

Autotrol® Performa™ FA Valve

With 400 Series Control

**Water Conditioning Control System
Dealer Installation, Operation, and Maintenance Manual**

Table of Contents

Installation	3
Location Selection	
Water Line Connection	
Drain Line Connection	
Regenerant Line Connection	
Overflow Line Connection	
Placing Conditioner into Operation	5
Electrical Connection	
440i Control Settings	6
Programming	
Manual Regeneration	
Removing the Valve Assembly for Servicing	7
Removing 440i for Servicing	7
Preventive Maintenance	8
Injector Screen and Injector	
Specifications	9
Pressure Graphs	10
Identification of Control Valving	11
Valve Disc Principle of Operation	11
Flow Diagrams	11
1 Service Position	
2 Backwash Position	
3 Draw/Slow Rinse Position	
4 Fast Rinse/Refill Position	
Replacement Parts	13
Performa Valve	
440i Control	
1265 Bypass	
Troubleshooting	15

Installation

All plumbing and electrical connections must conform to local codes.

Inspect the unit carefully for carrier shortage or shipping damage.

Location Selection

1. The distance between the unit and a drain should be as short as possible.
2. If it is likely that supplementary water treatment equipment will be required. Make sure adequate additional space is available.
3. Since salt must be added periodically to the brine tank, the location must be easily accessible.
4. There should be at least 10 feet (3 m) of piping between the outlet of the conditioner and the inlet to the heater. Water heaters can sometimes overheat and transmit heat back down the cold pipe into the unit control valve.

Hot water can severely damage the conditioner. A 10-foot (3-m) total pipe run, including bends, elbows, etc., is a reasonable distance to help prevent this from happening. To prevent hot water flowing from heat source to the conditioner, in the event of a negative pressure situation, install a check valve in the treated water piping from the conditioner. **If a check valve is installed, make sure the water heating unit is equipped with a properly rated temperature and pressure safety relief valve. Also, make sure that local codes are not violated.**

5. Do not locate the unit where it or its connections (including the drain and overflow lines) will ever be subjected to room temperatures under 34°F (1°C) or over 120°F (49°C).
6. Do not install the unit near acid or acid fumes.
7. The use of resin cleaners in an unvented enclosure is not recommended.

Water Line Connection

The installation of a bypass valve system is recommended to provide for occasions when the water conditioner must be bypassed for untreated water or for servicing.

The most common bypass systems are the Autotrol Series 1265 bypass valve (Figure 1) and the plumbed-in globe valves (Figure 2). Though both are similar in function, the Autotrol Series 1265 bypass offers simplicity and ease of operation.

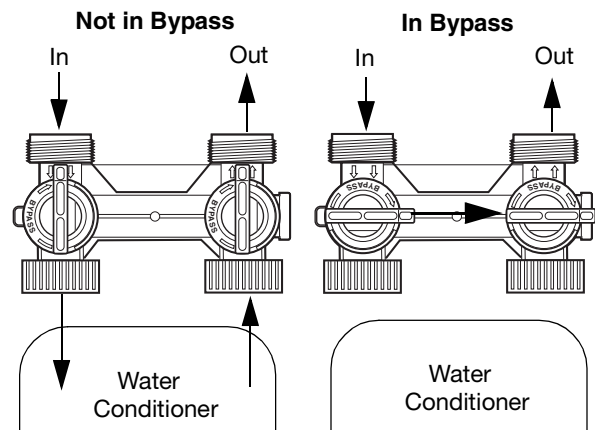


Figure 1 - Autotrol Series 1265 Bypass Valve

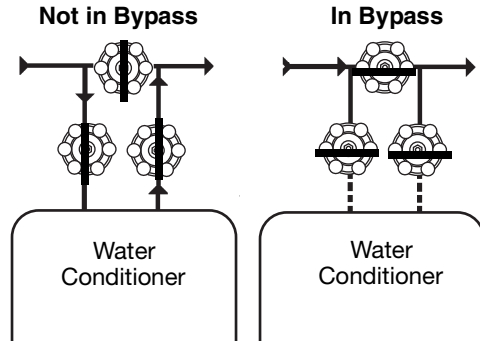


Figure 2 - Typical Globe Valve Bypass System

Drain Line Connection

Note: Standard commercial practices are followed here. Local codes may require changes to the following suggestions.

1. Ideally located, the unit is above and not more than 20 feet (6.1 m) from the drain. For such installations, using an appropriate adapter fitting, connect 1/2-inch (1.3-cm) plastic tubing to the drain line connection of the control valve.
2. If the backwash flow rate exceeds 5 gpm (22.7 Lpm) or if the unit is located more than 20 feet (6.1 m) from the drain, use 3/4-inch (1.9-cm) tubing for runs up to 40 feet (12.2 m). Also, purchase the appropriate fitting to connect the 3/4-inch tubing to the 3/4-inch NPT drain connection.
3. If the unit is located where the drain line must be elevated, you may elevate the line up to 6 feet (1.8 m) providing the run does not exceed 15 feet (4.6 m), and the water pressure at conditioner is not less than 40 PSI (2.76 bar). You may elevate an additional 2 feet (61 cm) for each additional 10 PSI (0.69 bar).

- Where the drain line is elevated but empties into the drain below the level of the control valve, form a 7-inch (18-cm) loop at the far end of the line so that the bottom of the loop is level with the drain line connection. This provides an adequate siphon trap.

Note: Where the drain empties into an overhead sewer line, a sink-type trap must be used.

IMPORTANT: Never insert the drain line into a drain, sewer line, or trap. Always allow an air gap between the drain line and the wastewater to prevent the sewage from back-siphoning into the conditioner (Figure 3).

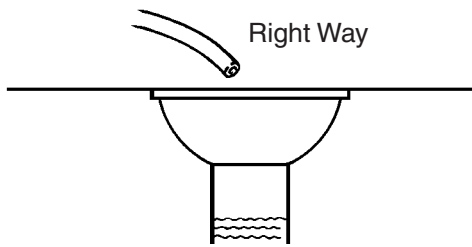


Figure 3

Note: Standard commercial practices have been followed here. Local codes may require changes to these suggestions.

Regenerant Line Connection

It is necessary to connect the regenerant line to the fitting on the valve (3/8-inch NPT).

