TABLE OF CONTENTS

SECTION A—MANUAL OVERVIEW

This section explains how this manual is used and the basic skills needed.

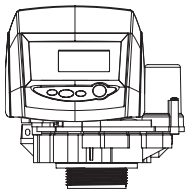
HOW TO USE THIS MANUAL

This installation manual is designed to guide the installer through the process of installing and starting conditioners featuring the GE Water Technologies 700 Logix series controllers.

This manual is a reference and will not include every system installation situation. The person installing this equipment should have:

- Training in the 700 Logix series controllers and Autotrol brand valves
- Knowledge of water conditioning and how to determine proper control settings
- Basic plumbing skills
- The directional instructions "left" and “right" are determined by looking at the front of the unit.

Left Side Right Side



ICONS THAT APPEAR IN THIS MANUAL

WARNING: Failure to follow this instruction can result in personal injury or damage to the equipment.

NOTE: This will make the process easier if followed.

INTRODUCTION

Inspect the unit for damage or missing parts. Contact your supplier if any discrepancies exist.

SECTION B—EQUIPMENT INSTALLATION

Section B explains the features of the valve and how to install the equipment. This includes:

GENERAL WARNINGS AND SAFETY INFORMATION

Electrical

There are no user-servicable parts in the AC adapter, motor, or controller. In the event of a failure, these should be replaced.

- All electrical connections must be completed according to local codes.
- Use only the power AC adapter that is supplied.
- The power outlet must be grounded.
- To disconnect power, unplug the AC adapter from its power source.

Mechanical

- Do not use petroleum based lubricants such as vaseline, oils, or hydrocarbon based lubricants. Use only 100% silicone lubricants.
- All plastic connections should be hand tightened. Teflon tape may be used on connections that do not use an O-ring seal. Do not use pliers or pipe wrenches.
- All plumbing must be completed according to local codes.
- Soldering near the drain line should be done before connecting the drain line to the valve. Excessive heat will cause interior damage to the valve.
- Observe drain line requirements.
- Do not use lead-based solder for sweat solder connections.
- The drain line must be a minimum of 1/2-inch diameter. Use 3/4-inch pipe if the backwash flow rate is greater than 7 GPM (26.5 Lpm) or the pipe length is greater than 20 feet (6 m).
- Do not support the weight of the system on the control valve fittings, plumbing, or the bypass.
- It is not recommended to use sealants on the threads. Use Teflon* tape on the threads of the 1-inch NPT elbow, the drain line connections, and other NPT threads.

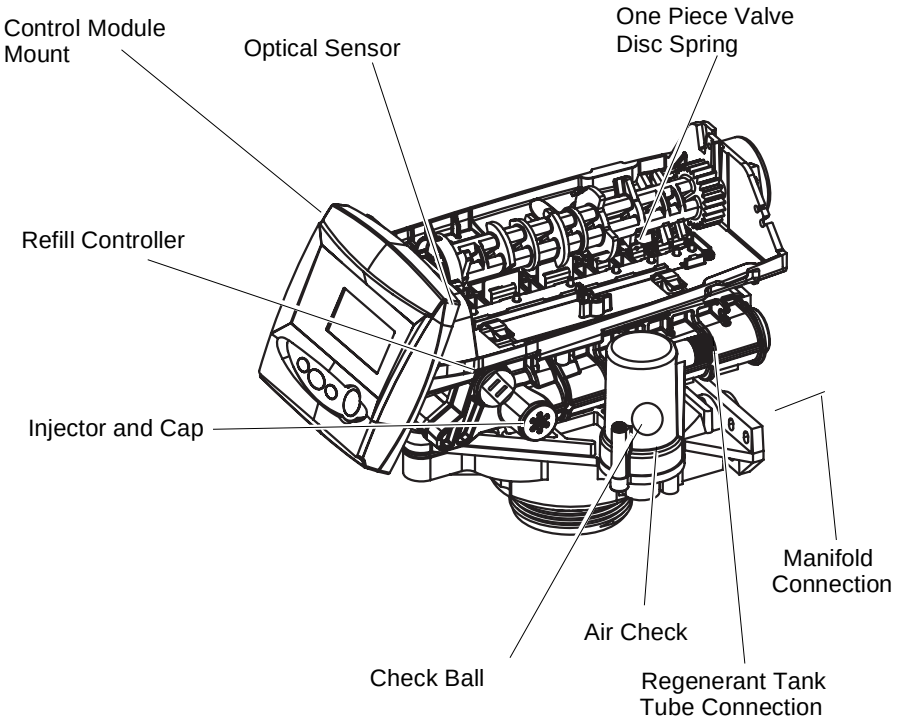
**Teflon is a trademark of E.I. duPont de Nemours.*

General

- Observe all warnings that appear in this manual.
- Keep the media tank in the upright position. Do not turn upside down or drop. Turning the tank upside down will cause media to enter the valve.
- Operating ambient temperature is between 34°F (1°C) and 120°F (49°C).
- Operating water temperature is between 34°F (1°F) and 100°F (38°C).
- Working water pressure range is 20 to 120 psi (1.38 to 8.27 bar). In Canada the acceptable working water pressure range is 20 to 100 psi (1.38 to 6.89 bar).
- Use only regenerant salts designed for water softening. Do not use ice melting, block, or rock salts.
- Follow state and local codes for water testing. Do not use water that is microbiologically unsafe or of unknown quality.
- When filling media tank, do not open water valve completely. Fill tank slowly to prevent media from exiting the tank.
- When installing the water connection (bypass or manifold) connect to the plumbing system first. Allow heated parts to cool and cemented parts to set before installing any plastic parts. Do not get primer or solvent on O-rings, nuts, or the valve.

