthened or shortened in time to suit local conditions.

A-13200 & A-13100 Series Timers

To expose cycle program wheel, grasp timer in upper left hand corner and pull, releasing snap retainer and swinging timer to the right. To change the regeneration cycle program, the program wheel must be removed. Grasp program wheel and squeeze protruding lugs toward center, lift program wheel off timer. (Switch arms may require movement to facilitate removal).

Return timer to closed position engaging snap retainer in back plate. Make certain all electrical wires snap above retainer post.

Timer Setting Procedure For A-13200 & A-13210 Timers -

How To Change The Length Of The Backwash Time:

The program wheel as shown in the drawing is in the service position. As you look at the numbered side of the program wheel, the group of pins starting at zero determines the length of time your unit will backwash.

For example: If there are six pins in this section, the time of backwash will be 12 min. (2 min. per pin). To change the length of backwash time, add or remove pins as required. The number of pins times two equals the backwash time in minutes.

How To Change The Length Of Brine And Rinse Time:

The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse (2 min. per hole).

To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and rinse section. Number of holes times two equals brine and rinse time in minutes.

How To Change The Length Of Rapid Rinse:

The second group of pins on the program wheel determines the length of time that your water conditioner will rapid rinse (2 min. per pin)

To change the length of refill time, add or remove pins at the higher numbered end of this section as required. The number of pins times two equals the rapid rinse time in minutes.

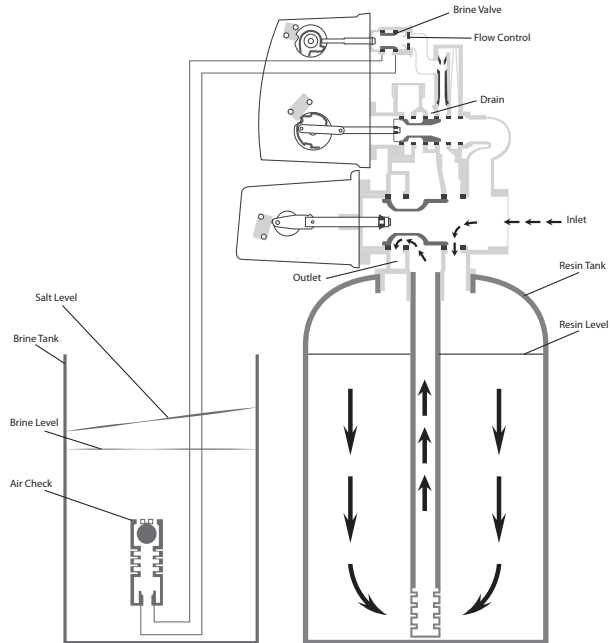
How To Change The Length Of Brine Tank Refill Time:

The second group of holes in the program wheel determines the length of time that your water conditioner will refill the brine tank (2 min. per hole).

To change the length of refill time, move the two pins at the end of the second group of holes as required.

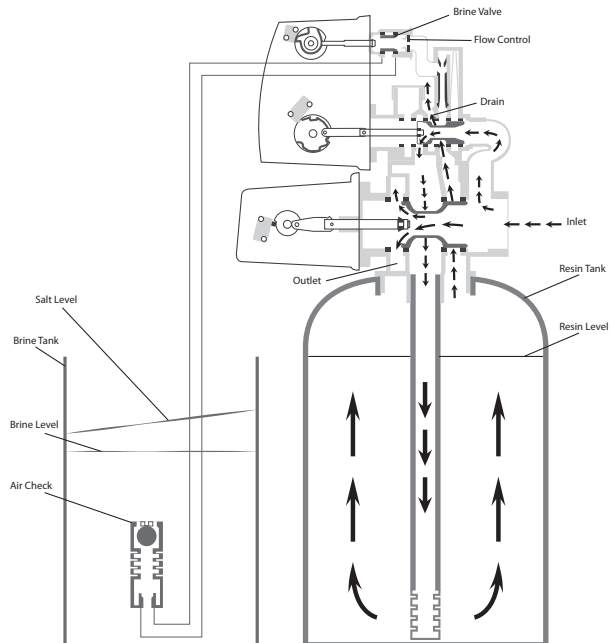
The regeneration cycle is complete when the outer microswitch is tripped by the two pin set at the end of the brine tank refill section.

The program wheel, however, will continue to rotate until the inner micro-switch drops into the notch on the program wheel.



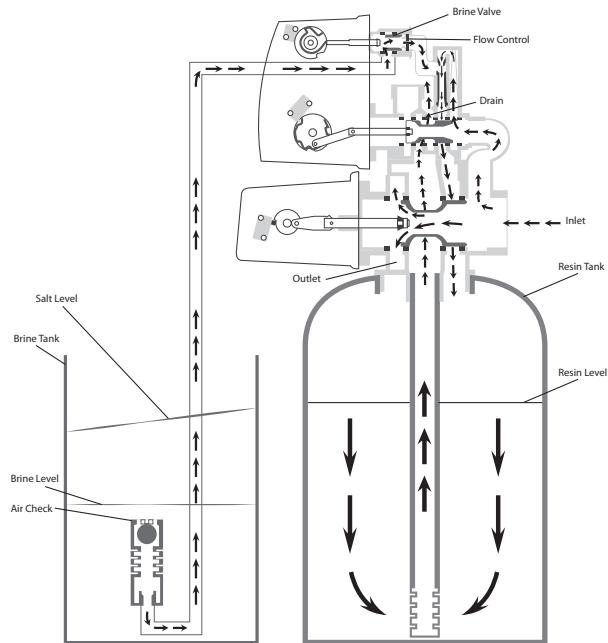
1) Service Position

Hard water enters unit at valve inlet and flows down through the mineral in the mineral tank. Conditioned water enters center tube through the bottom distributor, then flows up through the center tube, around the piston, and out the outlet of the valve.



