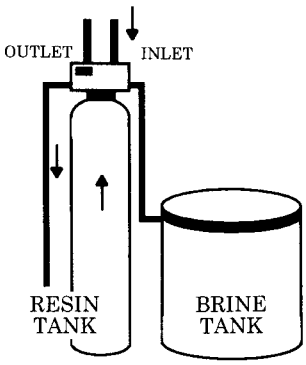
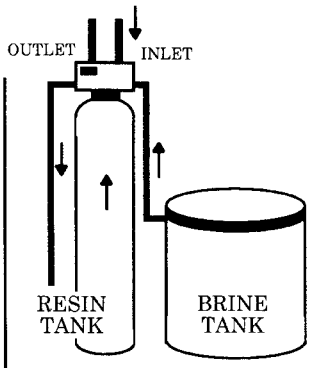
Introduction

A signal from the computer board to the drain motor and solenoids dictates each cycle during regeneration. If for any reason power is interrupted during regeneration, both the drain motor and the solenoids close and the control returns to the service position.

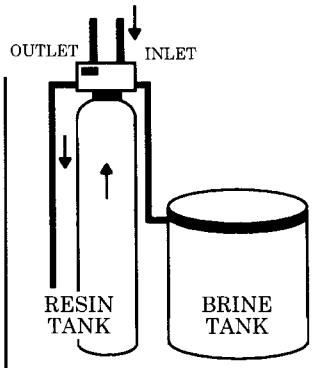
Meanwhile, the battery backup in the computer will retain the program for the continuation of the regeneration cycle when power is restored. Upflow brining and softwater refill cycles are also featured.



Backwash Cycle
The drain valve is opened, transferring the control into backwash. The solenoid opens, backwash water flows down through the riser tube and out the lower distributor, up through the mineral bed, through the backwash controller and out the drain.

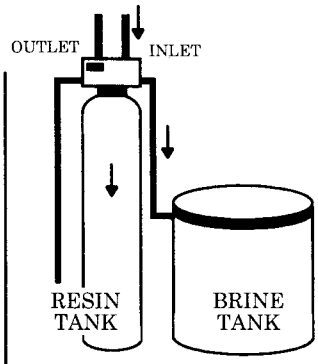


Brine and Slow Rinse Cycle
Raw water passes through the control where it's diverted through the injector, creating a vacuum which draws brine from the brine tank. The brine flows down the riser, through the lower distributor, up the mineral bed and out the drain. After brine has been drawn, clean water follows the same pattern. (Slow rinse).



Bonus Backwash Cycle
Flow is identical to first backwash cycle.

Service
The raw water enters the inlet of the control and passes down through the mineral bed. Soft water enters the lower distributor assembly, passes up through the riser tube and out the soft water outlet.



Purge/Timed Brine Refill
Drain motor and lower solenoid are closed; the valve returns to the service position. The upper solenoid is energized, allowing water to flow through the mineral bed and to the brine tank, refilling the brine tank with conditioned water. In case of power loss, the solenoid will close, preventing the brine tank from overflowing.

Specifications

Valve body material :	Noryl
Operating pressure :	
Minimum	20 psi (138 kPa)
Maximum	120 psi (827 kPa)
Electrical rating :	24 V - 50 Hz 120 V - 60 Hz 240 V - 50 Hz
Operating temperature :	
Minimum	35° F
Maximum	120° F
Drain connection :	1/2 inch NPT
Brine line connection :	1/4 inch NPT

Riser size :	13/16 inch or 1.050 inch
Inlet/Outlet connections :	3/4 or 1 inch copper sweat 3/4 or 1 inch NPT
Maximum service flow :	18.6 gpm
Maximum backwash flow :	5.0 gpm
Brine cycle :	Upflow
Refill cycle :	Softwater
Regeneration system :	Demand (gallons or liters), with optional day timer override.
Backwash flow controller :	Adjustable