VALVE FEATURES

Figure 1
255 Valve Identification



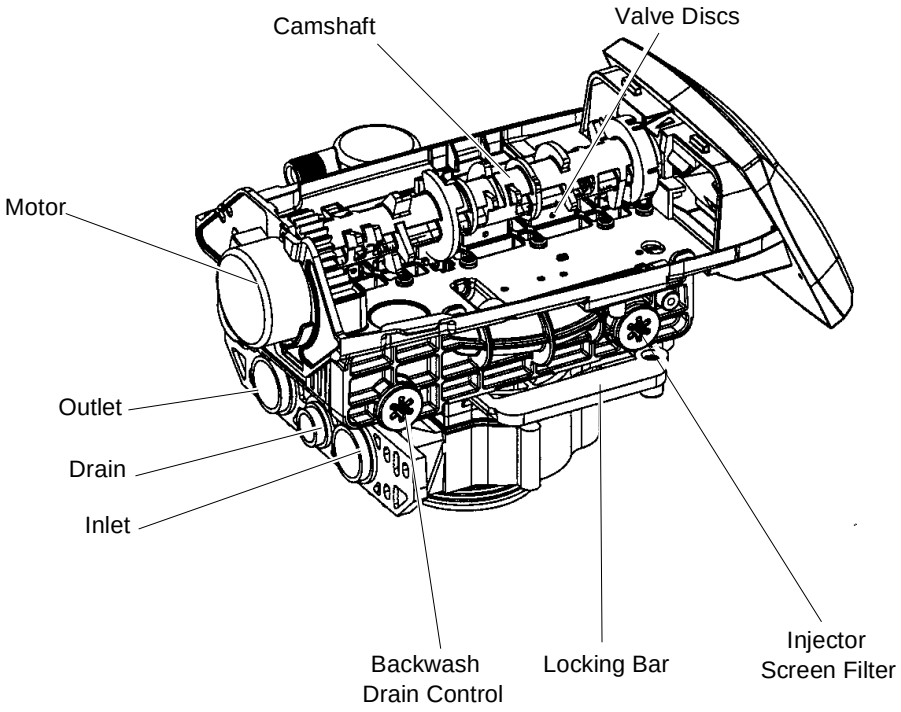


Figure 2
Performa Valve
Identification

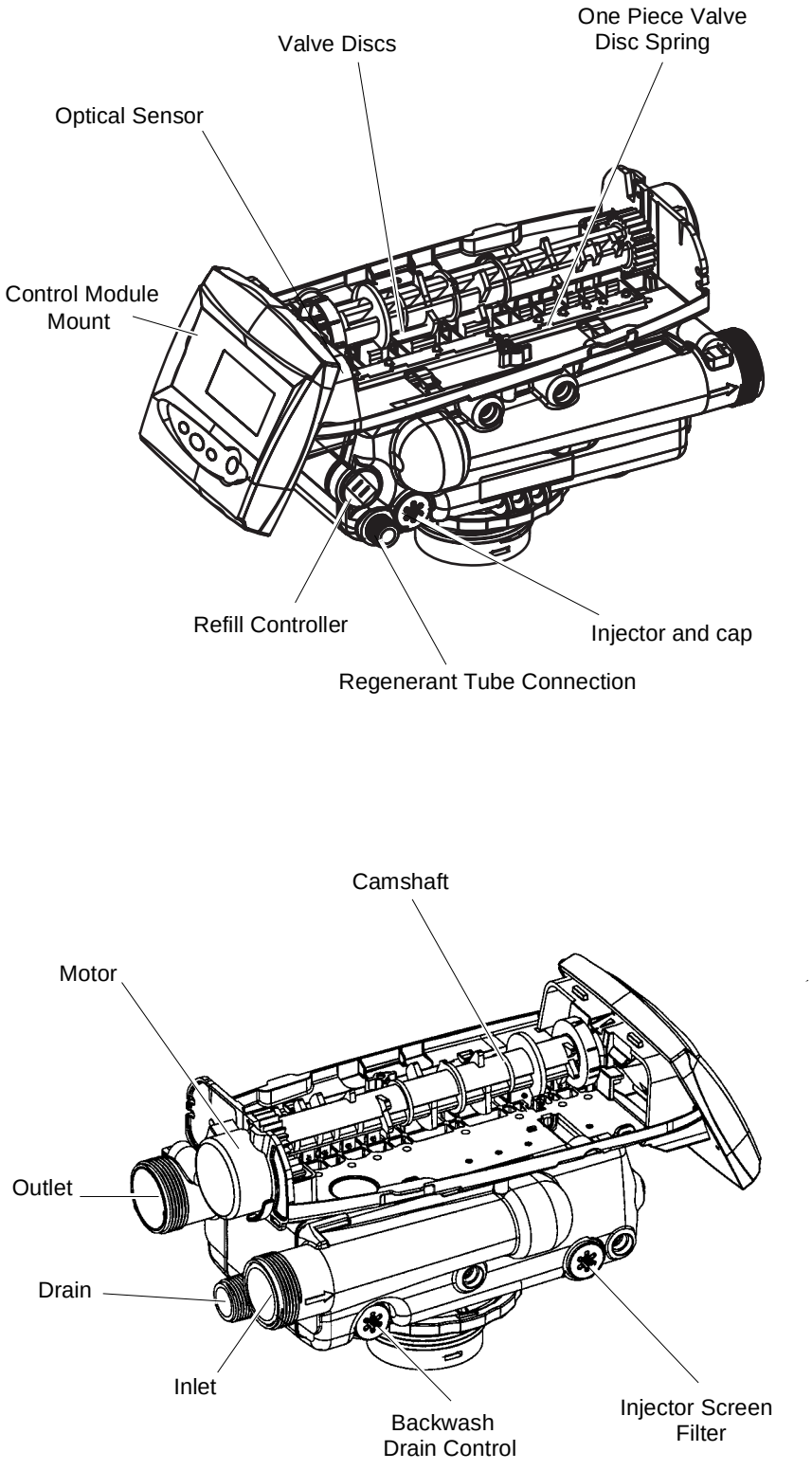
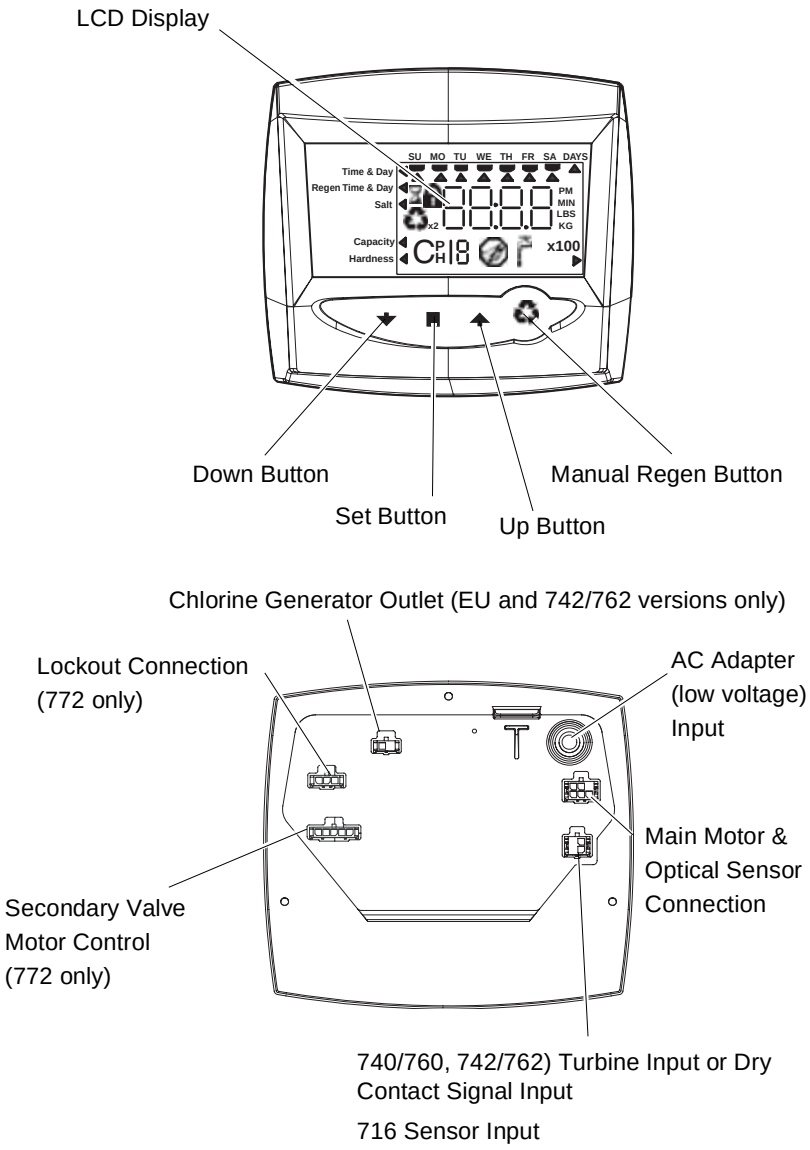