Make sure all fittings and connections are tight.

Overflow Line Connection

In the absence of a safety overflow and in the event of a malfunction, the REGENERANT TANK OVERFLOW directs “overflow” to the drain instead of spilling the “overflow” on the floor where it could cause considerable damage. This fitting must be on the side of the cabinet or regenerant tank.

To connect the overflow line, locate the hole on the side of the regenerant tank. Insert the overflow fitting (not supplied) into the tank and tighten the fitting with plastic thumb nut and gasket as shown (Figure 4). Attach a 1/2-inch (1.3-cm) length of I.D. tubing (not supplied) to the fitting, and run it to the drain. Do not elevate the overflow line higher than 3 inches (7.6 cm) below the bottom of the overflow fitting. Do not connect to the drain line of control unit. The overflow line must be a direct, separate line from the overflow fitting to the drain, sewer, or tub. Allow an air gap as per drain line instructions (Figure 3).

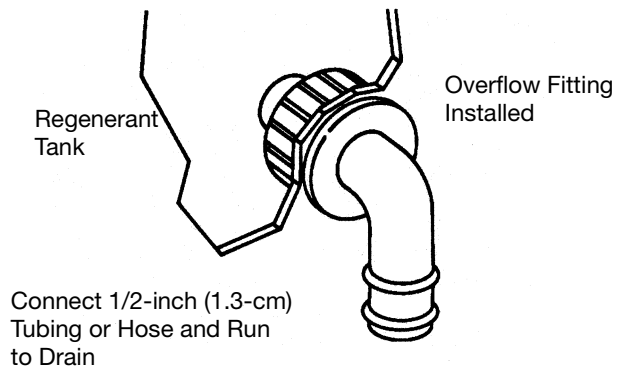


Figure 4

Placing Conditioner into Operation

After all of the previous steps have been completed, the unit is ready to be placed into operation. Follow these steps carefully.

1. Remove the control valve cover by first releasing the plastic tab from the back of the cover. Pull the back of the cover slightly outward and lift it up.

Note: The following steps will require turning the indicator knob (Figure 5) to various positions.

Manually rotate the camshaft

COUNTERCLOCKWISE only until the indicator knob points to required position. (See the manual regeneration sections for each control's manual operation.)

2. Rotate the indicator knob **COUNTERCLOCKWISE** until it points directly to the word **BACKWASH**.
3. Fill the media tank with water.
 - A. With the water supply off, place the bypass valve(s) into the "not in bypass" position.
 - B. Open the water supply valve very slowly to approximately the 1/4 open position.

IMPORTANT: If the water supply valve is opened too rapidly or too far, media may be lost. In the 1/4 open position, you will hear air escaping slowly from the drain line.

- C. When all of the air has been purged from the tank (water begins to flow steadily from the drain), open the main supply valve all of the way.
 - D. Allow the water to run to the drain until it is clear.
 - E. Turn off the water supply and let the unit stand for about five minutes. This allows all of the trapped air to escape from the tank.
4. Add water to the regenerant tank (initial fill).

With a bucket or hose, add water to the regenerant tank. If the tank has a platform above the bottom of the tank, add water until the level is approximately 1 inch (25 mm) above the platform. Do not add regenerant at this time.
 5. Place the unit into operation.

- A. With the water supply valve completely open, carefully advance the indicator knob **COUNTERCLOCKWISE** to the center of the **REFILL** position. Hold the indicator knob at this position until water starts to flow through the regenerant line into the regenerant tank. Do not run the unit for more than one or two minutes.
 - B. Advance the indicator knob **COUNTERCLOCKWISE** until it points to the center of the **DRAW/SLOW RINSE** position.
 - C. With the indicator knob in this position, check to see if water is being drawn from the regenerant tank. The water level in the regenerant tank recedes very slowly. Observe the water level for at least three minutes. If the water level does not recede, or if it goes up, reference the Troubleshooting section.
 - D. Advance the indicator knob **COUNTERCLOCKWISE** to the **SERVICE** or **CONDITIONED WATER** position and run water from a nearby faucet until the water is clear and soft.
6. Add the regenerant. Potassium permanganate is normally used as the regenerant, however, other regenerants that provide satisfactory results may be used.

Electrical Connection

100 VAC, 115 VAC, and 230 VAC units: Remove the twist tie from the power cord, and extend the cord to its full length. Make sure the power source matches the rating printed on the control. Make sure a wall switch does not control the outlet.

12 VAC: Connect the plug of the transformer (supplied) secondary cable to the mating socket at the rear or bottom of the timer housing. Make sure the transformer is secure and is plugged into a power source of correct voltage that is not controlled by a wall switch.

440i Control Settings

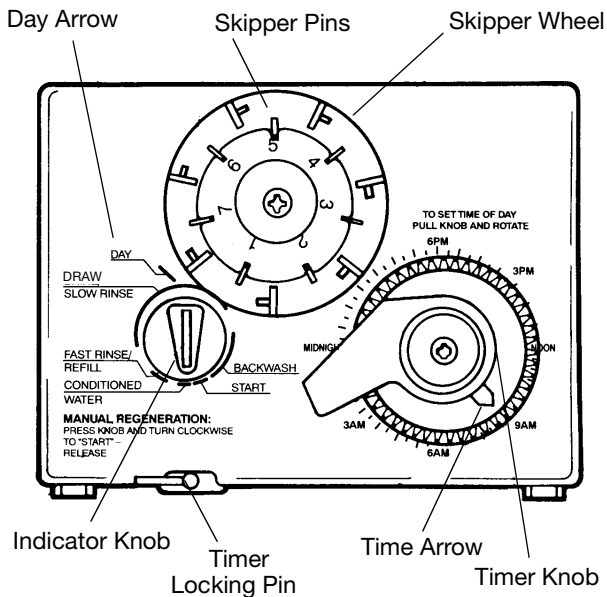


Figure 5

Programming

1. Set the number of days of regeneration on the skipper wheel (Figure 5).
 - Pull all of the skipper pins outward (away from the control).
 - Rotate the skipper wheel until day arrow points to the number of current day or number 1.
 - Depress the skipper pin(s) at the day(s) for which regeneration is required.
2. Set the time of day.
 - Grasp the timer knob and pull it outward.
 - Rotate it in either direction until the timer arrow points to the actual time of day.
 - Release the timer knob.