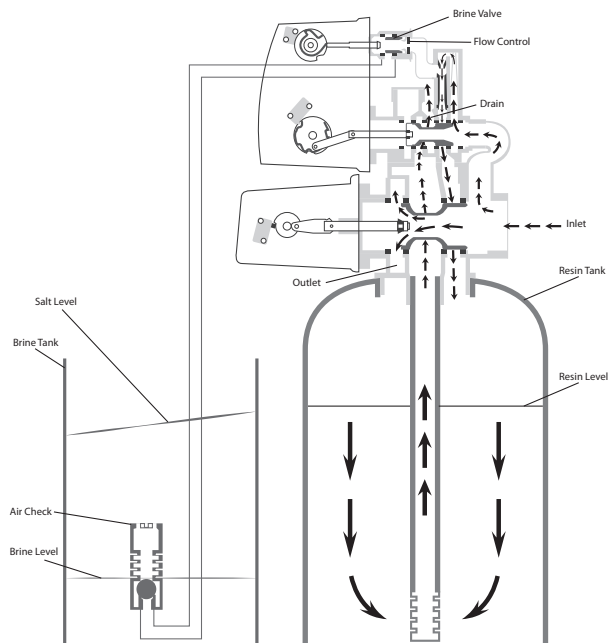
2) Backwash Position

Hard water enters unit at valve inlet - flows through service adapter for bypass, and up through coupling to regenerating valve piston - down the center tube - through the bottom distributor and up through the mineral - around the piston and out the drain line. If optional no hard water bypass piston is used water flow to outlet is prevented by an extended section of the service piston which closes the outlet port from bypass water until the end of rapid rinse.



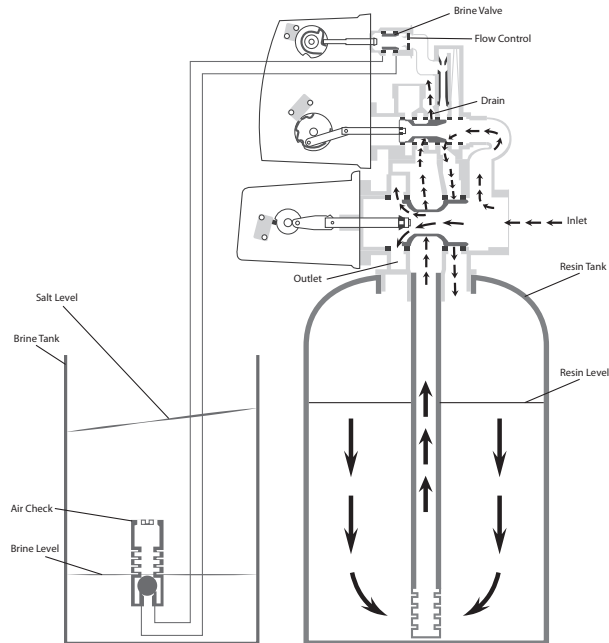
3) Brine Position

Hard water enters unit at valve inlet - flows up into injector housing and down through nozzle and orifice to draw brine from the brine tank - brine flows down through mineral and enters the center tube through bottom distributor - flows up through center tube - around the piston and out through the drain line.



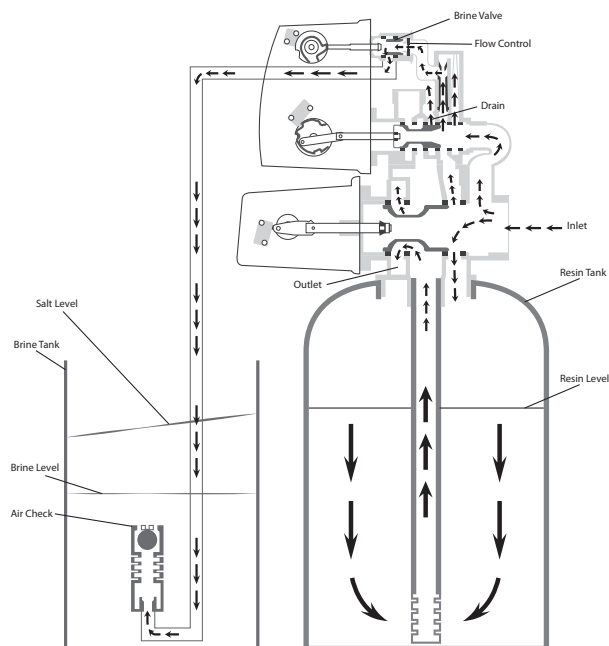
4) Slow Rinse Position

Hard water enters unit at valve inlet - flows up into injector housing and down through nozzle and around orifice - around the piston - down through mineral - enters center tube through bottom distributor - flows up through center tube - around piston and out through the drain line.