Figure 3
700 Series Controller
Identification



LOCATION SELECTION

Location of a water treatment system is important. The following conditions are required:

- Level platform or floor
- Room to access equipment for maintenance and adding regenerant (salt) to tank.
- Ambient temperatures over 34°F (1°C) and below 120°F (49°C).
- Water pressure below 120 psi (8.27 bar) and above 20 psi (1.4 bar).
- In Canada the water pressure must be below 100 psi (6.89 bar).
- Constant electrical supply to operate the controller.
- Total minimum pipe run to water heater of ten feet (three meters) to prevent backup of hot water into system.
- Local drain for discharge as close as possible.
- Water line connections with shutoff or bypass valves.
- Must meet any local and state codes for site of installation.
- Valve is designed for minor plumbing misalignments. Do not support weight of system on the plumbing.
- Be sure all soldered pipes are fully cooled before attaching plastic valve to the plumbing.

OUTDOOR LOCATIONS

When the water conditioning system is installed outdoors, several items must be considered.

- Moisture — The valve and 700 controller are rated for NEMA 3 locations. Falling water should not affect performance.
  The system is not designed to withstand extreme humidity or water spray from below. Examples are: constant heavy mist, near corrosive environment, upwards spray from sprinkler.
- Direct Sunlight — The materials used will fade or discolor over time in direct sunlight. The integrity of the materials will not degrade to cause system failures.
  If it is necessary to locate the conditioner in direct sunlight, a protective outdoor cover over the valve and controller is necessary.

- Temperature — Extreme hot or cold temperatures will cause damage to the valve or controller.
  Freezing temperatures will freeze the water in the valve. This will cause physical damage to the internal parts as well as the plumbing.
  High temperatures will affect the controller. The display may become unreadable but the controller should continue to function. When the temperature drops down into normal operating limits the display will return to normal. A protective cover should assist with high temperature applications.
- Insects — The controller and valve have been designed to keep all but the smallest insects out of the critical areas. Any holes in the top plate can be covered with a metal foil ductwork tape. The top cover should be installed securely in place.
- Wind — The Logix cover is designed to withstand a 30 mph (48 Kph) wind when properly installed on the valve.

WATER LINE CONNECTION

A bypass valve system should be installed on all water conditioning systems. Bypass valves isolate the conditioner from the water system and allow unconditioned water to be used. Service or routine maintenance procedures may also require that the system is bypassed. Figures 4, 5, and 6 show the three common bypass methods.

Figure 4
Autotrol Series 256 bypass for use with 255 valve body

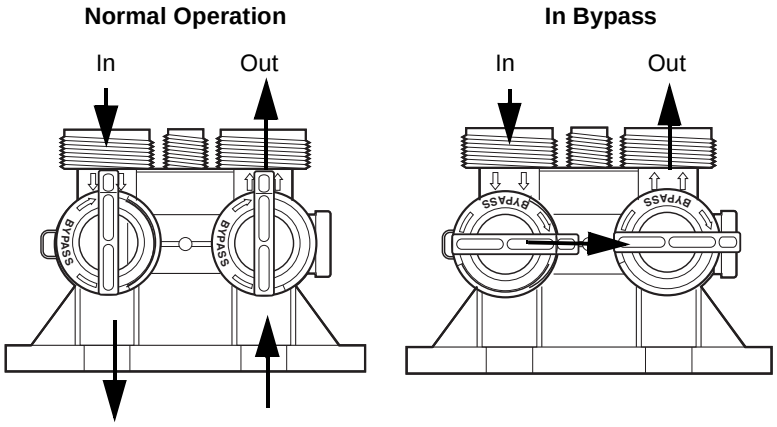


Figure 5
Autotrol Series 1265 bypass for use with Performa and 1100 valve bodies

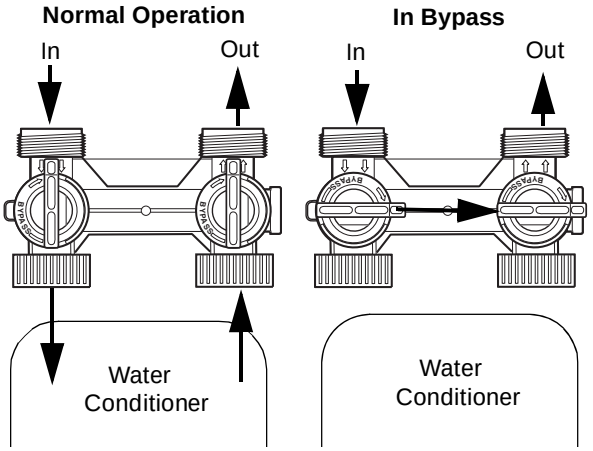
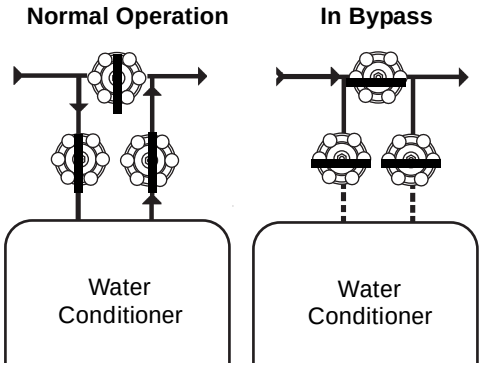


