AQT-390

SERIES

AQUATROL™
CONTROL VALVES

SERVICE MANUAL

TABLE OF CONTENTS

AQUATROL™
CONTROL VALVES

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 110°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 7 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. Remote meter system wiring diagrams are on page 26.
11. Plug into power supply

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

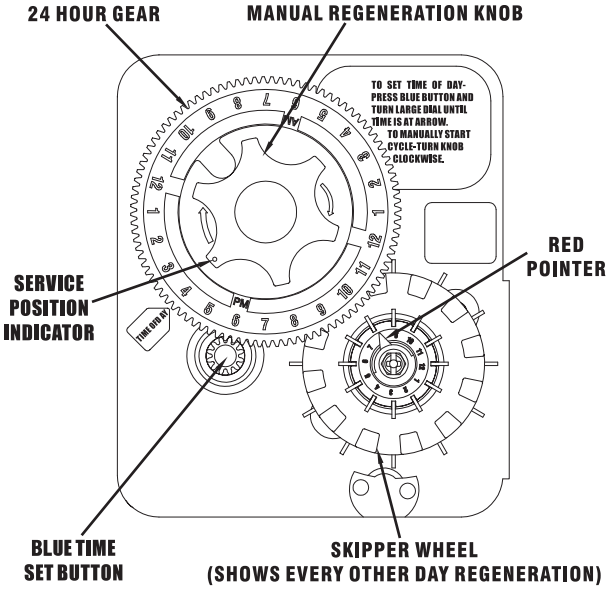
Rotate the skipper wheel until the number "1" is at the red pointer.
Set the days that regeneration is to occur by sliding tabs on the skipper wheel outward to expose trip fingers.
Each tab is one day. Finger at red pointer is tonight.
Moving clockwise from the red pointer, extend or retract fingers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

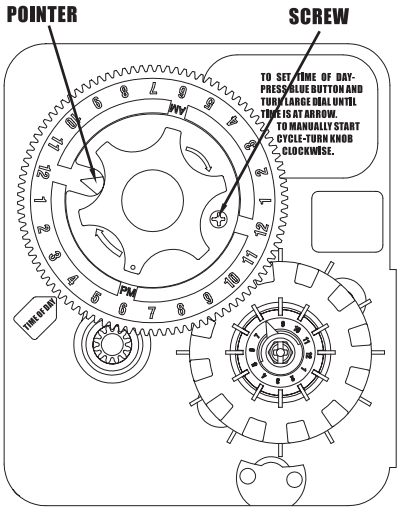
How To Manually Regenerate Your Water Conditioner At Any Time:

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.



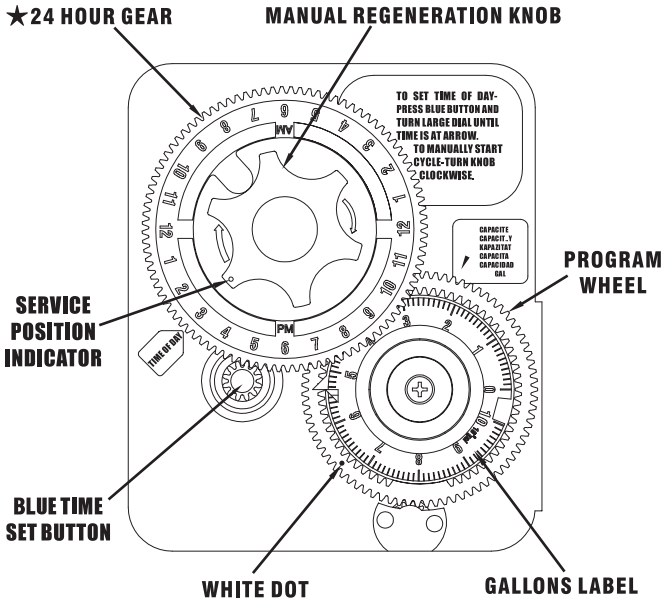
How To Adjust Regeneration Time:

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.



13200 ADJUSTABLE REGENERATION TIMER

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



NOTE:
To set meter capacity rotate manual knob 1-360º 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 appropriate gallons available opposite the small white dot on the program wheel. Note, drawing shows 10,000 gallon setting. The capacity (gallons) arrow denotes remaining gallons exclusive of the calculated reserve.

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:

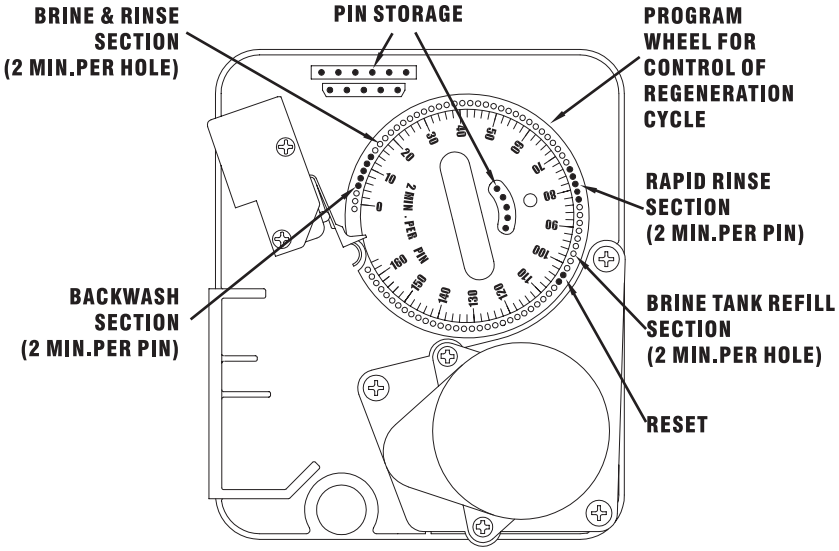
Press and hold the white button in to disengage the drive gear.
Turn the large gear until the actual time of say is opposite of the time of day pointer.
Release the white button to again engage the drive gear.

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.



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.

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 locate above snap retainer post.

Timer Setting Procedure -

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:

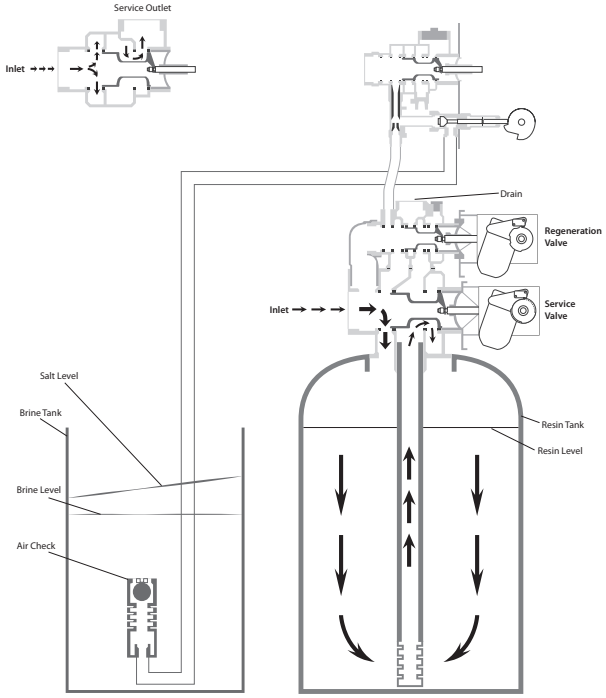
The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse (2 min. per hole).
To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and 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 rapid 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.