Note: With the time of day properly set, the conditioner regenerates at about 2:30 a.m. If you prefer to have the unit regenerate at an earlier or later time, simply set the current time-of-day accordingly (e.g., to have the unit regenerate at 4:30 a.m. — two hours later — set the clock two hours earlier than the actual time of day.)

Note: The Timer Locking Pin should always be horizontal (Figure 5) during operation.

Manual Regeneration

Electricity is used only to run the control and to rotate the camshaft. All other functions are operated by water pressure. Therefore, in the event of a power outage, all the regeneration positions may be dialed manually by depressing the indicator knob and turning **COUNTERCLOCKWISE** (Figure 5). The following cycle times should be used for proper regeneration:

- BACKWASH** — 20 minutes
- DRAW/SLOW RINSE** — 50 minutes
- FAST RINSE/REFILL** — 10 minutes

Do not exceed 10 minutes for the **FAST RINSE/REFILL** cycle as this causes excessive regenerant usage during the next regeneration and possibly a regenerant residue in the treated water.

Removing the Valve Assembly for Servicing

1. Unplug the power cord.
2. Shut off the water supply or put the bypass valve(s) into bypass position.
3. Remove the cover, and with a screwdriver, relieve tank pressure by pushing open valve No. 7 (rear flapper) on the control as shown (Figure 10).

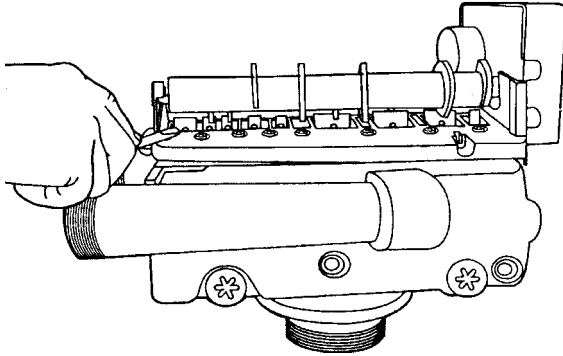


Figure 10

4. When used with a globe valve bypass, loosen and detach the inlet, outlet, regenerant, and drain lines from the valve. If using the 1265 bypass, loosen and remove the valve from bypass as well as loosening and removing the regenerant and drain lines.
5. Unscrew the valve (counterclockwise) and remove the valve from tank.
6. To replace the control valve, reverse the above procedure.

Removing 440i for Servicing

1. Unplug the power cord.
2. Remove the cover.
3. Align the indicator arrow on the rear of the camshaft with the top of the rear hoop of the top plate (Figure 11).

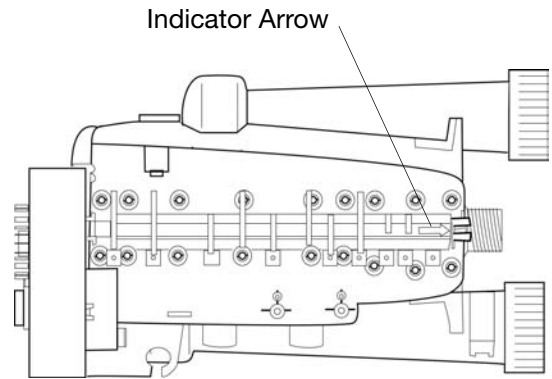


Figure 11

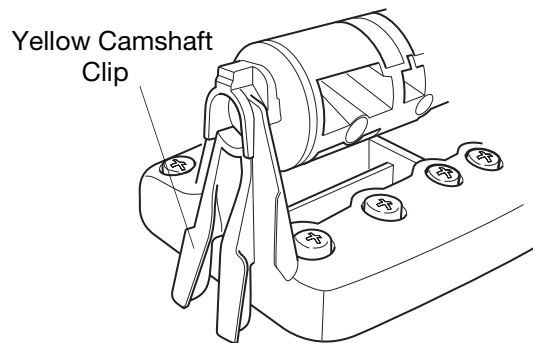


Figure 12

4. Remove the yellow camshaft clip, located at the rear of the camshaft (Figure 12) to remove the camshaft. Push the two ends of the clip together (Figure 13) to remove the clip from the back.

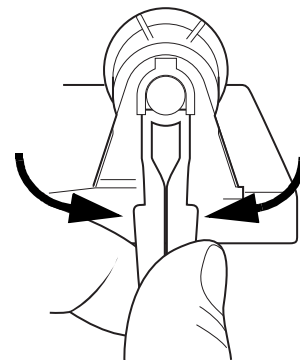


Figure 13

- Remove the yellow camshaft clip from the rear top plate hoop (Figure 14).

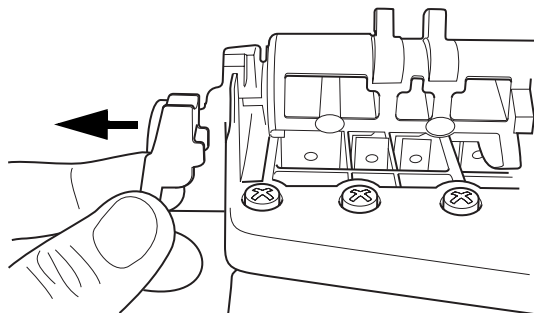


Figure 14

- Disengage the front of the camshaft from the output gear of the control.
- Remove the timer locking pin and lift the control straight up and off of the valve.
- Reverse the above procedures to reinstall the camshaft and control.

Preventive Maintenance

Injector Screen and Injector

Clean the injector screen and the injector once a year:

- Unplug the wall-mount transformer.
- Shut off the water supply or put the bypass valve(s) into the bypass position.
- Relieve system pressure by opening valve No. 7 (at rear) with a screwdriver (Figure 10).
- Remove the injector screen and injector cap (Figure 15) with a screwdriver.
- Clean the injector screen using a fine brush. Flush it with water until clean.
- Pull the injector straight out using a needle-nose pliers.
- Flush water into the injector screen recess of the valve body to flush debris out through the injector recess.
- Clean and flush the injector with water.
- Lubricate the O-rings on the injector, injector cap, and injector screen with silicone lubricant **only!**
- Reinstall the injector, injector cap, and injector screen.