Figure 6
Typical Globe Valve
Bypass System



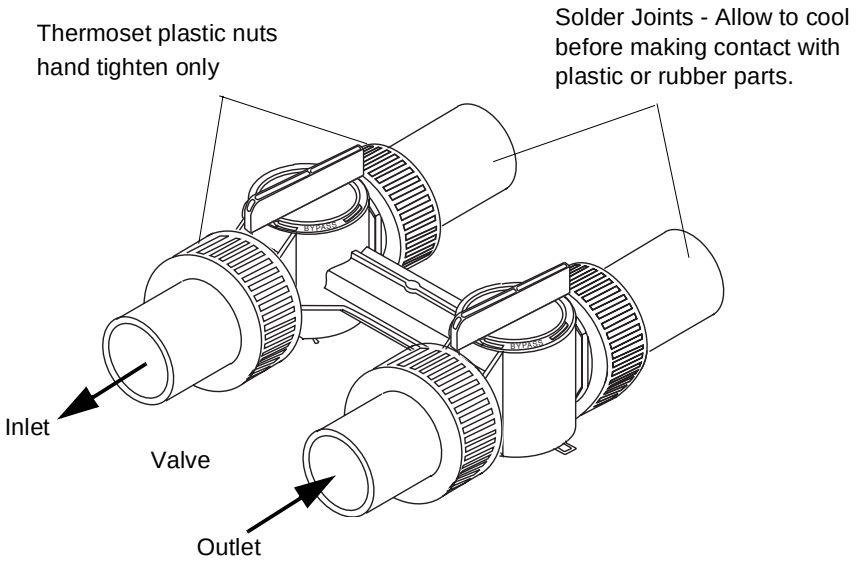
WARNING: The inlet water must be connected to the inlet port of the valve. When replacing non-Autotrol valves, the inlet and outlet may be reversed. It is also possible for the plumbing to be installed in an opposite order.
Do not solder pipes with lead-based solder.

WARNING: Do not use tools to tighten plastic fittings. Over time, stress may break the connections. When the 1265 or 256 bypass valve is used, only hand tighten the nuts.

WARNING: Do not use petroleum grease on gaskets when connecting bypass plumbing. Use only 100% silicone grease products when installing any Autotrol brand valve. Non-silicone grease may cause plastic components to fail over time.

NOTE: Several tube adapters are available to connect the valve to the water plumbing. See *Parts* section (Section F).

Figure 7


Thermoset plastic nuts
hand tighten only
Solder Joints - Allow to cool
before making contact with
plastic or rubber parts.
Inlet
Valve
Outlet

DRAIN LINE

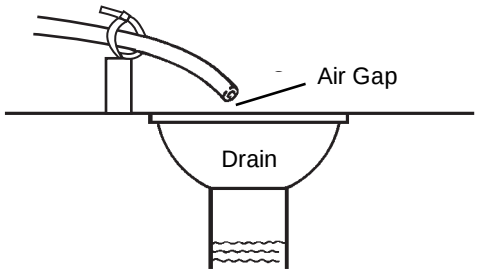
Drain Line Connection

NOTE: Standard commercial practices are expressed here. Local codes may require changes to the following suggestions. Check with local authorities before installing a system.

1. The unit should be above and not more than 20 feet (6.1 m) from the drain. Use an appropriate adapter fitting to 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 20-40 feet (6.1-12.2 m) from drain, use 3/4-inch (1.9 cm) tubing. Use appropriate fittings to connect the 3/4-inch tubing to the 3/4-inch NPT drain connection on valve.
3. The drain line may be elevated up to 6 feet (1.8 m) providing the run does not exceed 15 feet (4.6 m) and water pressure at the conditioner is not less than 40 psi (2.76 bar). Elevation can increase by 2 feet (61 cm) for each additional 10 psi (.69 bar) of water pressure at the drain connector.
4. Where the drain line is elevated but empties into a 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 will provide an adequate siphon trap.

   Where the drain empties into an overhead sewer line, a sink-type trap must be used.
   Secure the end of the drain line to prevent it from moving.

Figure 8
Drain Line Connection



WARNING: Never insert drain line directly into a drain, sewer line or trap (Figure 8). Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into the conditioner.

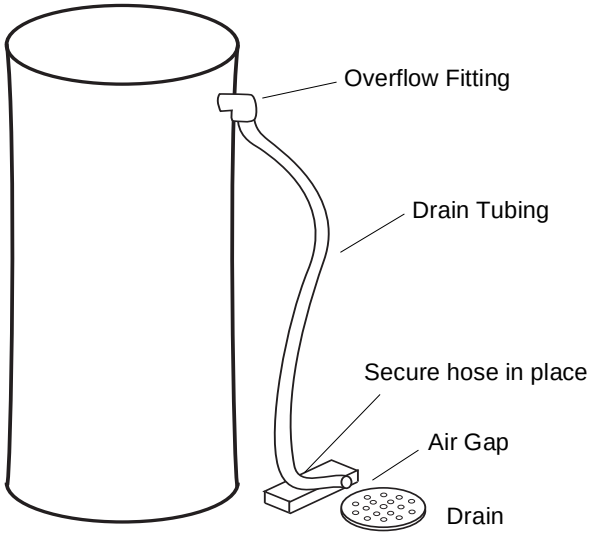
OVERFLOW LINE CONNECTION
(not used with 3-cycle filter system)

In the event of a malfunction, the regenerant TANK OVERFLOW will direct “overflow” to the drain instead of spilling on the floor. This fitting should be on the side of the cabinet or regenerant tank. Most tank manufacturers include a post for the tank overflow connector.

To connect the overflow line, locate hole on side of tank. Insert overflow fitting into tank and tighten with plastic thumb nut and gasket as shown (Figure 9). Attach length of 1/2-inch (1.3-cm) I.D. tubing (not supplied) to fitting and run to drain. Do not elevate overflow line higher than overflow fitting.