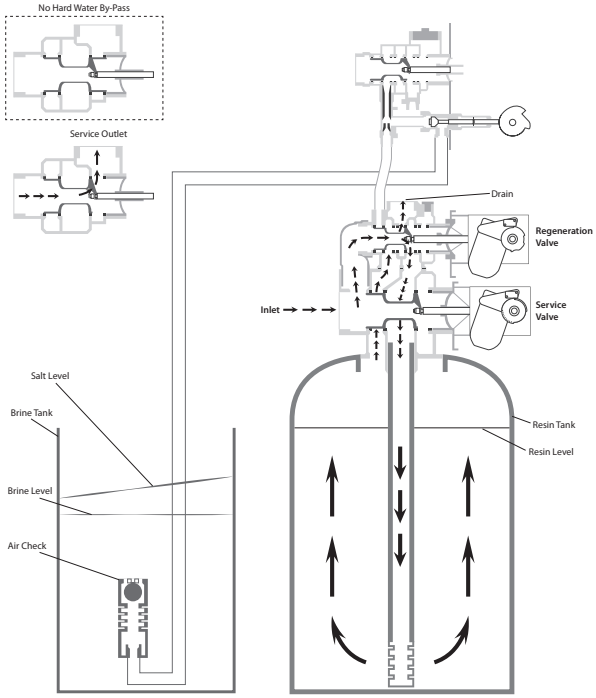
How To Change The Length Of Brine Tank Refill Time:

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 micro-switch 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.



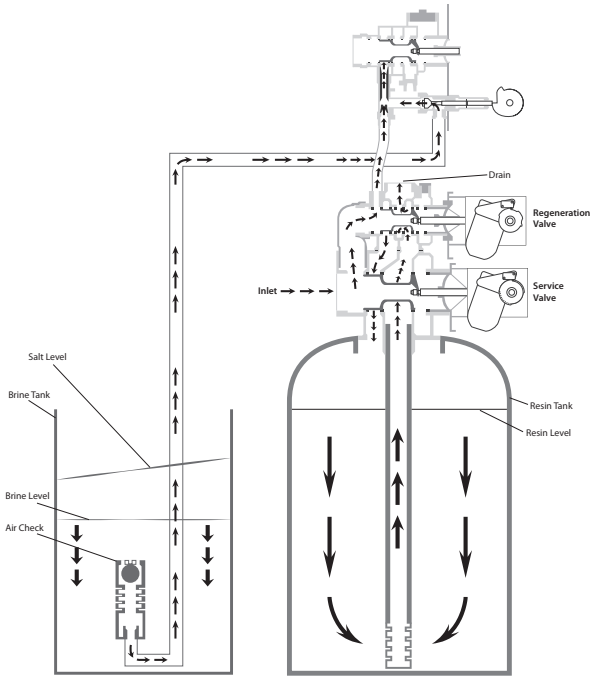
1) Service Position

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



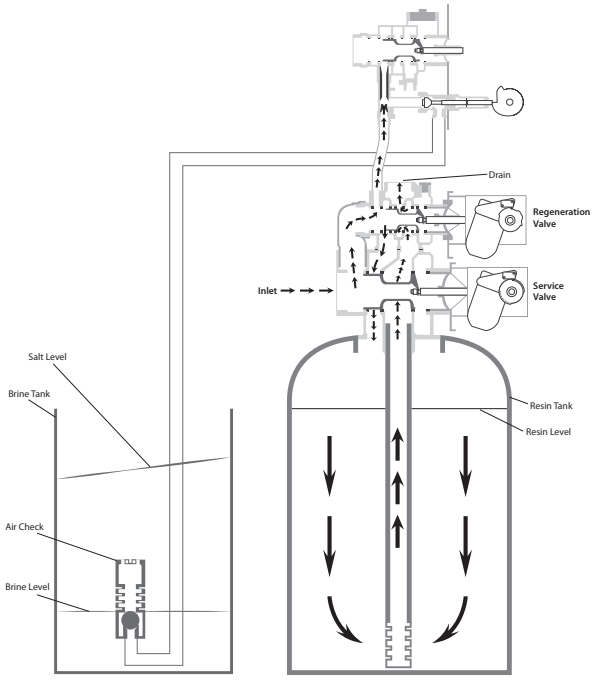
2) Backwash Position

Hard water enters unit at valve inlet and flows through the service adapter piston for by-pass, and up through the coupling to regenerate valve inlet. Flow continues through the regeneration valve piston - down the distributor tube - through the bottom distributor and up through the mineral - around the piston and out the drain. If optional no hard water by-pass piston is used, water flow to service outlet is prevented by an extension on the service outlet until the end of the rapid rinse cycle or brine tank refill cycle, depending on option chosen.