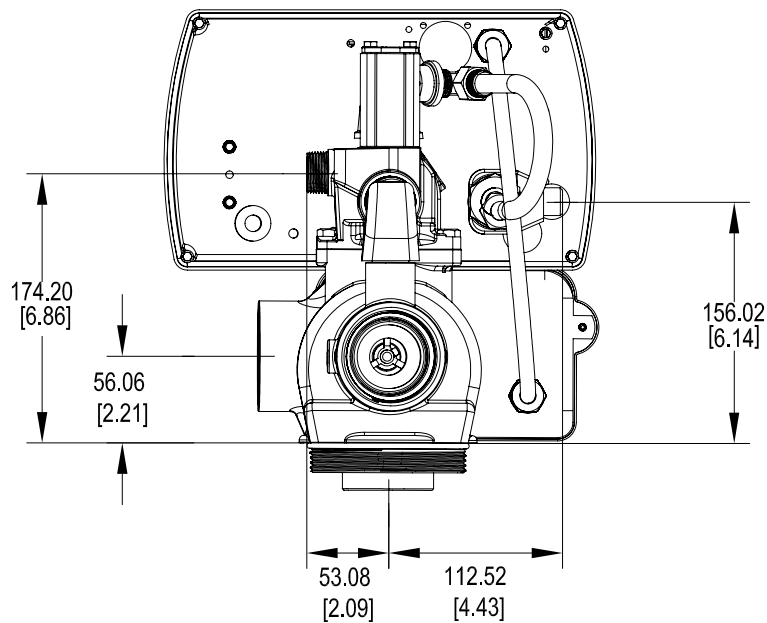
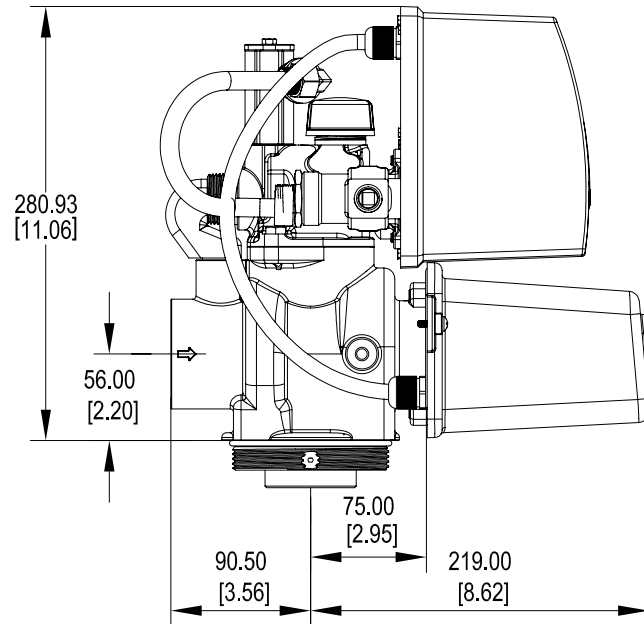
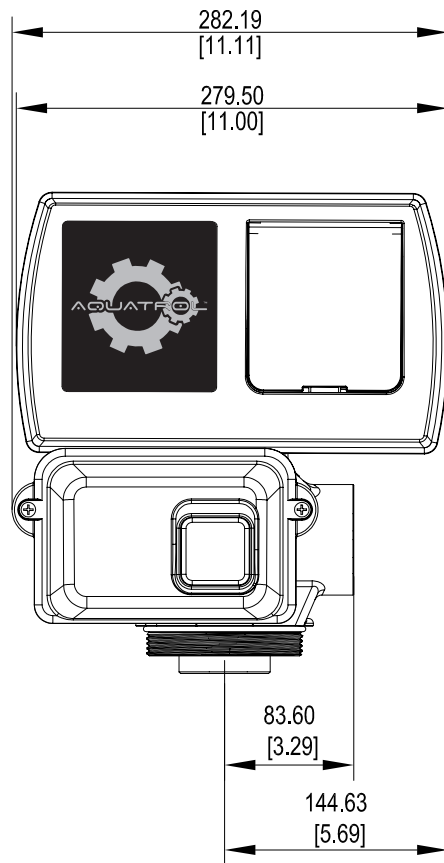
5) Rapid Rinse

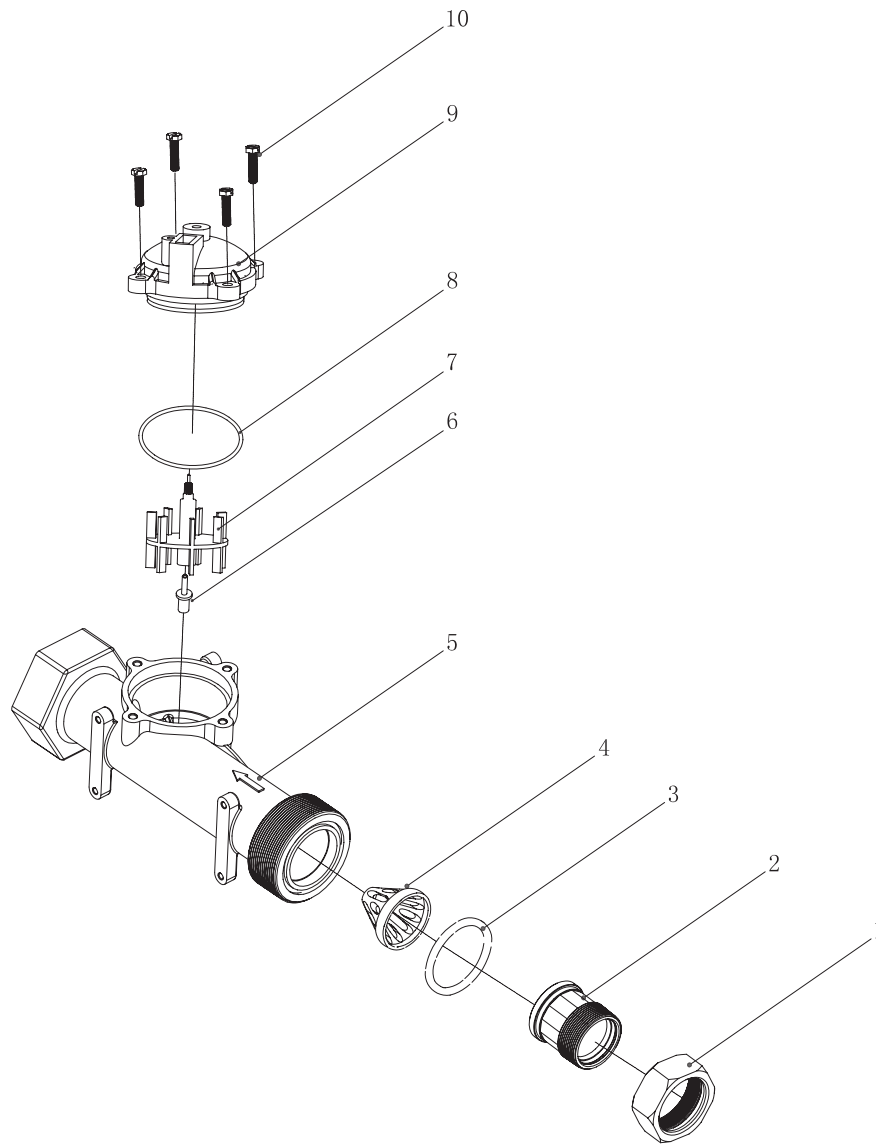
Hard water flows through the regenerating valve directly down through the mineral into the bottom distributor and up through the center tube.