IMPORTANT: Do not overtighten the plastic cap. Seat the cap lightly into position. Overtightening may cause breakage of the plastic cap that may not be immediately visible.

- Plug the wall-mount transformer into the outlet. Reset the clock, if necessary.
- Slowly open the water supply valve or return the bypass valve(s) to the “service” position.

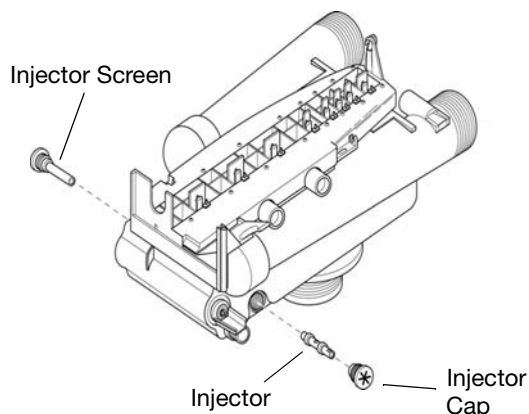
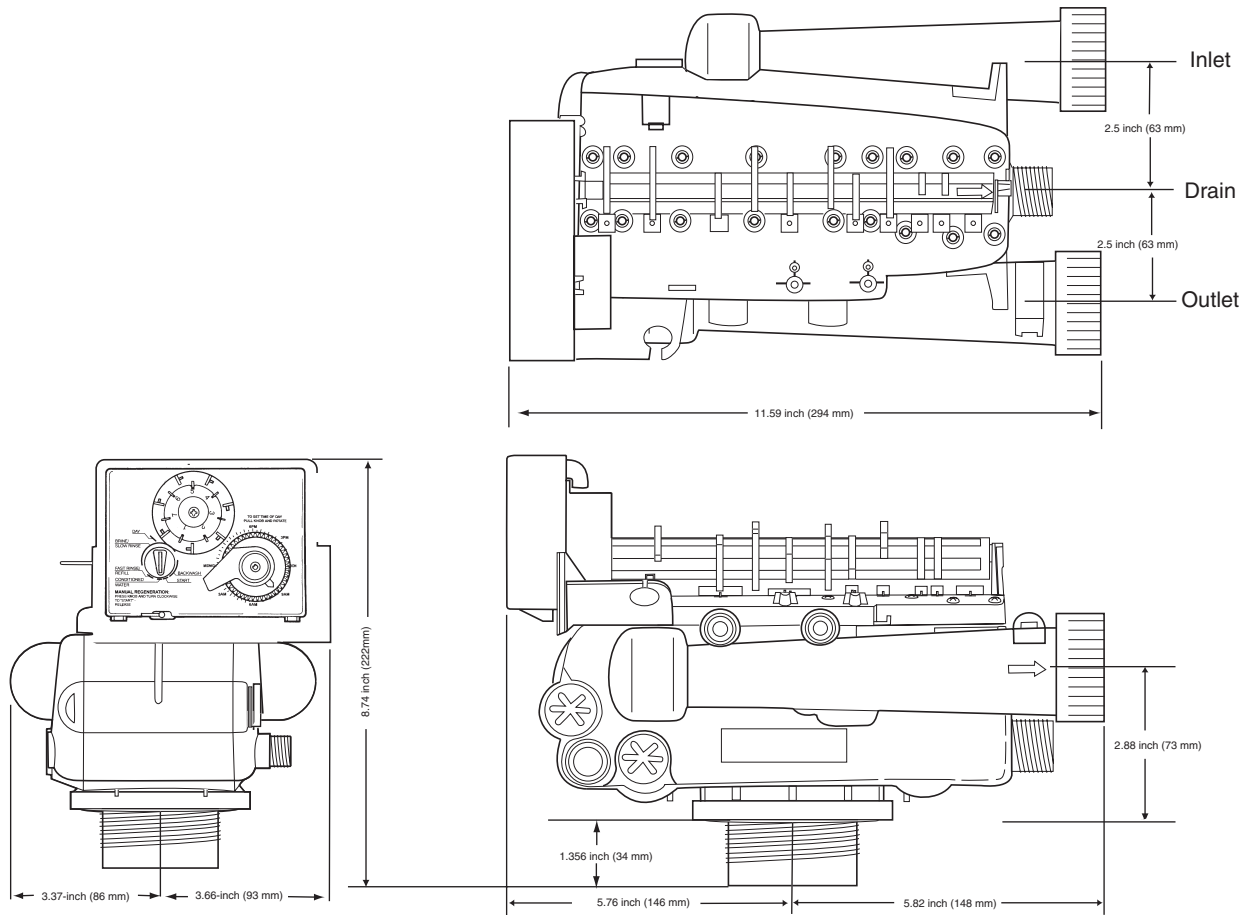


Figure 15

Specifications



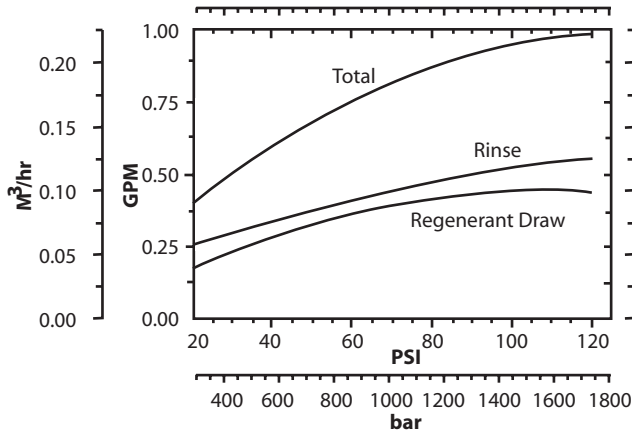
Hydrostatic Test Pressure	300 PSI (20.69 bar)
Working Pressure	20-125 PSI (1.38 - 8.62 bar)
Standard Electrical Rating	12V 60 Hz
Optional Electrical Rating	115V 50 Hz, 230V 50 Hz, 200V 60 Hz, 24V 60 Hz, 24V 50 Hz, 100V 60 Hz, 100V 50 Hz, 12V 50 Hz/transformer, 12V 60 Hz/transformer
Pressure Tank Thread	2 1/2 inch-8 male
Riser Pipe Diameter Required	1.050 inch OD (26.7 mm)
Riser Pipe Length	1-1/8 ±1/8 inches (31.8 mm) higher than the top of mineral tank
Standard Connection	.1-inch (25.4-mm) copper tube adapters
Optional Connections	3/4-inch, 1-1/4-inch, 22-mm, and 28-mm copper tube adapters 3/4-inch BSPT, 1-inch BSPT, 1-inch NPT brass pipe adapters 3/4-inch, 1-inch, 25-mm CPVC tube adapters
Regenerant Line Connection	3/8-inch NPT male
Drain Line Connection	3/4-inch NPT male
Optional Bypass Valve	Rotating handles, full 1-inch porting, reinforced Noryl*
Control Module, Tank Adapter	Reinforced Noryl
Rubber Goods	Compounded for cold water service
Program Clock (Timer)	440i: Available in 6- or 7-day English, German, French, Italian, Spanish, Japanese
Injector Size "A" White	Nozzle .042-inch (1.1-mm) diameter, Throat .089-inch (2.3-mm) diameter
Injector Size "B" Blue	Nozzle .052-inch (1.3-mm) diameter, Throat .099-inch (2.5-mm) diameter
Injector Size "C" Red	Nozzle .059-inch (1.5-mm) diameter, Throat .099-inch (2.5-mm) diameter
Injector Size "D" Green	Nozzle .071-inch (1.8-mm) diameter, Throat .147-inch (3.7-mm) diameter
Internal Backwash Controllers	7- through 14-inch (17.8- through 35.6-cm) diameter media tanks