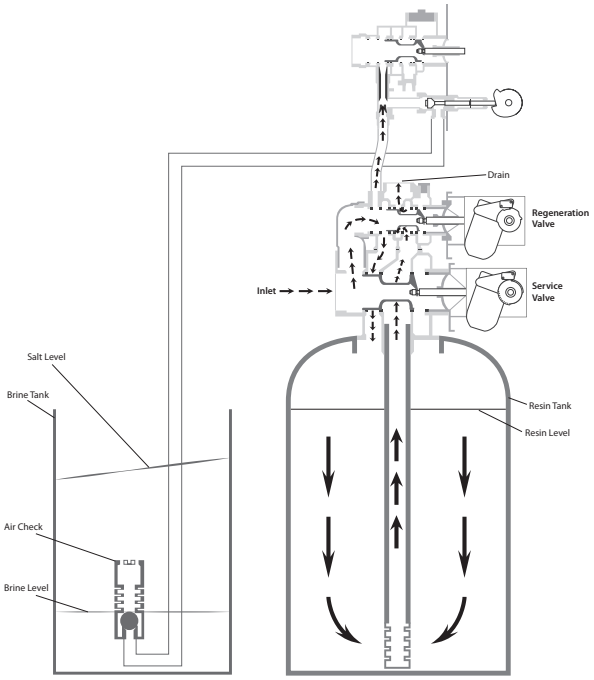
3) Brine Position

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



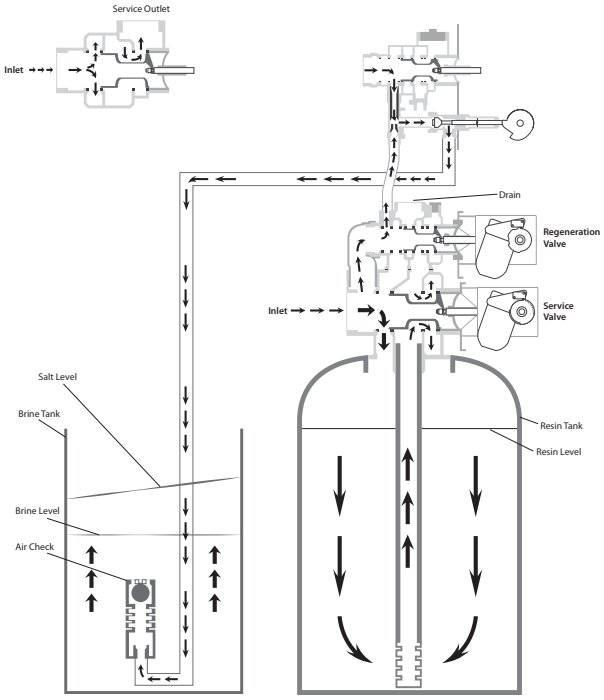
4) Slow Rinse Position

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



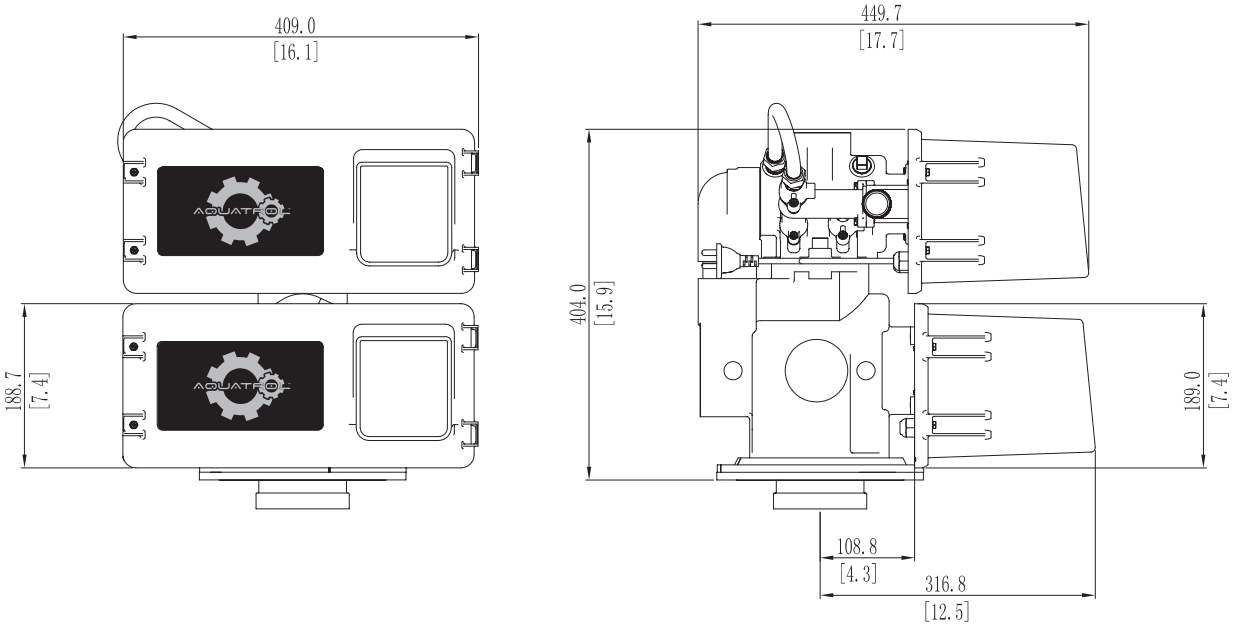
5) Rapid Rinse

Hard water enter unit at inlet valve - flows through the regeneration valve directly down through the mineral into the bottom distributor and up through the center tube - around the piston and out the drain.



6) Brine Tank Fill Position

Hard water enters unit at valve inlet - flows through nozzle and through throat to brine valve to refill the brine tank. Inlet flows also continues down through mineral to the bottom distributor. Conditioned water flows up through the distributor tube, around the piston and out the outlet. Note: An option is available to keep service valve in by-pass position until the end of brine tank refill cycle.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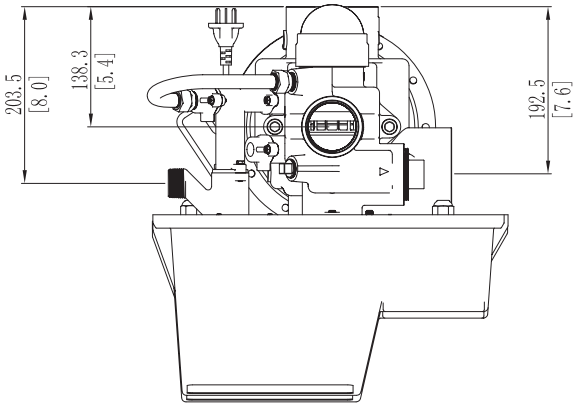
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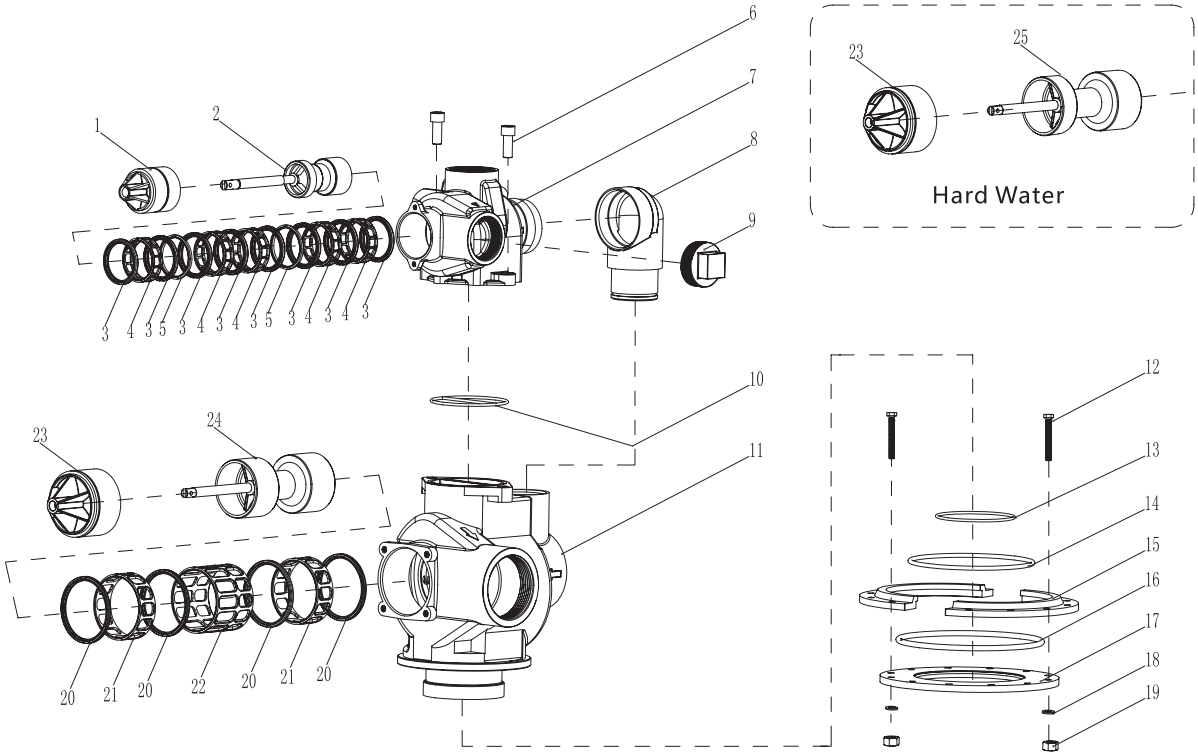
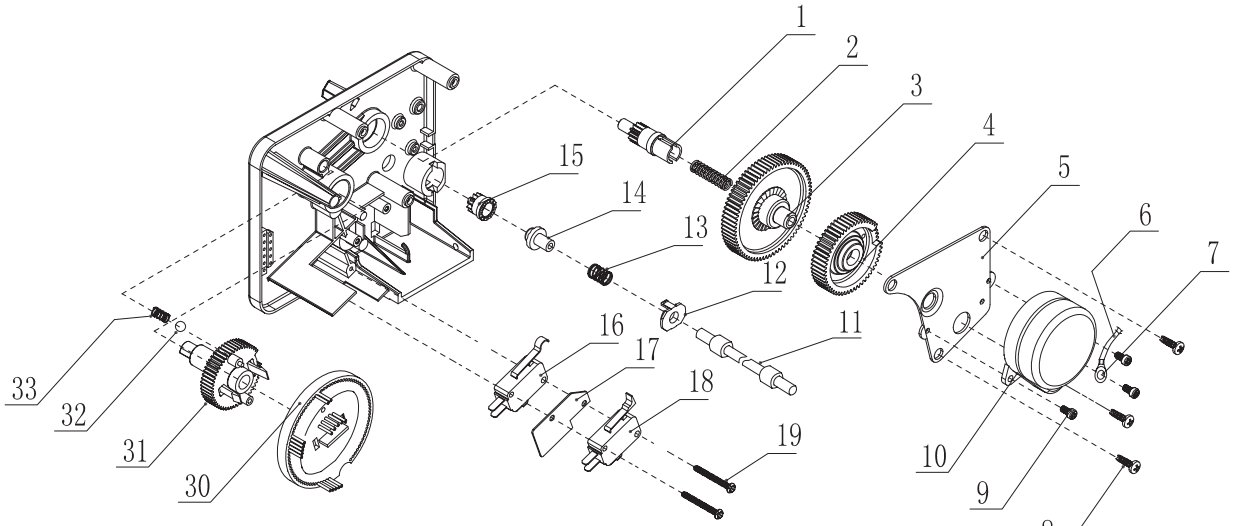