Table 1: Injector Flow Rate Table

Injector Size	Inlet PSI	Total Flow/GPM	Rinse Flow/GPM	Brine Flow/GPM
#1 12" – 13" tanks	20	1.00	0.70	0.30
	40	1.15	1.00	0.50
	60	1.90	1.30	0.60
	80	2.10	1.45	0.65
	100	2.30	1.60	0.70
#2 10" – 12" tanks	20	0.90	0.60	0.30
	40	1.30	0.80	0.50
	60	1.40	0.80	0.60
	80	1.70	1.05	0.65
	100	1.80	1.10	0.70
#3 9" – 10" tanks	20	0.70	0.40	0.30
	40	1.00	0.50	0.50
	60	1.20	0.60	0.60
	80	1.35	0.75	0.60
	100	1.40	0.80	0.60
#4 8" – 9" tanks	20	0.60	0.30	0.30
	40	0.80	0.40	0.40
	60	0.90	0.40	0.50
	80	1.20	0.65	0.55
	100	1.25	0.70	0.55
#5 6" – 7" tanks	20	0.35	0.25	0.10
	40	0.50	0.30	0.20
	60	0.60	0.30	0.30
	80	0.70	0.40	0.35
	100	0.75	0.35	0.40

Sizing

The size of the unit depends on three parameters:
1. The amount of impurities in the water to be removed (a.k.a. grains of hardness).
2. Daily water demand (gallons).
3. Regeneration frequency : days or water volume between regenerations.

System Sizing Chart					
Mineral Cubic Ft.	0.75	1.00	1.25	1.50	2.00
Tank Size	8 x 44	9 x 48	10 x 47	10 x 54	12 x 48
Service Flow/GPM (Max.)	9.2	9.2	9.2	9.3	9.6
Backwash Flow/GPM (Max.)	1.8	2.2	2.6	2.6	3.5
Pressure Drop @ 70 psi	15	15	15	15	15
Capacity/Grains Maximum	22,300	29,800	37,200	44,600	59,500
Salt Setting Lbs. Maximum	11.4	15.2	19	22.8	30.4
Capacity/Grains Medium	19,100	25,500	31,900	38,300	51,000
Salt Setting Lbs. Medium	7.8	6.2	13	15.6	20.8
Capacity/Grains Minimum	12,900	17,200	21,500	25,800	34,400
Salt Setting Lbs. Minimum	3.6	4.8	6	7.2	9.6

Backwash Table				
Inlet Pressure	**FLOW (GPM) Backwash Flow Position**			
PSI	Wide Open	45 Deg.	78 Deg.	90 Deg.
20	2.77	2.48	1.14	0.42
30	3.39	3.09	1.42	0.52
40	3.91	3.54	1.65	0.61
50	4.31	3.99	1.85	0.66
60	4.75	4.37	2.03	0.73

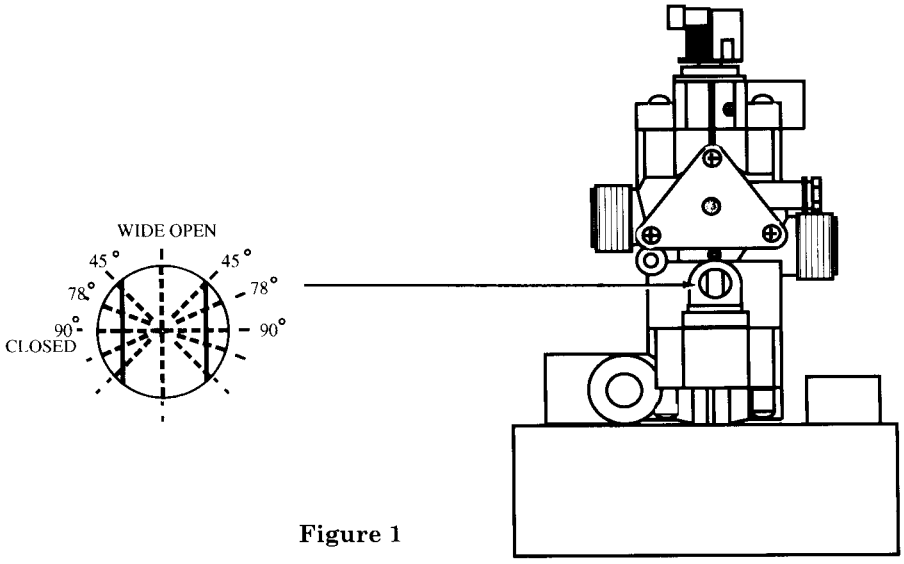


Figure 1

Backwash Adjustment

The backwash flow controller is assembled in the wide open position. The controller will need to be adjusted for the system's size. To adjust, place the unit in the backwash cycle, then turn the flow controller either to the right or the left. Check the flow to drain for the proper flow rate. Refer to resin manufacturer's specifications for recommended backwash flow rate.