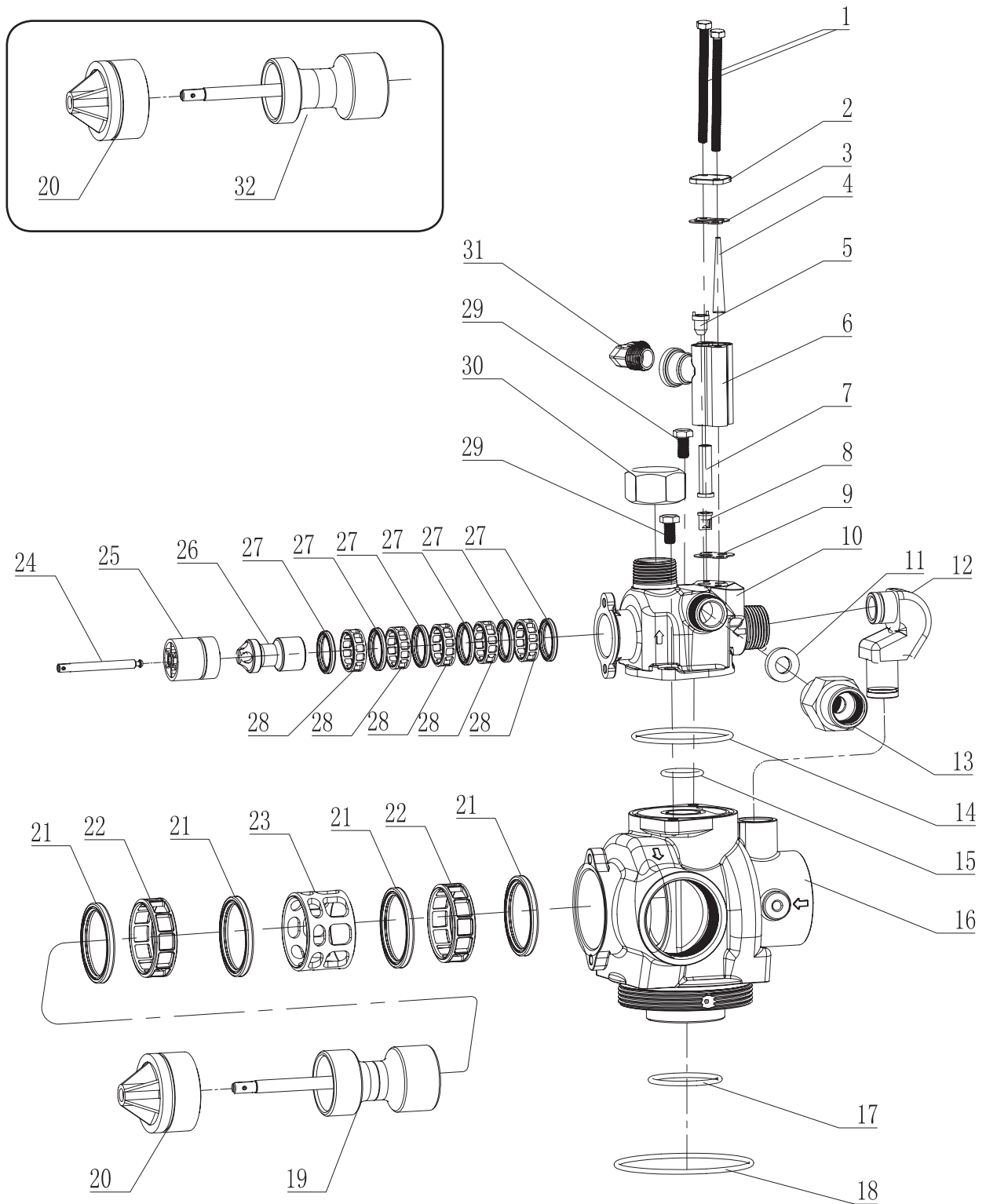
6) Slow Rinse Position

Hard water enters unit at valve inlet - flows up into injector housing and down through nozzle and around orifice - around the piston - down through mineral - enters center tube through bottom distributor - flows up through center tube - around piston and out through the drain line.