Do not tie into drain line of control unit. Overflow line must be a direct, separate line from overflow fitting to drain, sewer or tub. Allow an air gap as per drain line instructions.

Figure 9
Overflow Line Connection



REGENERANT LINE CONNECTION
(not used with 3-cycle filter system)

The regenerant line from the tank connects to the valve. Make the connections and hand tighten. Be sure that the regenerant line is secure and free from air leaks. Even a small leak may cause the regenerant line to drain out, and the conditioner will not draw regenerant from the tank. This may also introduce air into the valve causing problems with valve operation.

Most installations utilize a tank check valve. This is not necessary when using the 255 valve with the built-in aircheck. Using a tank check valve with the 255 valve with aircheck will result in premature checking of the aircheck valve, before the tank is empty.

Figure 10A
Air Check for 255 valve

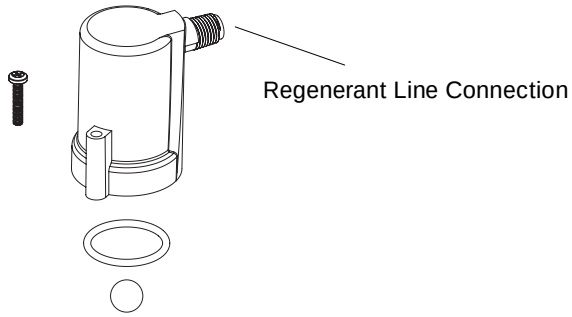
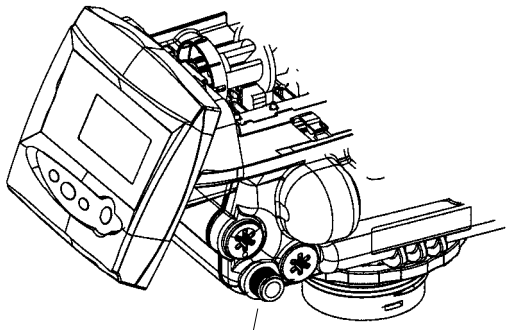
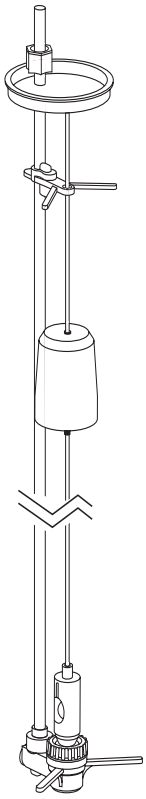


Figure 10B
Performa Valve



NOTE: When installing a 3-cycle filter (253, 263, or 273 valve) use a cap on the regenerant line connection to prevent water seepage from the port. See *Parts* section (Section F) for part number.

Figure 11
Regenerant Tank Check
Valve (not provided)



ELECTRICAL CONNECTION

All Logix controllers operate on 12-volt alternating current power supply. This requires use of the GE Water Technologies supplied AC adapter. A variety of AC adapters are available for different applications. These AC adapters are available from your supplier. They include:

AC Adapter	Input Voltage	Application	Part Number
Standard wall-mount AC adapter	120V 60Hz	Standard indoor application	1000811
Outdoor rated AC adapter	120V 60Hz	UL listed for outdoor installations	1235448
International option AC adapters	Varies based on country	Standard indoor application	See Parts Lists Section

100 VAC, 120 VAC and 230 VAC AC Adapters:

Make sure power source matches the rating printed on the AC adapter.

NOTE: The power source should be constant. Be certain the AC adapter is not on a switched outlet. Power interruptions longer than 8 hours may cause the controller to lose the time and day settings. When power is restored, the day and time settings must then be re-entered.

The 740/760 controller is available in two power configurations. The North America controller operates on 60 Hz. If the incoming power is 50 Hz, the "North American" controller will not function. The error code "ERR 2" will show on the display.

The "World" controller will sense the input power as 50 or 60 Hz and operate accordingly.

740 Controller Location

The Logix controllers are designed to be mounted on the valve or attached to a flat surface. Installations that do not provide easy access to the valve can have the controller mounted for remote operation.

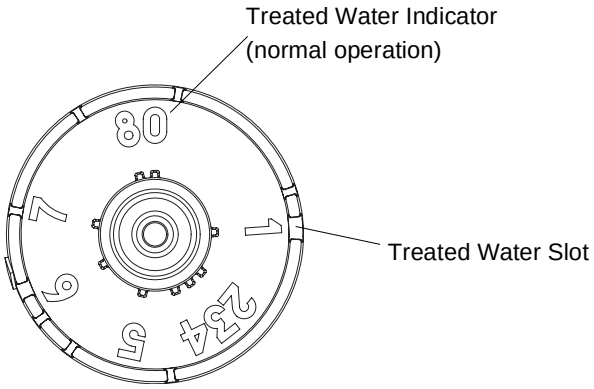
To enable mounting for remote operation the wiring harness can be extended up to 50 feet (15 m) with a minimum 22 gauge wire.

CAMSHAFT

The front end of the camshaft has an indicator cup. The cup has slots in the outer periphery and numbers on the inside face (Figure 12).

The numbers can be seen with the cover off, from the front over the top of the controller. The number at the top indicates which regeneration cycle is currently in progress.

Figure 12
Camshaft Front End for 255, 263, and 268 valve bodies



The corresponding slot for the number is positioned at the optical sensor which is approximately 90 degrees out of phase.

Regeneration Cycle Indicators

C0 = Treated Water - normal operation mode
C1 = Backwash Cycle
C2 = Regenerant Draw Cycle (not used in filter mode)
C3 = Slow Rinse Cycle (not used in filter mode)
C4 = System Pause
C5 = Fast Rinse Cycle 1
C6 = Backwash Cycle 2 (not used in filter mode)
C7 = Fast Rinse Cycle 2 (not used in filter mode)
C8 = Regenerant Refill (not used in filter mode)

SECTION C—SYSTEM DISINFECTION

Section C explains how to disinfect the water conditioner.

DISINFECTION OF WATER CONDITIONERS

The materials of construction of the modern water conditioner will not support bacterial growth, nor will these materials contaminate a water supply. During normal use, a conditioner may become fouled with organic matter, or in some cases with bacteria from the water supply. This may result in an off-taste or odor in the water.

Some conditioners may need to be disinfected after installation and some conditioners will require periodic disinfection during their normal life.

Depending upon the conditions of use, the style of conditioner, the type of ion exchanger, and the disinfectant available, a choice can be made among the following methods.