Item No.	Quantity	Part No.	Description
1	1	A-16398-01	End Plug Assembly
2	1	A-15125	Piston Assembly
3	8	A-11720	Seal
4	5	A-10369	Spacer
5	2	A-10368	Spacer, Narrow
6	2	A-02057F	Screw
7	1	A-31501-1F	Valve Body
8	1	A-16074	Coupling Assembly
9	1	A-16088-01	Plug
10	1	A-15112	Seal
11	1	A-39501-1F	Valve Body
12	12	A-02059F	Bolt
13	1	A-01042F	O-Ring
14	1	A-16345	O-Ring
15	2	A-16482	Flange Segment
16	1	A-16484	O-Ring
17	1	A-12341-01NP	Flange Ring
18	12	A-18619	Washer
19	1	A-03005F	Nut
20	4	A-16068	Seal
21	2	A-16069	Spacer
22	1	A-16070	Spacer
23	1	A-16074	End Plug Assembly
24	1	A-16082	Piston Assembly
25	1	A-16071	Piston Assembly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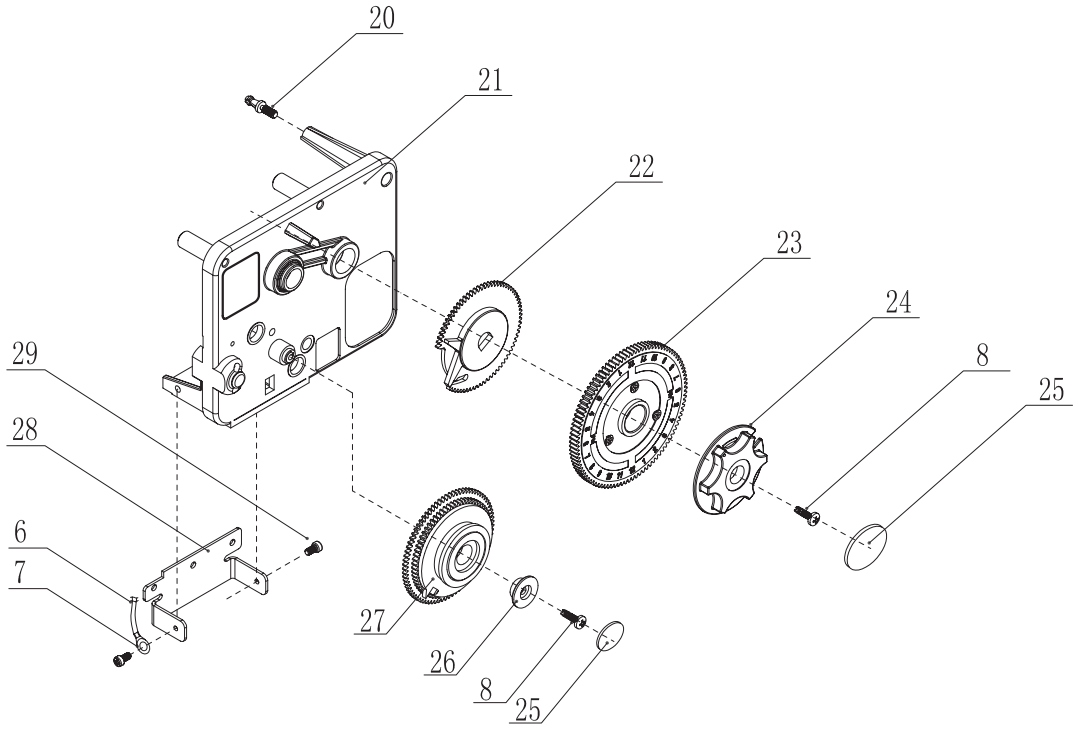
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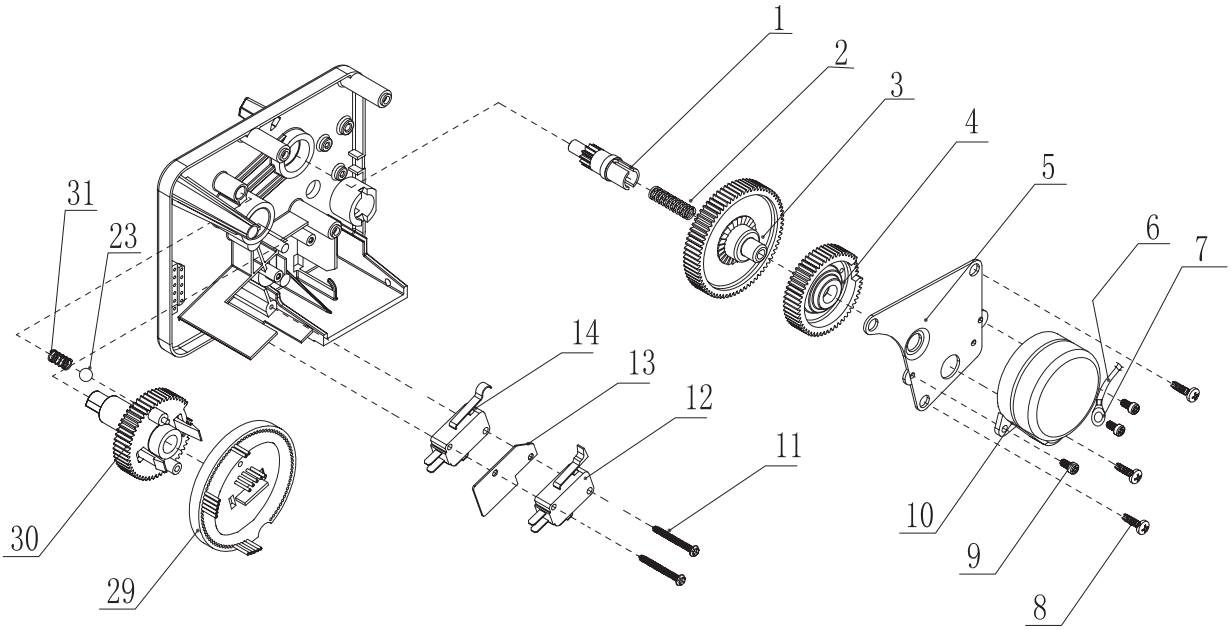
Item No.	Quantity	Part No.	Description
1	1	A-13018	Idler Shaft
2	1	A-13312	Spring
3	1	A-13017	Idler Gear
4	1	A-13164	Drive Gear
5	1	A-13887	Motor Mounting Plate
6 & 7	1	A-15354-01	Wire & Terminal
8	5	A-13296	Screw
9	3	A02008F	Screw
10	1	*	Motor
11	1	A122771F	Soft Shaft
12	1	A-14253	Spring Retainer
13	1	A-14276	Spring
14	2	A-13831	Clutch
15	1	A13111F	Drive Pinion
16	1	A-10896	Switch
17	1	A-14087	Insulator
18	1	A-15320	Switch Assembly
19	2	A-11413	Screw
20	1	A13214F	Stretch Pin
21	1	A-13870	Timer Housing
22	1	A-13802	Cycle Actuator Gear
23	1	A-40096-02	Time Gear Assembly
24	1	A-13886-01F	Knob
25	2	A-11999	Label
26	1	A-13806	Program Wheel Retainer
27	1	AB0004F	Flow Gear Assembly
28	1	A-13881	Hinge Bracket