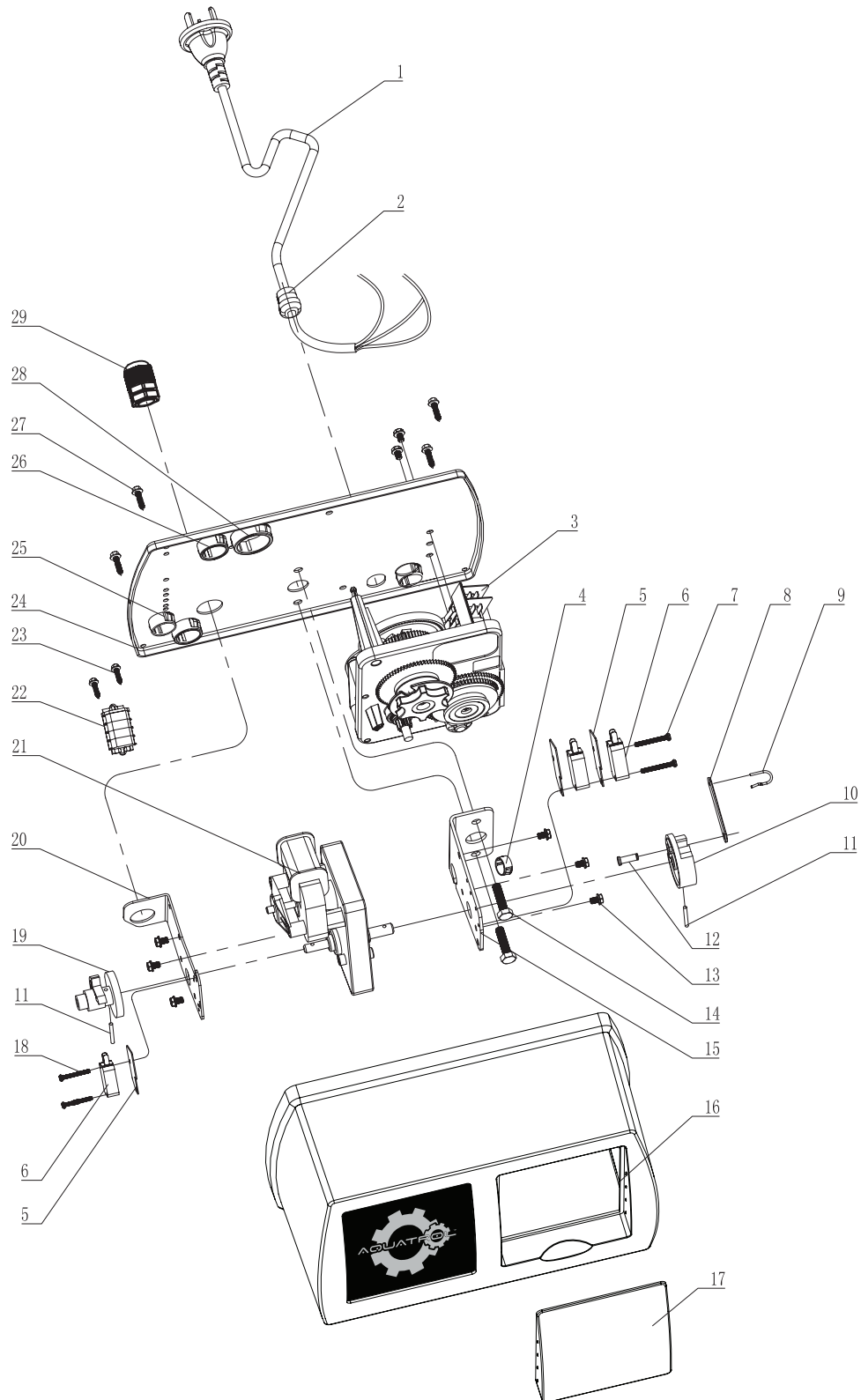




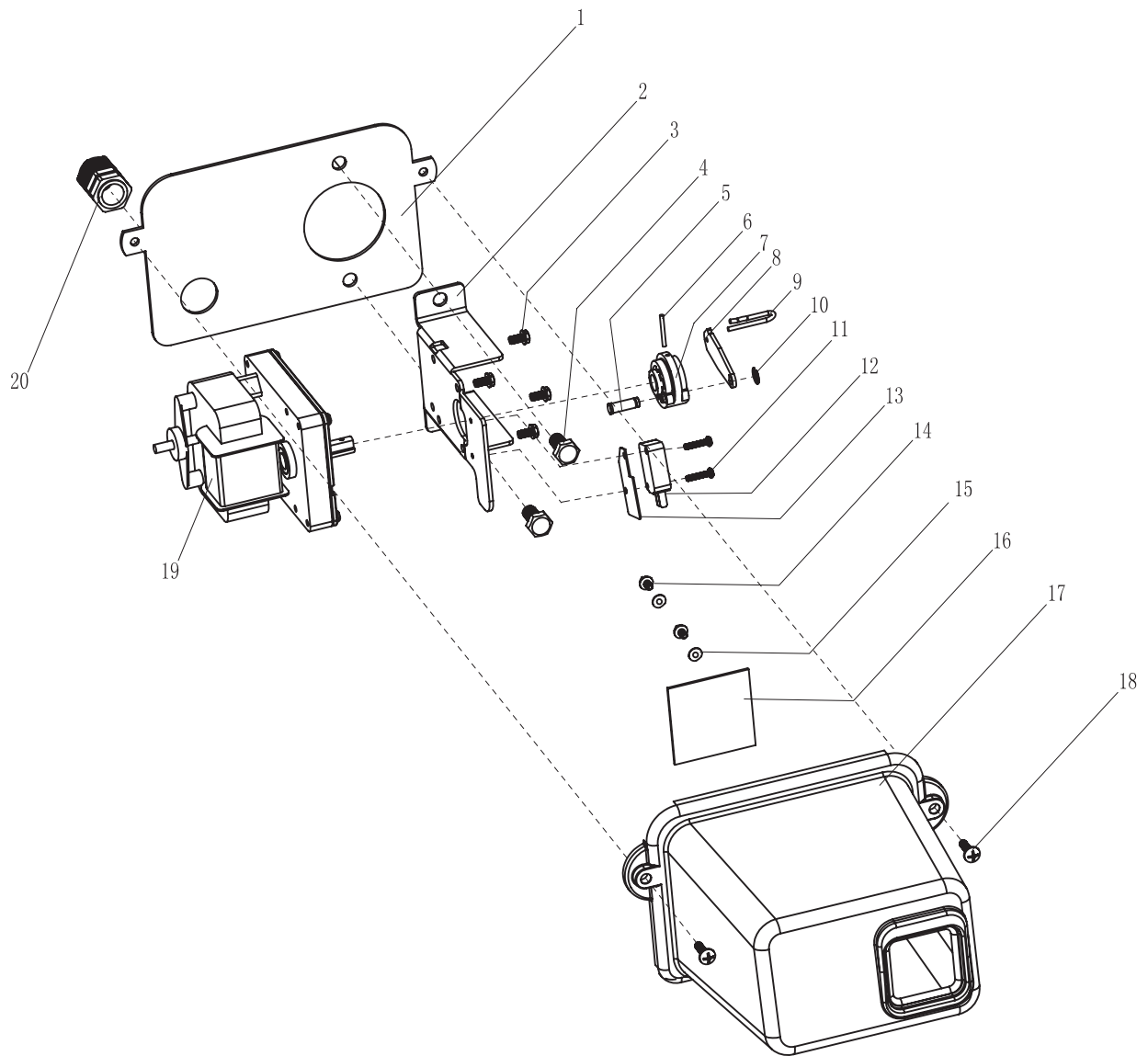
Item No.	Quantity	Part No.	Description
1	4	A02082F	Screw
2	1	A15237	Meter Cover Assembly
3	1	A13847	O-ring
4	1	A12331F	Impeller Assembly
5	1	A12101F	Impeller Spindle
6	1	A12301F	Body
7	1	A14680	Flow Straightener
8	1	A14679	O-ring
9	1	A14568	Tube
10	1	A14569	Screw