All sizes to flow 5.0 gpm/sq ft (183 L/m²) of bed area.
For tank sizes above 14 inches in diameter, use an external flow control.

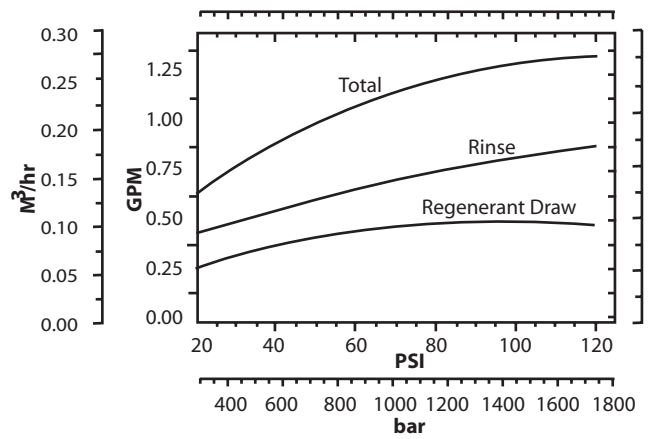
* Noryl is a trademark of the General Electric Company.

Pressure Graphs

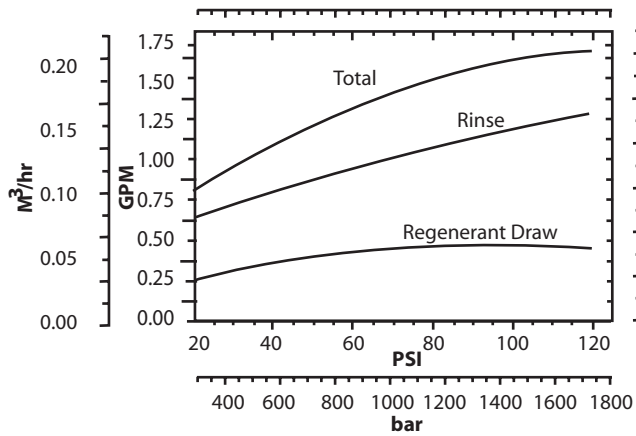
Injector #1031363
"A" in a 268 Valve



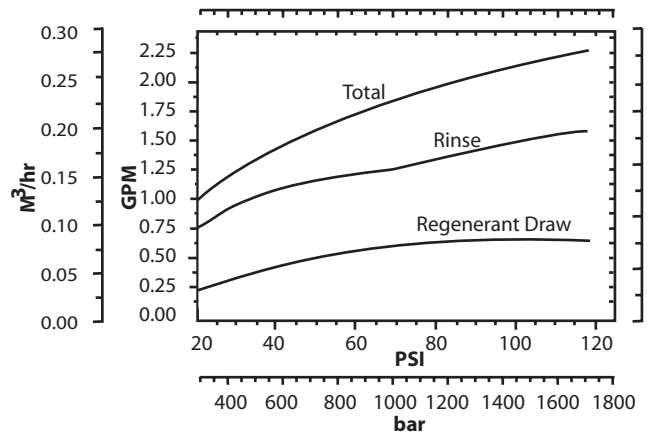
Injector #1031364
"B" in a 268 Valve



Injector #1031365
"C" in a 268 Valve



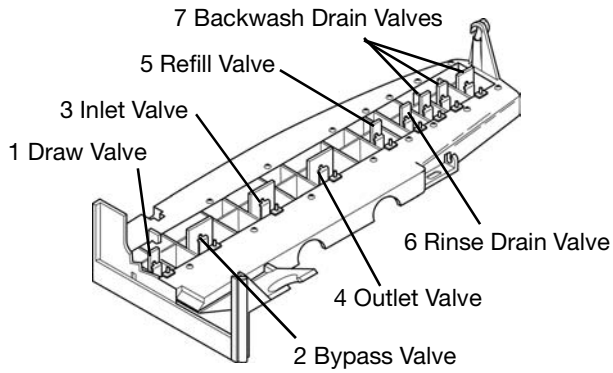
Injector #1030272
"D" in a 268 Valve



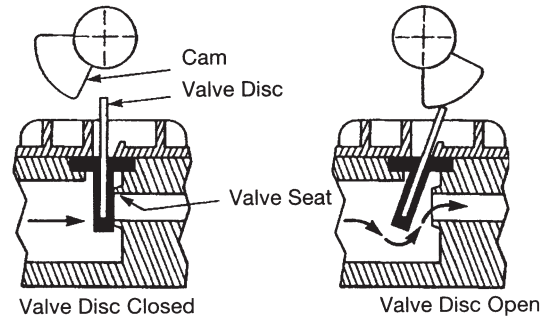
Backwash Number	7	8	9	10	12	13	14
Flow (GPM*)	1.3	1.7	2.2	2.7	3.4	4.5	5.3
Flow (LPM*)	4.9	6.4	8.3	10.2	12.9	17.0	20.0