29	2	A-11384	Screw
30	1	AB0003F	Program Wheel Assembly
31	1	A-13911	Main Drive Gear
32	1	A-15066	Ball
33	1	A-15424	Spring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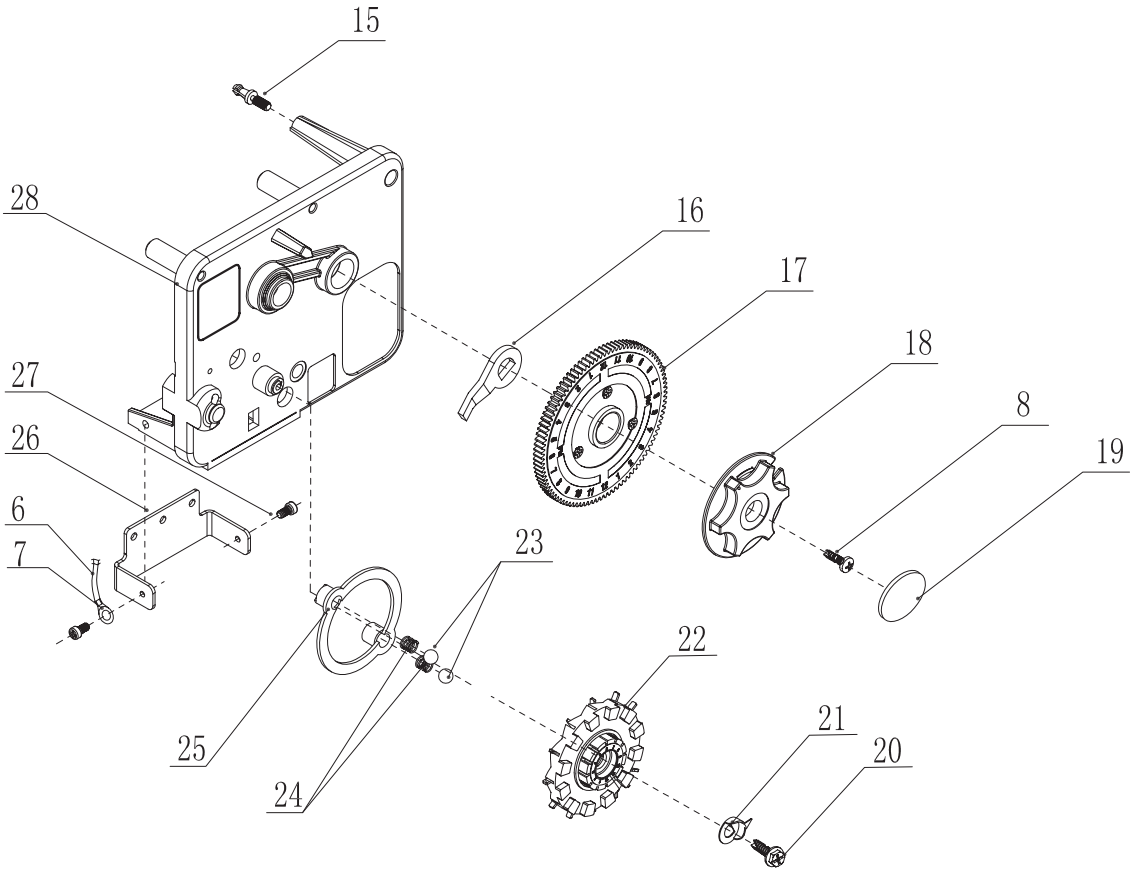
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Item No.	Quantity	Part No.	Description
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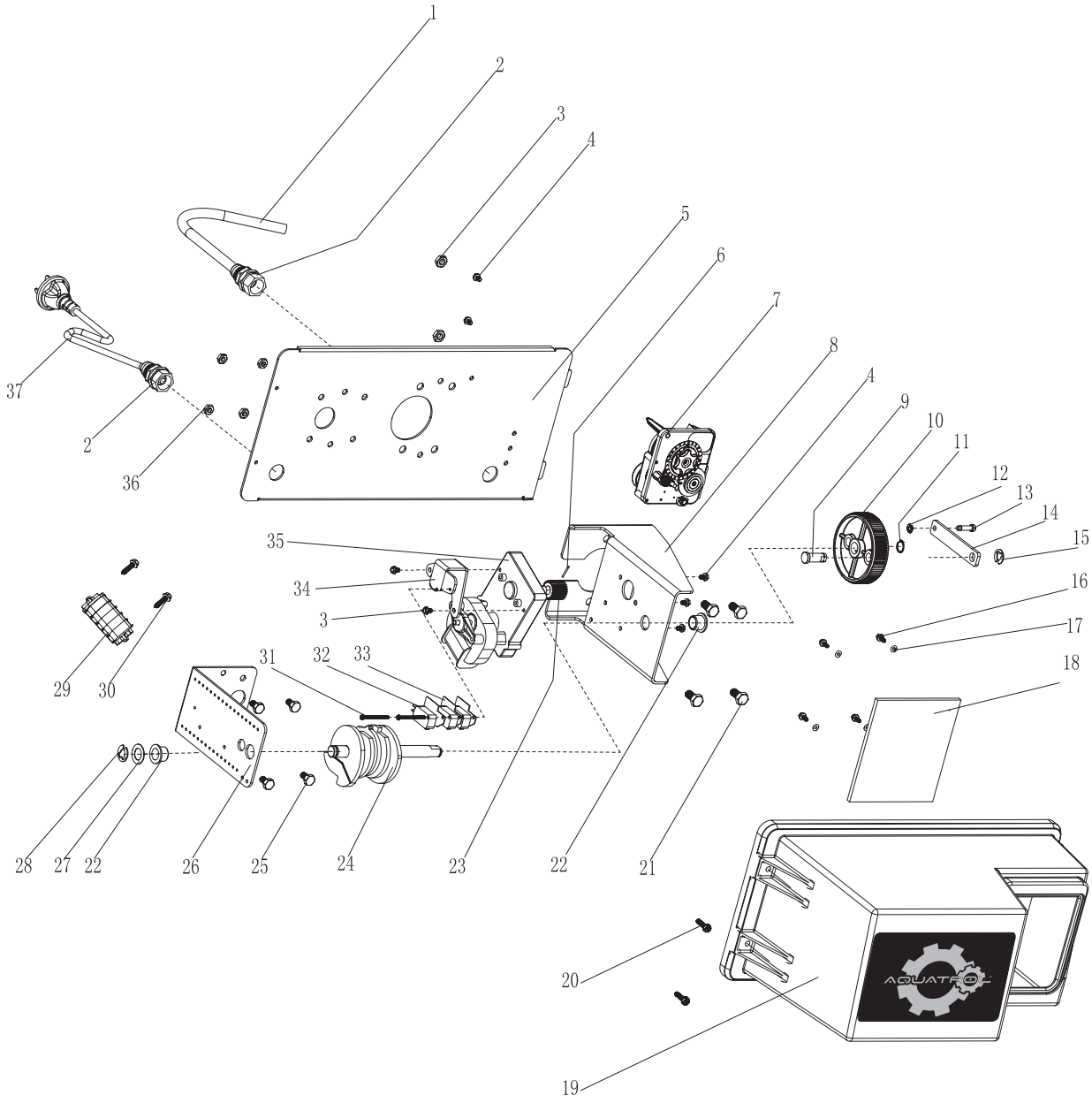
3	1	A-13017	Idler Gear
4	1	A-13164	Drive Gear
5	1	A-13887	Motor Mounting Plate
6 & 7	1	A-15354-01	Wire
8	4	A-13296	Screw
9	3	A02008F	Screw
10	1	*	Motor
11	2	A-11413	Screw
12	1	A-15320	Switch Assembly
13	1	A-14087	Insulator
14	1	A-10896	Switch
15	1	A13214F	Stretch Pin
16	1	A-13011	Cycle Actuator Staff
17	1	A-40096-02	Time Gear Assembly
18	1	A-13886	Knob
19	1	A-11999	Label
20	1	A02107F	Screw
21	1	A-13014	Pointer
22	1	A66109F	Skipper Wheel Assembly
23	3	A-15066	Ball
24	2	A-13311	Spring
25	1	A-13864	Skipper Wheel Ring
26	1	A-13881	Hinge Bracket
27	2	A-11384	Screw
28	1	A-13870	Timer Housing
29	1	AB0003F	Program Wheel Assembly
30	1	A-13911	Main Drive Gear
31	1	A-15424	Spring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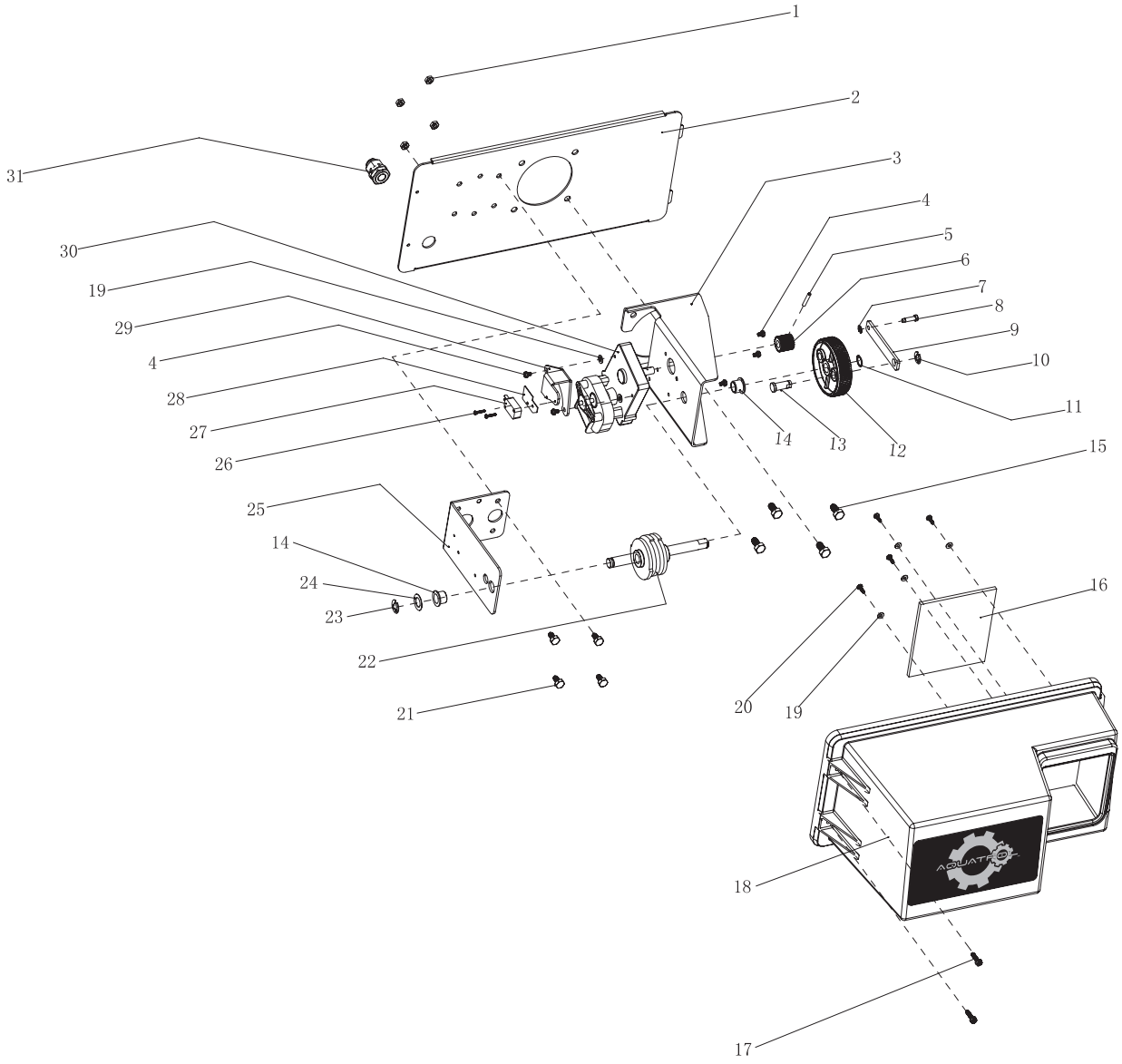
Item No.	Quantity	Part No.	Description
1	1	A-15879	Meter Cable Guide
2	2	A-17967	Screw Cap
3	2	A03005F	Nut
4	7	A-10872	Screw
5	1	A10108F	Back Plate
6	1	A-11381	Roll Pin
7	1	A-60320-02	13100 Timer Assembly
8	1	A-15120-01	Bracket-Motor
9	1	A-16048	Drive Bearing
10	1	A-16046	Drive Gear
11	1	A-16050	Retainer Ring
12	1	A04052F	Retainer