Assembly

Resin Tank & Control

(Figure 2)

1. Rinse the resin tank well.
2. Attach the riser tube (D) to the lower distributor (K) using cotter pins or glue.
3. Lower the riser tube/distributor assembly into the resin tank (C) so that it touches the bottom.
4. Cut the top of the riser tube 1/4 in. below the top of the tank threads. Chamfer the tube to prepare for insertion into the control.
5. Plug the top of the riser tube to prevent resin from entering the tube.
6. Pour the resin (E) into the tank. ***Note**: The resin tank should be no more than 2/3 to 3/4 full to allow for resin expansion during the backwash cycle.
7. Verify that the control (A) is equipped with the proper voltage, injector and flow controls (see back page).
8. Remove the plug from the riser tube. Screw the upper distributor (B) into the control.
9. Insert the riser tube into the valve assembly.
10. Be sure that tank threads are free from resin beads and that the tank o-ring is in place.**
11. Grip control valve by the body and screw onto the tank. Hold the tank and hand tighten.

Brine Tank

1. Install overflow elbow (F).
2. Clean the inside of the brine tank (G) to remove dirt and shavings.
3. Assemble the salt platform (J) and brine well (I) into the brine tank
4. Assemble the brine valve (H) and adjust float height. Place the brine valve into the brine well.
5. Connect the brine tube to the control.

Note: Controls using a 1.050 inch diameter riser tube will need to cut the tube length 1/2 inch below the top of the resin tank threads.

Typical Setup

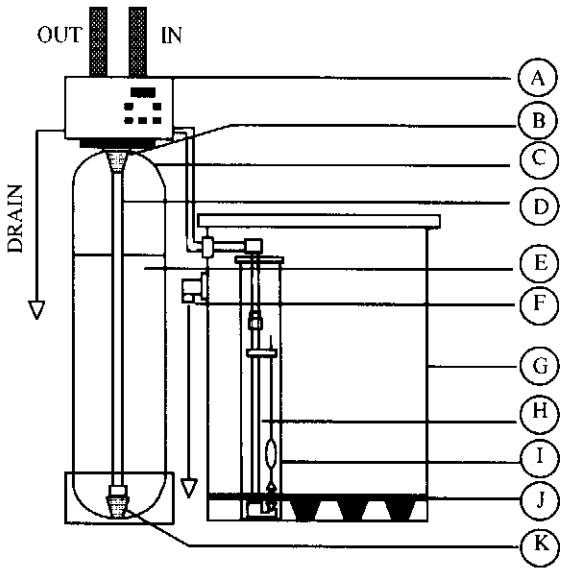


Figure 2

A – Control
B – Upper Distributor
C – Resin Tank
D – Riser Tube
E – Resin
F – Overflow Elbow
G – Brine Tank
H – Brine Valve
I – Brine Well
J – Salt Platform
K – Lower Distributor

* Check resin manufacturer for recommended bed depth, backwash flow rates and bed expansion specifications.

** Larger tank O-ring required for Park tanks. See ordering specifications for option.

Installation

Put the softener in place and connect the inlet and outlet to the bypass valve arrangement. **Note:** Facing the front of the of control, the inlet is at the right with the outlet and drain at the left.

DO NOT OVERTIGHTEN CONNECTIONS.

The water softener must be installed in accordance with local codes.

If the pressure exceeds 120 psi, a pressure reducing valve MUST BE INSTALLED. The pressure must exceed 20 psi for good performance.

Select the location for the softener where the water supply, drain outlet and electrical supply can easily be reached.

A supply for drinking water and outside tap may also be plumbed prior to the softener.

Installation With 541 BP Bypass Kit
See Figure 3.

1. Fit the bypass valve (A) to the couplers (B & C). **Note:** The coupler with the meter assembly (C) must be installed on the outlet side.
2. Assemble the union kit (E) to the control (F).
3. Using compression fittings (D), connect the union kit to the couplers. Note inlet and outlet connections.

Installation With 3-Valve Bypass System.
(Figure 4)

1. Fit the "T" fittings (A) to the inlet/outlet lines.
2. Fit the bypass valve (B) between the "T" fittings.
3. Install the inlet/outlet valves (C & D).
4. Connect the union kit (E) to the inlet/outlet valves.
5. Connect the union kit to the control (F).