*Approximate flow rates at 60 PSI (4.14 bar)

Identification of Control Valving

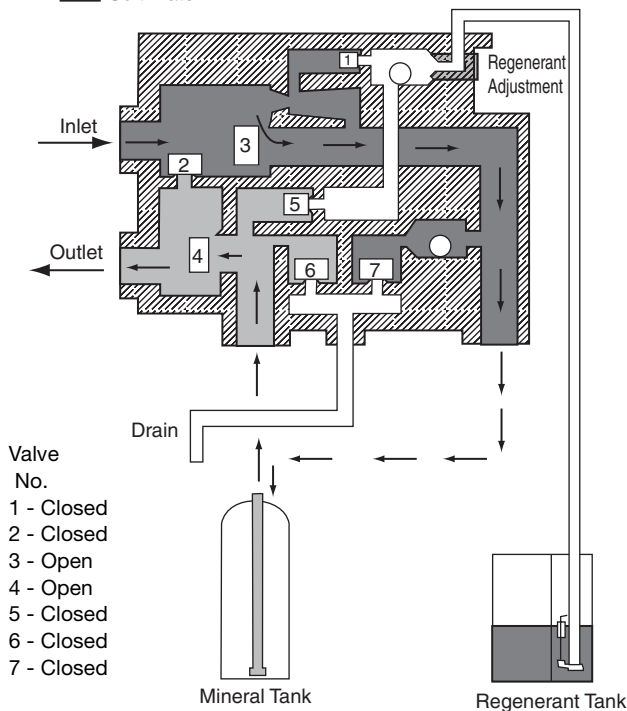
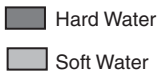


Valve Disc Principle of Operation

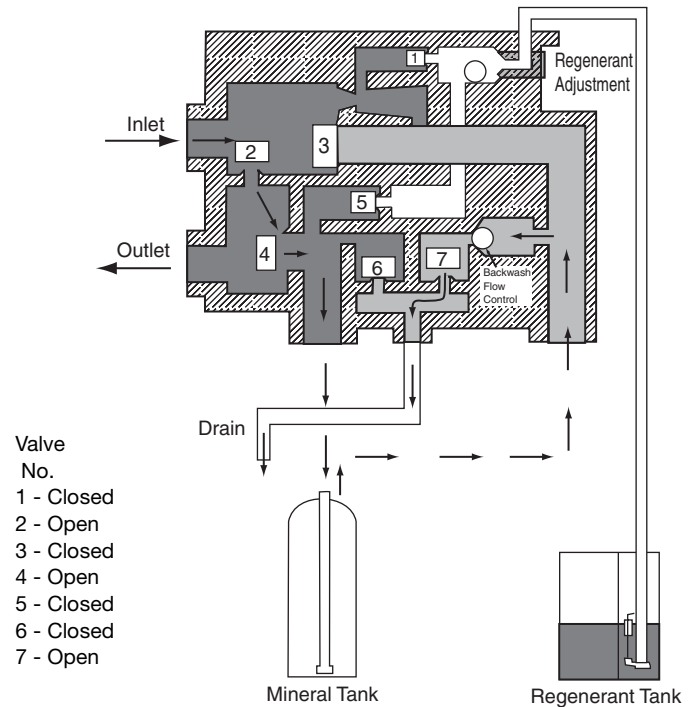
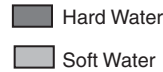


Flow Diagrams

1 Service Position

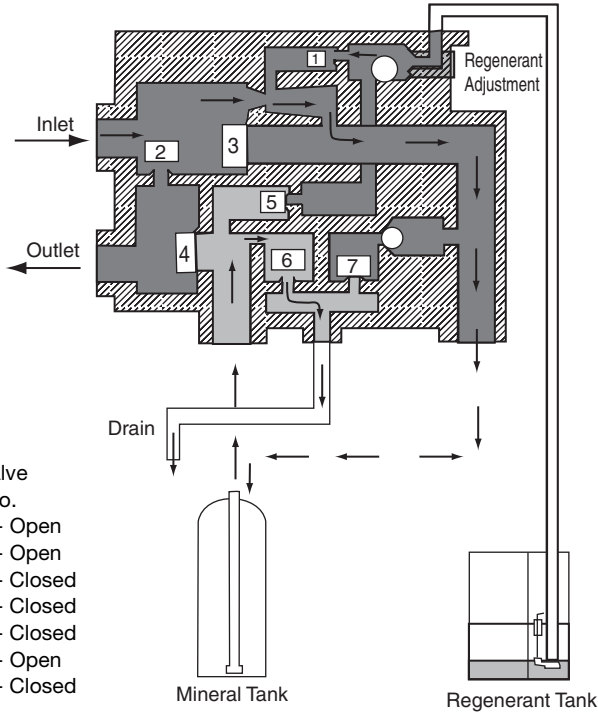


2 Backwash Position



3 Draw/Slow Rinse Position

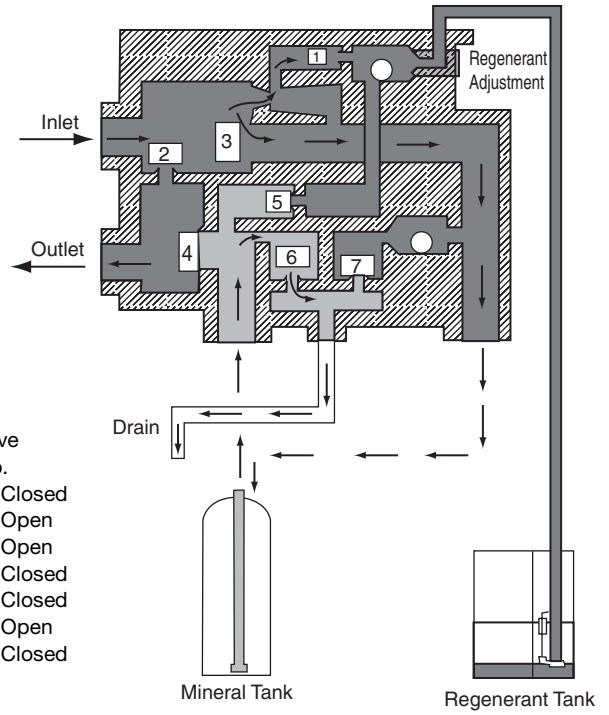
Hard Water
 Soft Water



- Valve No.
- 1 - Open
 - 2 - Open
 - 3 - Closed
 - 4 - Closed
 - 5 - Closed
 - 6 - Open
 - 7 - Closed