13	1	A-11709	Pin-Drive Link
14	1	A-16047	Connecting Link
15	1	A-11774	Retaining Ring
16	4	A-19203F	Screw
17	4	A-12288	Washer
18	1	A31549F	Look-In
19	1	A31545F	Housing
20	2	A02011F	Screw
21	4	A02055F	Screw
22	2	A-16052	Bushing
23	1	A-16045	Drive Pinion
24	1	A-16494-03	Cam Assembly
25	4	A02052F	Screw-Drive Mounting
26	1	A-16053	Bracket-Brine Valve Side
27	1	A-16059	Washer
28	1	A-16051	Retaining Ring
29	1	A-15226-6	Terminal Assembly
30	2	A-13296	Screw
31	2	A02083F	Screw
32	3	10218F	Switch
33	2	A-10302	Insulator
34	1	A-17797	Bracket Switch
35	1	A-40084-**	Motor
36	4	A03004F	Nut
37	1		Power Cord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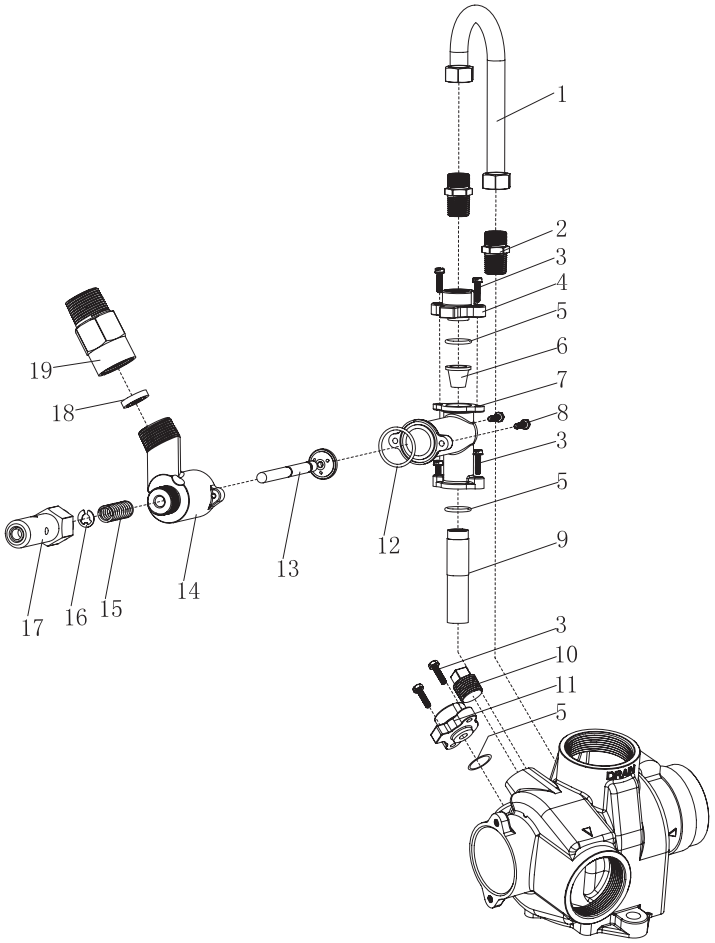
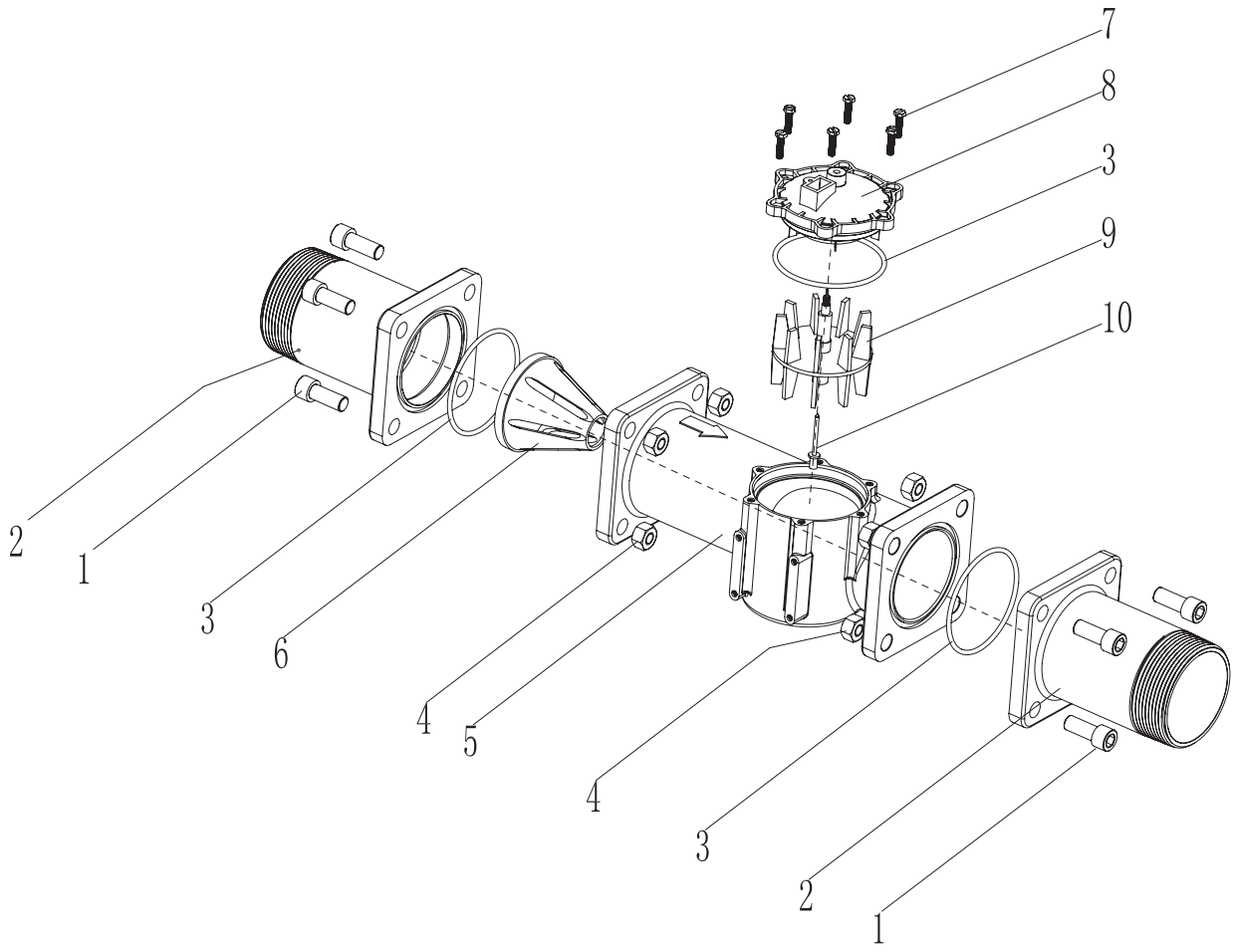
Item No.	Quantity	Part No.	Description
1	4	A-03004F	Nut
2	1	A-10108-1F	Back Cover Board
3	1	A-16086	Bracket
4	5	A-10300	Screw
5	1	A-11381	Pin
6	1	A-16045	Pinion, Drive
7	1	A-04052F	Ring, Retainer
8	1	A-11709	Pin, Drive Link
9	1	A-16047	Link, Drive
10	1	A-11774	Ring, Retaining
11	1	A-16050	Ring, Retaining
12	1	A-16046	Drive Gear
13	1	A-16048	Bearing, Drive Link
14	2	A-16052	Bushing
15	4	A-02055F	Bolt
16	1	A-31549F	Window
17	2	A-02011F	Screw
18	1	A-31545F	Cover
19	6	A-12288	Washer
20	4	A-14430	Screw
21	4	A-02052F	Bolt
22	1	A-16495	Dive Cam Assembly
23	1	A-16051	Ring, Retaining
24	1	A-16059	Washer
25	1	A-16053	Bracket, Brine Side
26	2	A-02084F	Screw
27	1	A-06003F	Switch
28	1	A-06051F	Insulator
29	1	A-17797	Bracket, Switch Mounting
30	1	A-40390	Motor
31	1	A-17967	Screw Cap