Figure 3

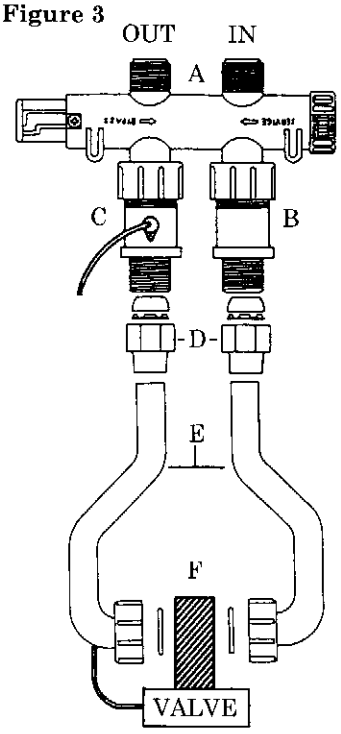
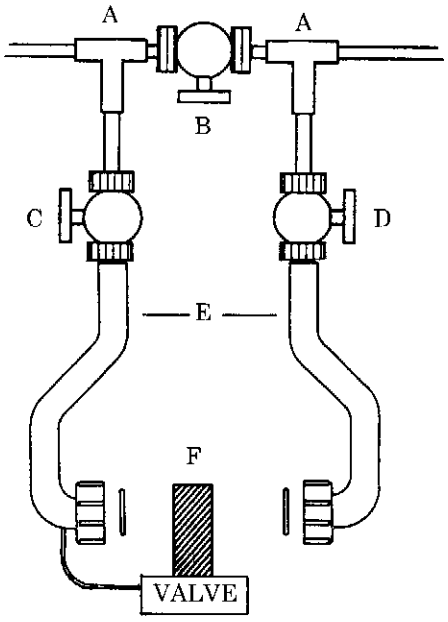


Figure 4



Drain Connection
(Figure 5.)

1. Maximum height above control: 48 inches.
2. If drain line is at floor level, 1/2 in. pipe or tubing can be used.
3. If drain line is at control level, 1/2 in. pipe or tubing can be used for lengths up to 30 ft. For drain lines exceeding 30 ft. use 3/4 in. pipe or tubing.
4. Drain lines and overflow lines must slope down to drain. Check for kinks.
5. Ensure that an air or siphon break is installed in the drain line.

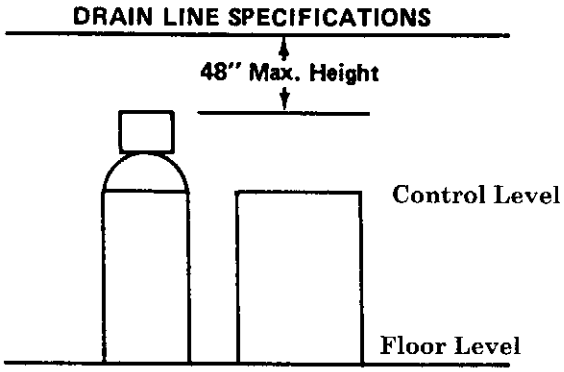


Figure 5

Electrical Connection

1. Electrical connections must be in accordance with local codes.
2. Install a ground jumper between the inlet and outlet plumbing lines to provide ground continuity throughout the houshold water system.
3. Use a three-prong electrical outlet to maintain proper polarity. DO NOT USE A TWO-WIRE EXTENSION CORD OR A PLUG ADAPTER WITHOUT PROPER GROUNDING.

Installation Checkout

1. Set the Mor-Flow bypass valve to service, or close manual bypass valve and open both inlet and outlet valves.
2. Open the main stop-cock.
3. Check system for leaks.
4. Open tap and run water for at least 2 minutes to settle the resin bed and to purge air from the outlet pipe.
5. Step control to the backwash cycle (see page 9) to remove all air from the tank.
6. Step control to the brine refill cycle (see page 9). To ensure sufficient brine for the next regeneration, let the control run through the entire duration of the refill cycle.
7. Check for proper brine level. If a safety brine check valve is used, ensure the float adjustment is slightly above the brine level.
8. Fill brine tank with salt. DO NOT OVERFILL.
9. For custom programming, see Programming section.

*If a brine valve is used, add 1 gallon of water to the brine tank to make up for the depth of the brine valve pickup.