4 Fast Rinse/Refill Position

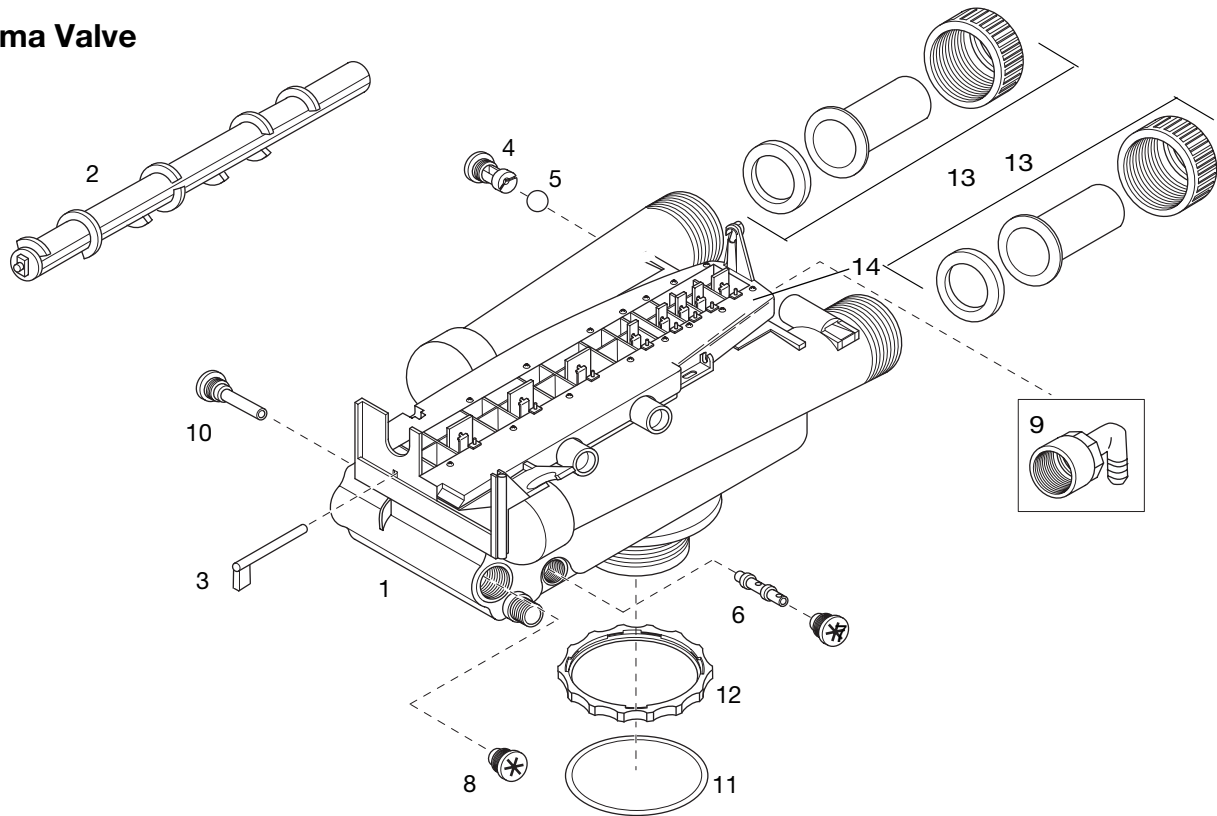
Hard Water
 Soft Water



- Valve No.
- 1 - Closed
 - 2 - Open
 - 3 - Open
 - 4 - Closed
 - 5 - Closed
 - 6 - Open
 - 7 - Closed

Replacement Parts

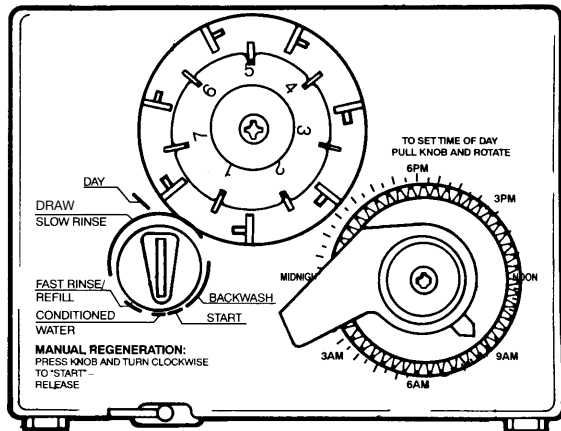
Performa Valve



Part				Part			
Code	No.	Description	Qty.	Code	No.	Description	Qty.
1	1035606	Valve Assembly, w/o Flow Controls	1	8	1033441	Refill Cap	1
2	1030376	Camshaft, 440i	1	9	1002449	Drain Fitting Elbow (3/4" hose barbed)	1
3	1031391	Timer Locking Pin	1	10	1000226	Screen/Cap Assembly	1
4		Drain Control Assembly:	1	11	1010429	O-Ring	1
	1000209	No. 7 (1.2 gpm; 4.5 Lpm)		12	1035622	Tank Ring	1
	1000210	No. 8 (1.6 gpm; 6.1 Lpm)		13		Plumbing Adapter Kits:	1
	1000211	No. 9 (2.0 gpm; 7.6 Lpm)			1001606	3/4-inch Copper Tube Adapter Kit	
	1000212	No. 10 (2.5 gpm; 9.5 Lpm)			1001670	1-inch Copper Tube Adapter Kit	
	1000213	No. 12 (3.5 gpm; 13.2 Lpm)			1041210	1-1/4-inch Copper Tube Adapter Kit	
	1000214	No. 13 (4.1 gpm; 15.5 Lpm)			1001608	22-mm Copper Tube Adapter Kit	
	1000215	No. 14 (4.8 gpm; 18.2 Lpm)			1001609	28-mm Copper Tube Adapter Kit	
5	1030502	Ball, Flow Control	1		1001613	3/4-inch CPVC Tube Adapter Kit	
6		Injector Assembly:	1		1001614	1-inch CPVC Tube Adapter Kit	
	1032970	"A" Injector - White			1001615	25-mm CPVC Tube Adapter Kit	
	1032971	"B" Injector - Blue			1001769	3/4-inch NPT Plastic Pipe Adapter Kit	
	1032972	"C" Injector - Red			1001603	1-inch NPT Plastic Pipe Adapter Kit	
	1030272	"D" Injector - Green			1001604	3/4-inch BSPT Plastic Pipe Adapter Kit	
7		Injector Cap Assembly:	1		1001605	1-inch BSPT Plastic Pipe Adapter Kit	
	1000217	"A" Cap			1001611	3/4-inch BSPT Brass Pipe Adapter Kit	
	1000218	"B" Cap			1001610	1-inch NPT Brass Pipe Adapter Kit	
	1000219	"C" Cap			1001612	1-inch BSPT Brass Pipe Adapter Kit	
	1030303	"D" Cap		14	1001580	Spring, Flapper Valve	
				*		Valve Disc Kit:	
					1041174	Standard	
					1041175	Severe Service	
				*	1000062	I-Lid Cover	1