Item No.	Quantity	Part No.	Description
1	1	A-18703	Brine Tube
2	2	A-18702	Tube Fitting
3	6	A-12473	Screw
4	1	A-16341-01	Injector Cover
5	2	A-15246	O-Ring
6	1	A-15128-*	Injector Nozzle
7	1	A-16340	Injector Body
8	2	A-12473	Screw
9	1	A-15127-*	Injector Throat
10	1	A-16387	Nut
11	1	A-16341-02	Cover
12	1	A-18879F	O-Ring
13	1	A-16497-01	Brine Stem Assembly
14	1	A-18713	Brine Valve Body
15	1	A-11772	Spring
16	1	A-11774	Retaining Ring
17	1	A-16498-01	Stem Guide Assembly
18	1		B.L.F.C Button
19	1	A-60710-*	Brine Fitting



Item No.	Quantity	Part No.	Description
1	8	A-17122	Screw
2	2	A-16328	Connecting Flange
3	3	A-15707	O-Ring
4	8	A-03006F	Screw
5	1	A-12401F	Body
6	1	A-16280	Flow Straightener
7	6	A-13296	Screw
8	1	A-6039-*	Meter Cover Assembly
9	1	A-12405F	Impeller Assembly
10	1	A-12408	Impeller Spindle

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.