Sodium or Calcium Hypochlorite

Application

These materials are satisfactory for use with polystyrene resins, synthetic gel zeolite, greensand and bentonites.

5.25% Sodium Hypochlorite

These solutions are available under trade names such as Clorox*. If stronger solutions are used, such as those sold for commercial laundries, adjust the dosage accordingly.

1. Dosage
   A. Polystyrene resin; 1.2 fluid ounce (35.5 ml) per cubic foot.
   B. Non-resinous exchangers; 0.8 fluid ounce (23.7 ml) per cubic foot.
2. Brine tank conditioners
   A. Backwash the conditioner and add the required amount of hypochlorite solution to the well of the regenerant tank. The regenerant tank should have water in it to permit the solution to be carried into the conditioner.
   B. Proceed with the normal regeneration.

**Clorox is a trademark of the Clorox Company.*

Calcium Hypochlorite

Calcium hypochlorite, 70% available chlorine, is available in several forms including tablets and granules. These solid materials may be used directly without dissolving before use.

1. Dosage
   A. Two grains (approximately 0.1 ounce [3 ml]) per cubic foot.
2. Regenerant tank conditioners
   A. Backwash the conditioner and add the required amount of hypochlorite to the well of the regenerant tank. The regenerant tank should have water in it to permit the chlorine solution to be carried into the conditioner.
   B. Proceed with the normal regeneration.

SECTION D—GENERAL 700 SERIES INSTRUCTIONS

Section D describes the general 700 series controllers and the regeneration modes.

700 SERIES CONTROLLER

Power Loss Memory Retention

The Logix series controllers feature battery-free time and date retention during the loss of power. This is designed to last a minimum of 8 hours depending on the installation. The controller will continue to keep time and day in dynamic memory while there is no AC power.

The controller will not track water usage on volumetric demand controls in the event of a power failure.

All programmed parameters are stored in the Logix series static memory and will not be lost in the event of a power failure. These settings are maintained separately from the time and day settings.

Motor

The Logix series controller uses a standard 12-volt AC motor that works with either 50 Hz or 60 Hz. The same motor is used worldwide and does not need to be changed for different power conditions.

Power

Logix Series controllers are available in two power configurations:

1. The North American model requires 60 Hz input. The controller will display USA units when power is first applied.
2. The World model accepts either 60 or 50 Hz input and will automatically adjust measurement units when power is first applied.

Information entered or calculated by the controller is stored in two different ways.

A static memory will store:

Media volume
Regenerant setting
Time of regeneration
Days between regeneration
Filter mode

A dynamic memory with 8 hour retention will store:

Current day of week
Running clock

NOTE: Water flow to the valve can be turned on or bypassed when the controller is powered up for the first time.

Variable Reserve Function

The Logix metered-demand volumetric controllers (760 and 762) are designed to have a variable reserve feature. This feature automatically adjusts the reserve to the end-user's water usage schedule.

A variable reserve saves salt and water by only regenerating when absolutely necessary, and ensures enough soft water for typical high-water usage days.

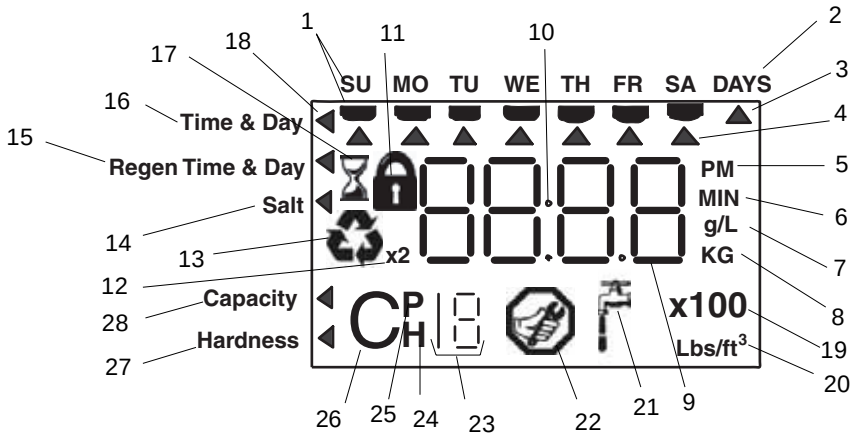
Each day of regeneration the controller reviews the last four weeks of water usage for the same day of the week to determine if the remaining capacity is adequate for the next day of the week. If not, it will initiate an automatic regeneration.

Slow Rinse Time (Cycle C3)

Logix controllers are programmed to provide 1.5 bed volumes of rinse. The Logix 742 and 762 controllers will default to 2.0 bed volumes of rinse when the 278 or 298 values are selected. Filter valves do not have a slow rinse cycle.

DISPLAY ICONS 700 CONTROLLER

Figure 1



NOTE: In normal operation and during programming, only a few of the icons will actually be displayed.

1. Days of the week. The flag immediately below the day will appear when that day has been programmed as a day the system should regenerate (used with 7-day timer programming).

2. See #3

3. This cursor is displayed when the days between regeneration are being programmed (used with .5 to 99 day regeneration programming).

4. One of these cursors will be displayed to indicate which day will be programmed into the controller.

5. "PM" indicates that the time displayed is between 12:00 noon and 12:00 midnight (there is no AM indicator). PM indicator is not used if clock mode is set to 24-hour.

6. When "MIN" is displayed, the value entered is in minute increments.

7. When g/L is displayed, the value for regenerant amount entered is in grams/Liter.

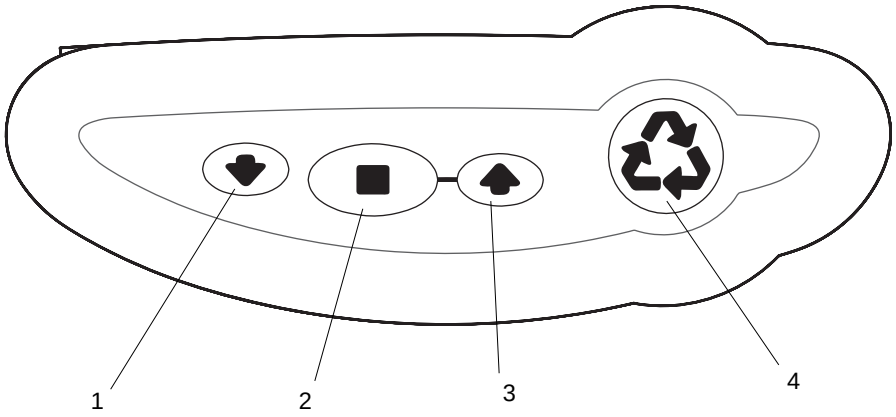
8. When "Kg" is displayed, the value entered is in kilograms or kilograins.