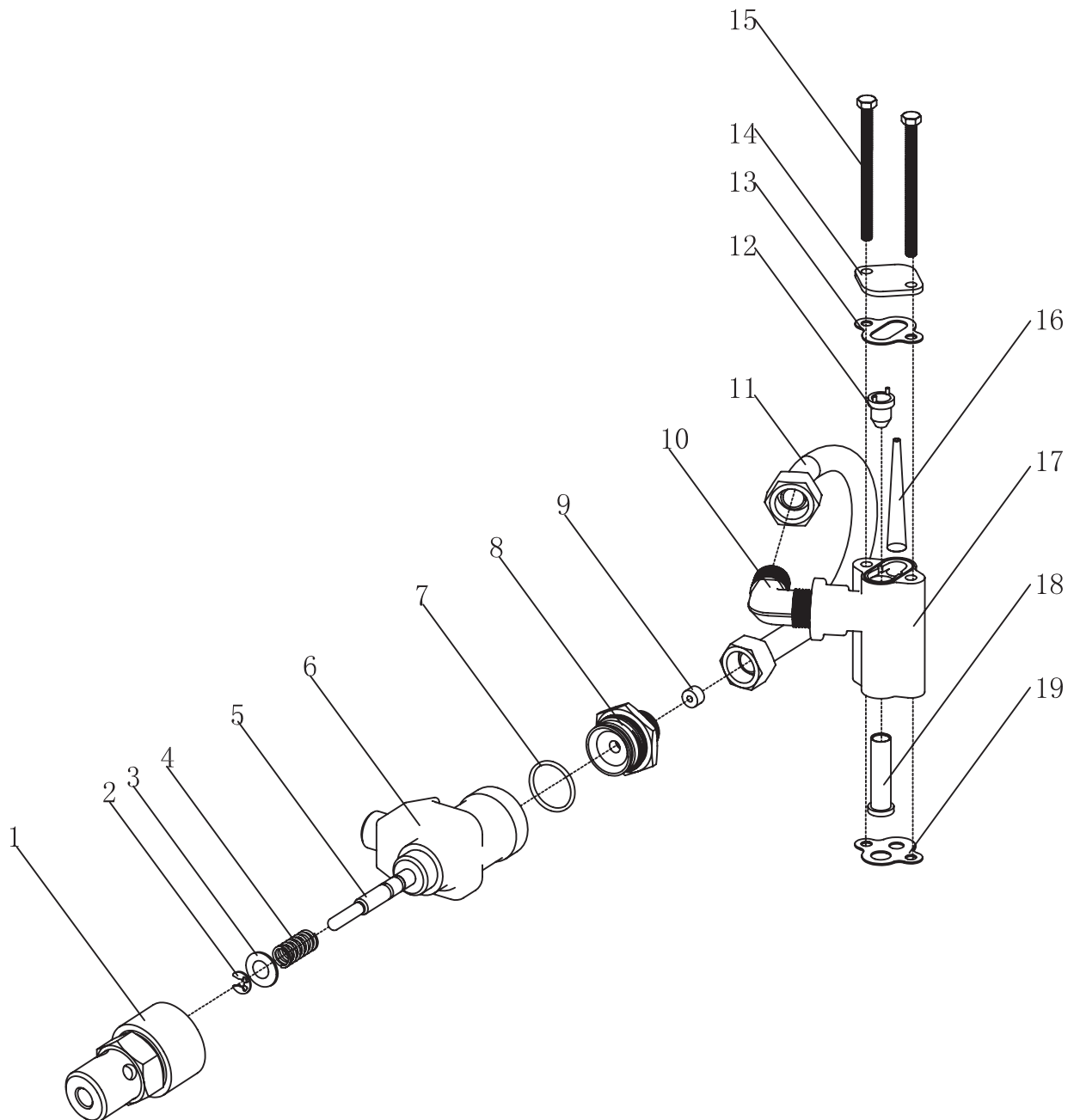
Item No.	Quantity	Part No.	Description
1	2	A02051f	Screw
2	1	A11893	Injector Cover
3	1	A10229	Injector Cover Gasket
4	1	A14803	Screen
5	1	A14801-XX	Nozzle
6	1	A17777	Injector
7	1	A14802-XX	Throat
8	1	A17996	Air Disperser
9	1	A14805	Injector Body Gasket
10	1	A14749	Vice Valve Body
11	1		D.L.F.C
12	1	A14751	Coupling
13	1	A15177	Drainage Connector
14	1	A11208	O-ring
15	1	A11710	O-ring
16	1	A14750-01	Valve Body
17	1	A13577	O-ring
18	1	A13575	O-ring
19	1	A14752+A14818+A14758	Piston Assembly
20	1	A14754-10	End Plug
21	4	A11720	Seal
22	2	A10369	Spacer
23	1	A14753	Spacer
24	1	A14452	Vice Piston Rod
25	1	A10598	Vice End-plug Assembly
26	1	A14451	Vice Piston
27	6	A10545	Seal
28	5	A11451	Spacer
29	2	A02055F	Bolt
30	1	A12248	Cap
31	1	A15413	Brine Valve Connector
32	1	A14757+A14818+A14758	Piston Assembly



Item No.	Quantity	Part No.	Description
1	1	A11838	Power Cord
2	1	A13547	Strain Relief
3	1	A13200F	Timer 13200 (12 day)
4	1	A07012F	Strain Relief
5	3	A10302	Insulator
6	3	A10218	Switch
7	2	A14923	Screw
8	1	A10621	Connecting Link
9	1	A10909	Connecting Link Pin
10	1	A12576	Drive Cam
11	2	A10338	Pin
12	1	A13366	Pin
13	8	A10872	Screw
14	2	A10231	Screw
15	1	A10774	Bracket
16	1	A19041F	Cover
17	1	A19042F	Plate Cover
18	2	A02054F	Screw
19	1	A12777	Brine Valve Cam
20	1	A11826	Brine Valve Bracket
21	1	A10769	Motor
22	1	A15226-6	Terminal Assembly
23	2	A02106F	Screw
24	1	A19001F	Back Plate
25	2	A19043F	Plate Plug (Small)
26	2	A19044F	Plate Plug (Middle)
27	4	A02103F	Screw
28	1	A19045F	Plate Plug (Big)
29	1	A19048F	Screw Cap



Item No.	Quantity	Part No.	Description
1	1	A19102F	Back Plate
2	1	A14769	Bracket
3	1	A10872	Screw
4	4	A02055F	Screw
5	2	A29509F	Drive Bearing
6	1	A11381	Roll Pin
7	1	A14775	Drive Cam
8	1	A14759	Connecting Link
9	1	A14813	U-Pin
10	1	A10250	Retaining Ring
11	1	A02054F	Screw
12	2	A10218	Switch
13	1	A10302	Insulator
14	1	A14430	Screw
15	1	A04002F	Washer
16	4	A29541F	Transparent Board
17	1	A18708-2	Housing
18	1	A18744	Screw
19	1		Motor
20	2	A18691	Lock Relief