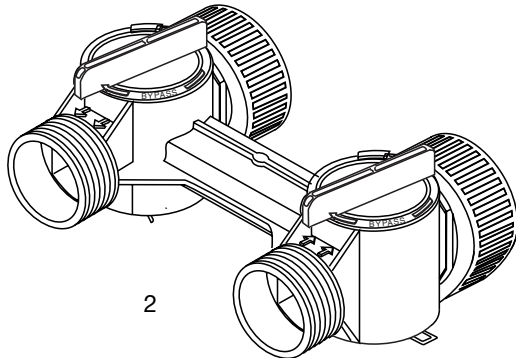
* Not Shown

440i Control



1

1265 Bypass



2

Part			
Code	No.	Description	Qty.
1		440i Control (6 day or 7 day)	1
2	1040930	1265 Bypass	1
*	1000811	Transformer (440i, 460i):	1
*	1000907	Transformer Extension Cord 15 feet (4.6 m)	1
*	1034264	Y-Splitter (run 2 units from 1 transformer)	1

* Not Shown

Troubleshooting

The technology upon which the Autotrol Performa control valve is based is well established and proven in service over many years. However, should a problem or question arise regarding the operation of the system, the control can very easily be serviced. For parts mentioned, refer to exploded views in the Replacement Parts section of this manual.

IMPORTANT: Service procedures that require the water pressure to be removed from the system are marked with a ! after the possible cause. To remove water pressure from the system, put the bypass valve or three-valve bypass into the bypass position and open the backwash drain valve (the seventh valve back from the control) with a screwdriver. Restore system water pressure when the service work is completed.

Valve Troubleshooting

Problem	Possible Cause	Solution
1. Control will not draw.	<ul style="list-style-type: none"> a. Low water pressure. b. Restricted drain line. c. Injector plugged ! d. Injector defective ! e. Valve (2 and/or 4) not closed. 	<ul style="list-style-type: none"> a. Set pump to maintain 30 PSI at unit. b. Remove restriction. c. Clean injector and screen. d. Replace injector. e. Remove foreign matter from disc and check disc for closing by pushing in on stem. Replace if needed.
2. Regenerant tank overflow.	<ul style="list-style-type: none"> a. Regenerant valve (1) being held open. b. Uncontrolled regenerant refill flow rate ! c. Valve (3 or 4) not closed during regenerant draw causing refill. d. Air leak in regenerant line. 	<ul style="list-style-type: none"> a. Manually operate valve stem to flush away obstruction. b. Remove variable regenerant controller to clean. c. Flush out foreign matter by holding disc open and manually operating valve stem. d. Check all connections in regenerant line for leaks.
3. System using more or less regenerant than regenerant control is set for.	<ul style="list-style-type: none"> a. Inaccurate setting. b. Foreign matter in controller causing incorrect flow rates ! c. Defective controller. 	<ul style="list-style-type: none"> a. Correct setting. b. Remove variable regenerant controller and flush out foreign matter. Manually position control to regenerant draw to clean controller (after so doing, position control to "purge" to remove regenerant from tank). c. Replace controller.
4. Intermittent or irregular draw.	<ul style="list-style-type: none"> a. Low water pressure. b. Defective injector ! 	<ul style="list-style-type: none"> a. Set pump to maintain 30 PSI at unit. b. Replace both injector and injector cap.
5. No conditioned water after regeneration.	<ul style="list-style-type: none"> a. Unit did not regenerate. b. No chemical in regenerant tank. c. Plugged injector ! 	<ul style="list-style-type: none"> a. Check for power. b. Add chemical. c. Clean injector. Flush with water.
6. Control backwashes at excessively low or high rate.	<ul style="list-style-type: none"> a. Incorrect backwash controller used. b. Foreign matter affecting controller operation ! 	<ul style="list-style-type: none"> a. Replace with correct size controller. b. Remove controller and ball. Flush with water.
7. Flowing or dripping water at drain or regenerant line after regeneration.	<ul style="list-style-type: none"> a. Drain valve (5 or 6) or regenerant valve (1) held open by foreign matter or particle. b. Valve stem return spring on top plate weak. 	<ul style="list-style-type: none"> a. Manually operate valve stem to flush away obstruction. b. Replace spring.
8. Unconditioned water leakage during service.	<ul style="list-style-type: none"> a. Improper regeneration. b. Leaking of bypass valve ! c. O-ring around riser tube damaged ! 	<ul style="list-style-type: none"> a. Repeat regeneration making certain that the correct regenerant dosage is set. b. Replace O-ring. c. Replace O-ring.

440i Control Troubleshooting

Problem	Possible Cause	Solution
1. Control does not regenerate automatically.	a. Transformer or motor not connected. b. Defective timer motor. c. Skipper pins not down on timer skipper wheel. d. Binding in gear train of timer.	a. Connect power. b. Replace motor. c. Depress pins for days regeneration required. d. Replace timer.
2. Control regenerates at wrong time of day.	a. Time set incorrectly.	a. Correct time setting according to instructions.