9. Four digits used to display the time or program value. Also used for error codes.

10. Colon flashes as part of the time display. Indicates normal operation.

11. Locked/unlocked indicator. In Level I programming this is displayed when the current parameter is locked-out. It is also used in Level II programming to indicate if the displayed parameter will be locked (icon will flash) when controller is in Level I.
12. When "x2" is displayed, a second regeneration has been called for.
13. The recycle sign is displayed (flashing) when a regeneration at the next time of regeneration has been called for. Also displayed (continuous) when in regeneration.
14. The display cursor is next to "SALT" when programming the amount of regenerant. If the controller is on a 3-cycle filter then backwash time is programmed.
15. The display cursor is next to "REGEN TIME & DAY" when programming the time of regeneration and the days of regeneration.
16. The display cursor is next to "TIME & DAY" when programming the current time and day.
17. The hourglass is displayed when the motor is running. The camshaft should be turning.
18. These cursors will appear next to the item that is currently displayed.
19. X100 multiplier for large values.
20. When Lbs/ft^3 is displayed the value for regenerant amount entered is in pounds/cubic foot.
21. Shows when water is flowing through the valve.
22. Maintenance interval display—not used on 740/760 controllers.
23. Used with #24, #25, and #26. Displays a sequence number or a value.
24. History Values (H). The number displayed by #23 identifies which history value is currently displayed.
25. Parameter (P). Displayed only in Level II Programming. The number displayed by #23 identifies which parameter is currently displayed.
26. Cycle(C). The number displayed by #23 is the current cycle in the regeneration sequence.
27. Hardness setting—only used with 760 and 762 controllers.
28. Capacity display—shows estimated system capacity.

KEYPAD — Buttons



1. DOWN arrow. Generally used to scroll down or increment through a group of choices.
2. SET. Used to accept a setting that normally becomes stored in memory. Also used together with the arrow buttons.
3. UP arrow. Generally used to scroll up or increment through a group of choices.
4. Regenerate. Used to command the controller to regenerate. Also used to change the lock mode.

Programming Conventions

The 700 series controller is programmed using the buttons on the keypad. The programming instructions will be described two ways whenever a section has keypad input.

First, a table shows simplified instructions. Second, text follows that describes the action. In each table:

"Action" lists the event or action desired.

"Keys" are listed as:

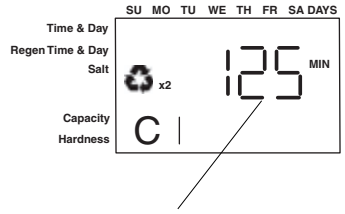
UP for up arrow
DOWN for down arrow
SET for set
REGEN for regeneration

"Duration" describes how long a button is held down:

P/R for press and release
HOLD for press and hold
X sec for a number of seconds to press the button and hold it down

"Display" calls out the display icons that are visible.

REGENERATION MODES



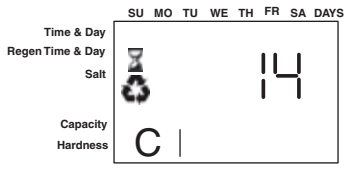
The Logix series controllers can be regenerated either automatically or manually. During a regeneration, the total time remaining of the regeneration will be displayed on the controller. The current cycle is shown in the lower left of the display.

Regeneration Cycle Indicators

C0 = Treated Water – normal operation mode (not displayed)
C1 = Backwash Cycle
C2 = Regenerant Draw Cycle (not used in 3-cycle filter mode)
C3 = Slow Rinse Cycle (not used in 3-cycle filter mode)
C4 = System Pause
C5 = Fast Rinse Cycle 1
C6 = Backwash Cycle 2 (not used in 3-cycle filter mode)
C7 = Fast Rinse Cycle 2 (not used in 3-cycle filter mode)
C8 = Regenerant Refill (not used in 3-cycle filter mode)

Advancing the Regeneration Cycles

Action	Key	Duration	Display
Show current cycle	SET	HOLD	Cx
Show regen time remaining	SET	HOLD	Time
Advance to next cycle	SET and UP	HOLD	Cx



To advance cycles during a regeneration (manual or automatic):

- Press and hold SET. The current cycle number, (Ex. C1) will be displayed along with the time remaining for that individual cycle.
- While holding the SET button, simultaneously press UP, and release to advance to the next cycle. While the motor is running, an hourglass icon will be displayed.
- Repeat this process for each cycle until the system is back into the treated water mode.

NOTE: When the controller gets to cycle C4 (Pause cycle), there may be a slight delay before the controller can be advanced onto cycle C5.

NOTE: Not all regeneration cycles may be used. A cycle will be skipped if it is not required by the current program.

Cancelling a Regeneration

Action	Key	Duration	Display
Cancel regen	SET and UP	5 Sec	Hourglass starts to flash

To cancel a regeneration (either manual or automatic):

- Press SET and UP simultaneously and hold until the hourglass icon starts flashing (approximately 5 seconds).
- The regeneration is cancelled.
- The camshaft rotates to the treated water position (may take up to 2 min.)
- Hourglass flashes while motor runs.

If a second regeneration was programmed (display shows a 2X by the regeneration icon) both regenerations must be cancelled separately.

WARNING: Cancelling a regeneration may cause undesirable or salty water to go into the plumbing. Only use this function when absolutely necessary.

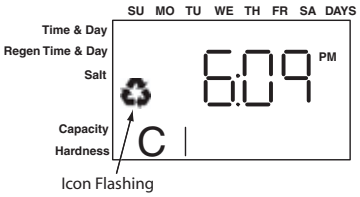
WARNING: If the regeneration cycle is cancelled after the regenerant draw cycle (C2), check the water level in the regenerant tank. It must be refilled to the proper level.

Manual Regenerations

Action	Key	Duration	Display
Regen at next time of regen	REGEN	P/R	Recycle icon flashes
Cancel regen	REGEN	P/R when recycle icon is flashing	Recycle icon disappears
Immediate regen	REGEN	5 Sec	Recycle icon appears
Immediate double regen	REGEN	5 Sec when immediate manual regen has started	X2 icon appears

The controller can be manually instructed to perform a regeneration.

There are two choices: The controller will perform a delayed regeneration at the next time of regeneration (ex: 2:00 AM that night), or regenerate immediately.