Item No.	Quantity	Part No.	Description
1	1	A 66164F	Brine valve cap assembly
2	1	A10250	Retaining Ring
3	1	A04003F	Washer
4	1	A15310	Spring
5	1	A66128F	Brine Stem Assembly
6	1	A17053F	Brine Valve Body
7	1	A13201	O-Ring
8	1	A17055F	End Plug, Brine Valve
9	1		BLFC Button
10	1	A15413	Fitting, Elbow
11	1	A66160F	Brine Tube
12	1	A14801-XXC	Injector Nozzle
13	1	A10229	Injector Cover Gasket
14	1	A11893	Injector Cover
15	2	A02051F	Screw
16	1	A14803	Screen
17	1	A17777	Injector Body
18	1	A14802-XXC	Injector Throat
19	1	A14805	Injector Cover Gasket

Troubleshooting

Problems, Cause & Corrections



Problem	Cause	Correction
1) Softener fails to regenerate.	A) Electrical service to unit has been interrupted.	A) Assure permanent electrical service (check fuse, plug, pull chain or switch).
	B) Timer is defective.	B) Replace timer.
	C) Power failure.	C) Reset time of day.
2) Hard water.	A) By-pass valve is open.	A) Close by-pass valve.
	B) No salt in brine tank.	B) Add salt to brine tank and maintain salt level above water level.
	C) Injector screen plugged.	C) Clean injector screen.
	D) Insufficient water flowing into brine tank.	D) Check brine tank fill time and clean brine line flow control if plugged.
	E) Hot water tank hardness.	E) Repeated flushing of the hot water tanks required.
	F) Leak at distributor tube.	F) Make sure distributor tube is not cracked. Check O-ring and tube pilot.
	G) Internal Valve Leak.	G) Replace seals and spacers and/or piston.
	H) Service Adapter did not return to service.	H) Check drive motor and switch.
3) Unit used too much salt.	A) Improper salt setting.	A) Check salt usage and salt setting.
	B) Excessive water in brine tank.	B) See problem No. 7.
4) Loss of water pressure.	A) Iron buildup in line to water conditioner.	A) Clean line to water.
	B) Iron buildup in water conditioner.	B) Clean control and add mineral cleaner to mineral bed. Increase frequency of regeneration.
	C) Inlet of control plugged due to foreign material broken loose from pipes by recent work done on plumbing system.	C) Remove piston and clean control.
5) Loss of mineral through drain line.	A) Air in water system.	B) Assure that well system has proper air eliminator control. Check for dry well conditions.
	B) improper size drain line flow control.	B) Check for proper drain rate.
6) Iron in conditioned water.	A) Fouled mineral bed.	A) Check backwash, brine draw and brine tank fill. Increase frequency of regeneration. Increase backwash time.
7) Excessive water in brine tank.	A) Plugged drain line flow control.	A) Clean flow control.
	B) Plugged injector system.	B) Clean injector and screen.
	C) Timer not cycling.	C) Replace timer.
	D) Foreign material in brine valve.	D) Replace brine valve seat and clean valve.
	E) Foreign material in brine line flow control.	E) Clean brine line flow control.

Problem	Cause	Correction
8) Softener fails to draw brine.	A) Drain line flow control is plugged.	A) Clean drain line flow control.
	B) Injector is plugged.	B) Clean injector.
	C) Injector screen plugged.	C) Clean screen.
	D) Line pressure is too low.	D) Increase line pressure to 20 P.S.I.
	E) Internal control leak.	E) Change seals, spacers and piston assembly
	F) Service adapter did not cycle.	F) Check drive motor and switches.
9) Control cycle continuously.	A) Misadjusted, broken or shorted switch.	A) Determine if switch or timer is faulty and replace it or replace complete power head.
10) Drain flows continuously.	A) Valve is not programming correctly.	A) Check timer program and positioning of control. Replace power head assembly if not positioned properly.
	B) Foreign material in control.	B) Remove power head assembly and inspect bore. Remove foreign material and check control in various regeneration positions.
	C) Internal control leak	C) Replace seals and piston assembly.

General Service Hints for Meter Control

Problem: Softener delivers hard water

Reason: Reserve capacity has been exceeded.

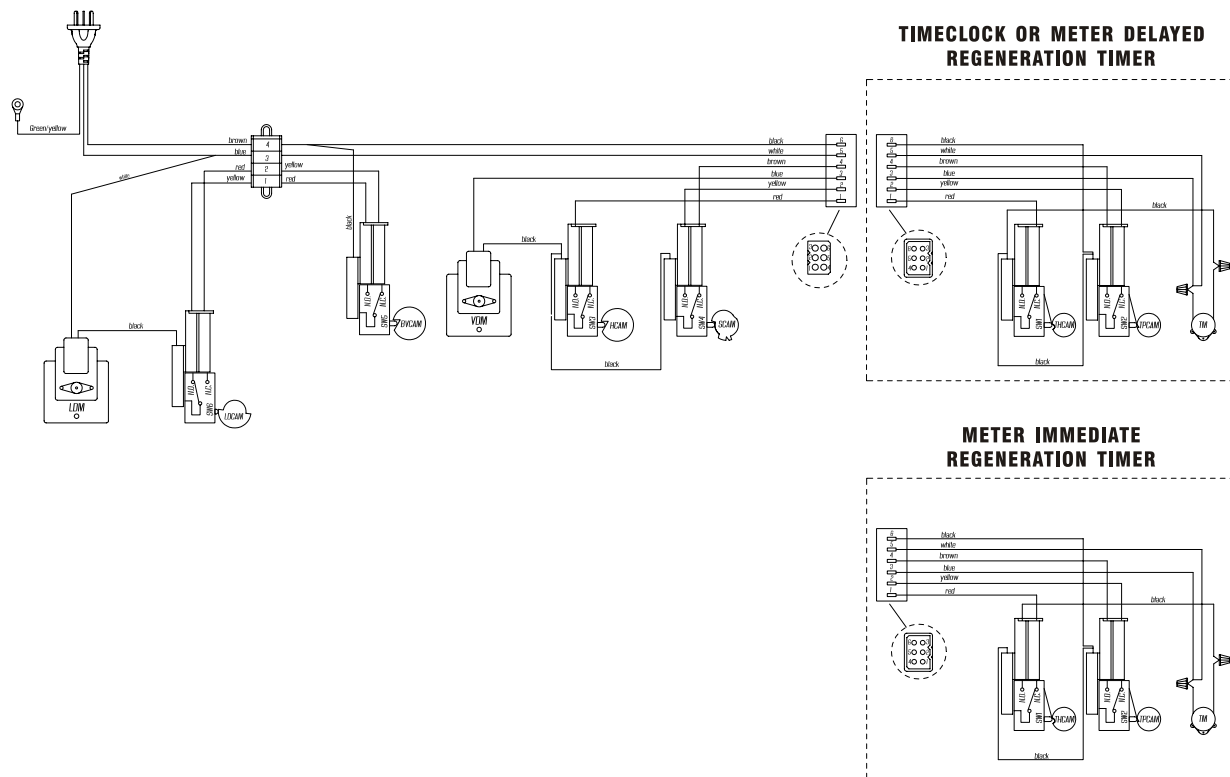
Correction: Check salt dosage requirements and reset program wheel to provide additional reserve.