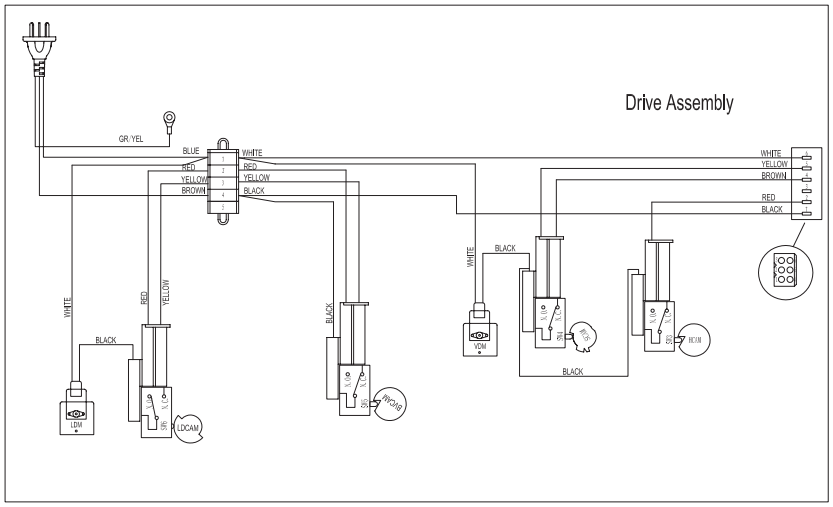
General Service Hints for Meter Control

Problem: Softener delivers hard water

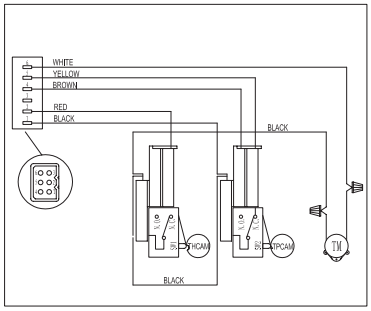
Reason: Reserve capacity has been exceeded.
Correction: Check salt dosage requirements and reset program wheel to provide additional reserve.

Reason: Program wheel is not 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.

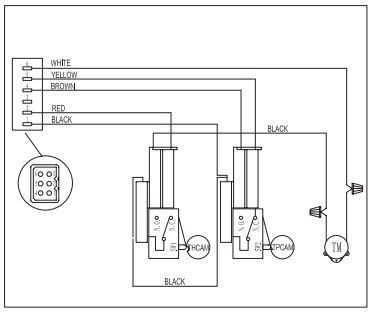
Reason: Meter is not measuring flow.
Correction: Check meter with meter checker.



Timer,meter delay control valve



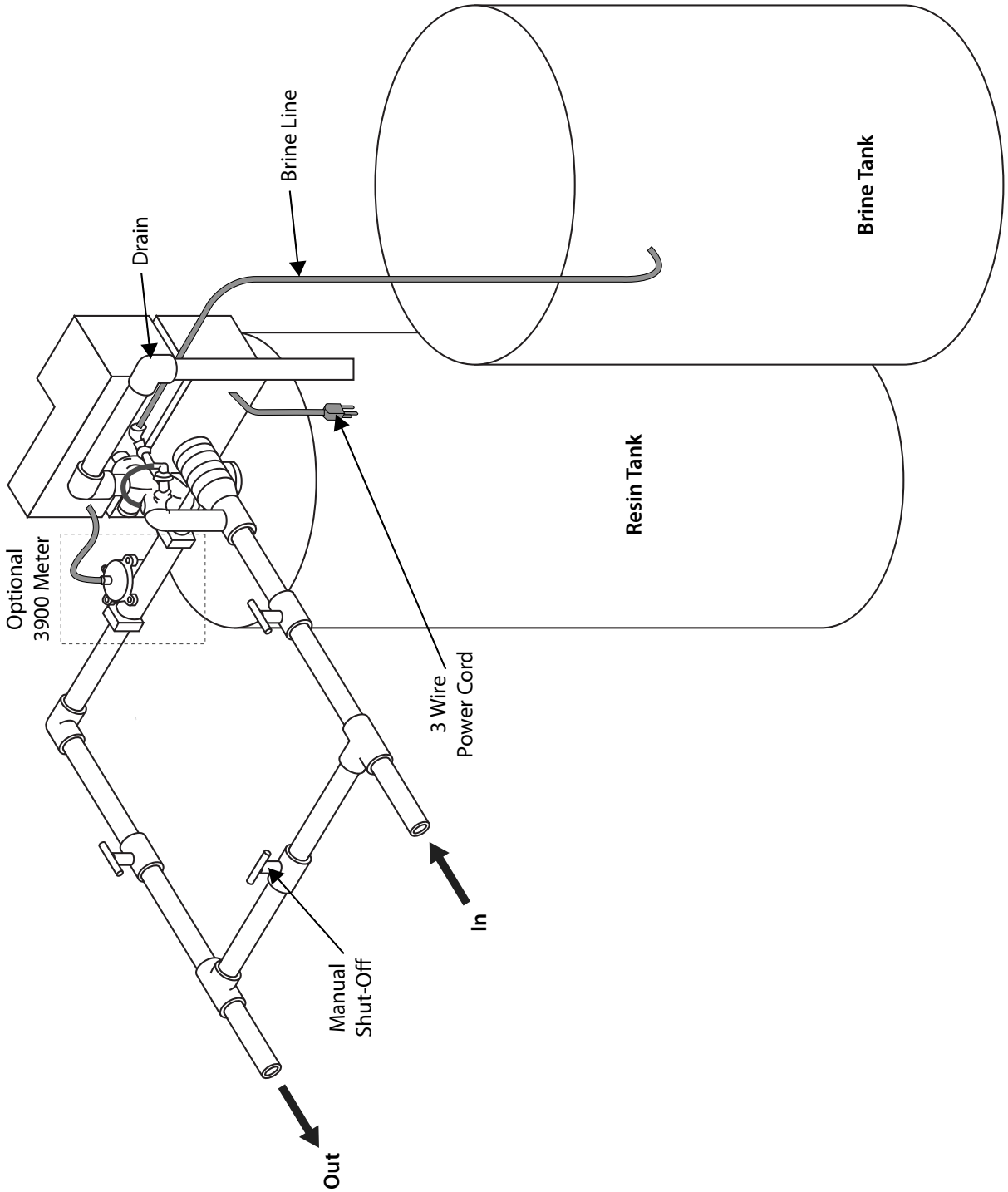
Meter Imm. control valve



TM Time Motor
VDM Valve Drive Motor
LDM Lower Drive Motor

SW1 Timer Homing Switch
SW2 Timer Program Switch
SW3 Valve Homing Switch
SW4 Valve Step Switch
SW5 Brine Cam Switch
SW6 Lower Drive Switch

THCAM Timer Homing Cam
TPCAM Timer Program CAM
HCAM Valve Homing Cam
SCAM Valve Step Cam
BVCAM Brine Valve Cam


Brine Line
Drain
Brine Tank
Resin Tank
Optional
3900 Meter
3 Wire
Power Cord
In
Manual
Shut-Off
Out

NOTES:

NOTES:

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CONTROL VALVES

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