Reason: Program wheel is not rotating with meter output.

Correction: Pull cable out of meter cover and rotate manually. Program wheel must move without binding and clutch must give positive clicks when program wheel strikes regeneration stop. If it does not, replace timer.

Reason: Meter is not measuring flow.

Correction: Check meter with meter checker.

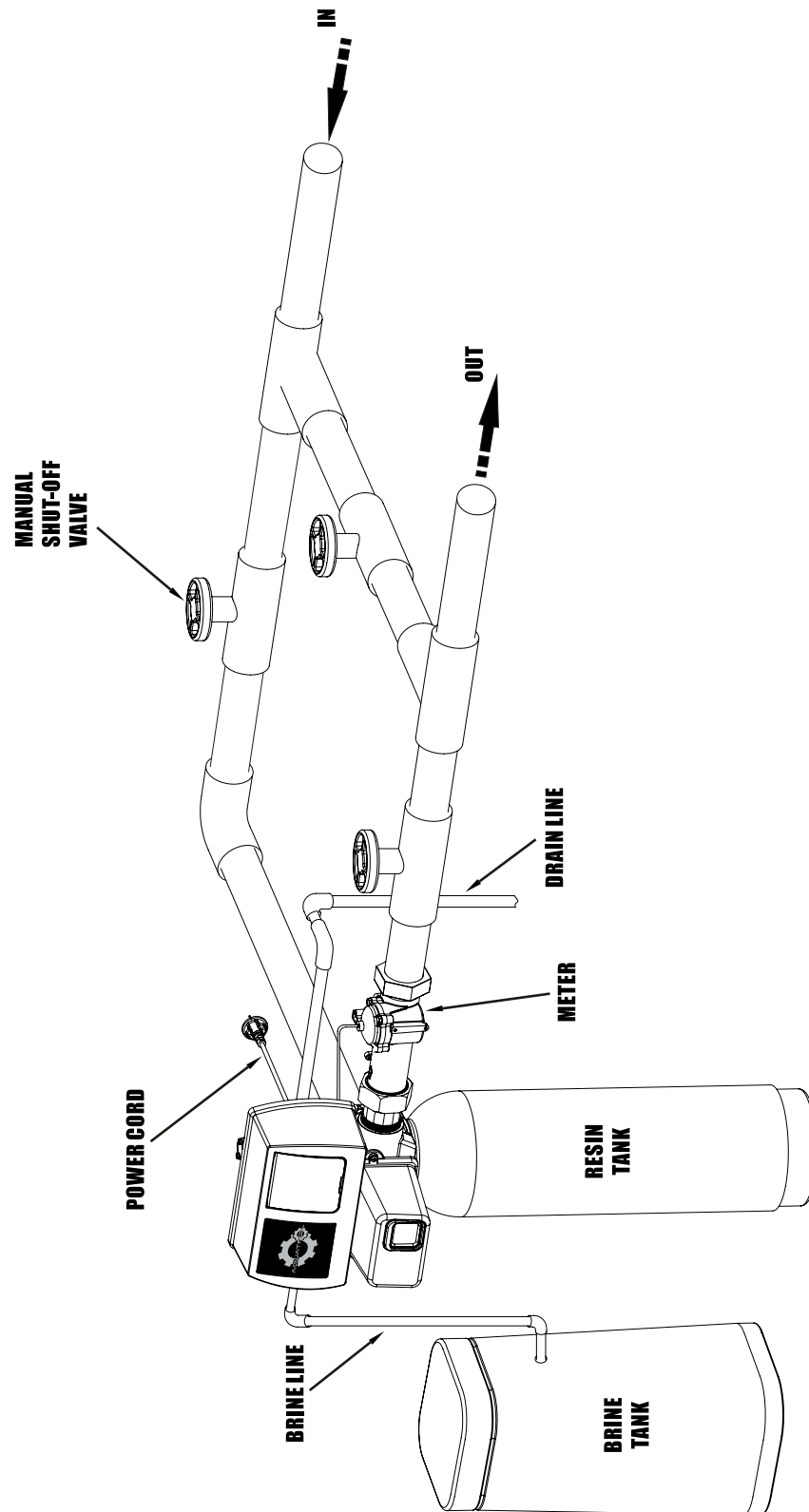


System #4 Immediate/Delayed Regeneration Valve Wiring

TM	Time Motor
VDM	Valve Drive Motor
SW1	Timer Homing Switch
SW2	Timer Program Switch
SW3	Valve Homing Switch
SW4	Valve Step Switch
SW5	Brine Cam Switch
THCAM	Timer Homing Cam
TPCAM	Timer Program CAM
HCAM	Valve Homing Cam
SCAM	Valve Step Cam
BVCAM	Brine Valve Cam
LDCAM	Lower Drive Cam

Note:

1. Single tank time clock, meter delayed, or meter immediate regeneration.
2. Valve shown in service position.



System #4 - Typical Single Tank Installation With Optional Meter