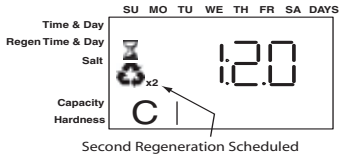


For a **delayed** regeneration (at the next set time of regeneration):

- Push REGEN once. The recycle symbol will be flashing on the display. Push REGEN again to cancel.

For an **immediate** regeneration:

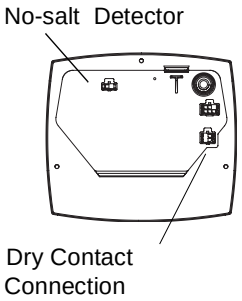
- Push and hold REGEN for five seconds. The display will show the regeneration symbol. The camshaft will start rotating to cycle C1.



For an **immediate, double** regeneration:

- After an immediate manual regeneration has begun, and the camshaft has rotated to cycle C1, you can initiate a second immediate manual regeneration.
- Press and hold REGEN for 5 seconds once the camshaft has begun cycle C1.
- The display will show a x2 icon indicating that a second manual regeneration will occur after the current regeneration is completed.

Remote Regeneration — Dry Contact Input



The 740/742 controller has a remote regeneration input that is activated by a dry-contact closure signal from a variety of devices. This gives the 740/742 controller the ability to be "told" when to regenerate by another device. These devices could be: a PLC controller, a filter pressure differential (ΔP) switch, a manual switch button, another water treatment device controller, or an independent timer.

This feature is automatically enabled on all 740/742 controllers.The Logix controller remote regen input cable harness, PN 1239979 is used to connect to the controller.

To use, plug the harness into the four pin connector on the back of the controller. The other end can be attached to a terminal block and wired to the device providing the dry contact closure signal.

A regeneration will begin when a continuous 60-second dry contact closure signal is input into the 740/742 controller. The 740/742 controller will follow a normal regeneration sequence as was programmed by the dealer/installer. Any further signals from the dry contact are ignored during regeneration.

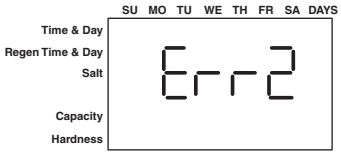
NOTE: If the dry contact signal is not removed at the completion of the regeneration, the controller will initiate another regeneration.

To use the dry contact closure as the only means for initiating regeneration, set the 740/742 "days to regenerate" (P4) to 0 and do not enable any days of the week (P5) for regeneration. This will cause the 740/742 controller to regenerate only when remotely signaled.

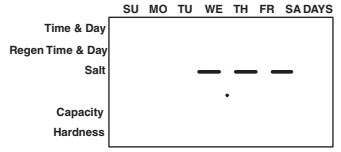
The 740/742 controller will also operate with a combination of the remote regeneration signal, and programmed regeneration days.

700 SERIES INITIAL POWER-UP

255 And Performa Valve Bodies



1. Plug the power supply transformer into a socket that is not controlled by a switch or timer.
2. Connect the transformer plug to the controller.



The display will show three dashes with a decimal point. The display will be flashing, indicating the unprogrammed state.

NOTE: This display will not appear if the resin/media volume has previously been entered (typically by an Original Equipment Manufacturer).

NOTE: The 700 series North American controller will not operate on 50 Hz power. "ERR 2" will be displayed.

NOTE: If “Err3” is displayed, the camshaft is rotating to the treated water position. This may take up to two minutes.

Resetting the Control to Unprogrammed

The control can be returned to its unprogrammed state.

To erase all information that was programmed in:

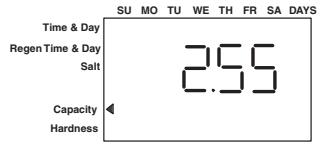
- Press DOWN and SET for five seconds.
- Press and hold SET for five seconds.
- The display will show three dashes and a decimal point.
- The 742/762 controllers will display "255".
- The display will be flashing.

This display indicates all programming has been erased.

Startup of the Logix 740/760 controllers is different than the 742/762 controllers. The 742/762 controllers need to have the valve type entered before the resin/media volume is entered.

Verify the Logix controller model. If the controller is a 740 or 760 skip *Select The Valve Type* and proceed to *Enter Resin/media Volume Or Select Filter Operation*.

To Select The Valve Type - Logix 742 and 762

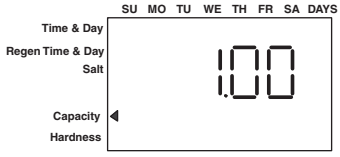


Action	Key	Duration	Display
Change a valve type (when flashing)	UP or DOWN arrow	P/R	The next valve type
Save (program) the valve type	SET	P/R	3 dashes with decimal point-flashing

Valve Selections

Softener	Filter
255 High Efficiency	
268 Performa High Efficiency	263 Performa
278 Performa CV	273 Performa CV
298 Magnum CV	293 Magnum CV

Enter Resin/Media Volume or Select Filter Operation

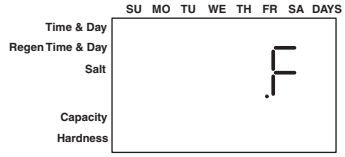


Action	Key	Duration	Display
Choose media volume	UP or DOWN arrow	P/R	Preprogrammed volumes
Select volume	SET	P/R	Selected Volume

The first time that the controller is powered-up (for the 742/762 the valve type is set first), the system type and size will need to be entered. Program in the volume of resin/media for the conditioner in cubic feet (liters) or select the 3-cycle filter option. See *Selecting The Valve Type For The 742 And 762*. This resin/media volume setting is used for determining the default settings for the controller.

The system is programmed in pre-defined increments. Choose the resin/media volume closest to the actual volume of the resin/media tank.

3-cycle filter



3. Use UP and DOWN to scroll through the preset resin/media volumes. If you do not know the volume of the system, contact the system supplier.

NOTE: To change to a filter, scrolling to 0 will indicate "F", for a 3-cycle filter operation. This tells the controller to no longer act as a 7-cycle conditioner, but rather as a 3-cycle filter. In filter mode, the regenerant draw/slow rinse, and refill cycles are skipped in the regeneration sequence.

If your exact resin/media volume is not displayed, choose the setting closest to the resin/media volume in the tank.

4. When the volume that matches your tank is displayed, press SET. The number is stored in the controller.

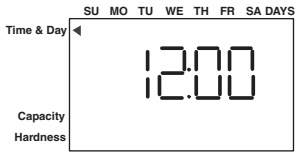
WARNING: Verify that the resin/media volume selected is correct. An incorrect volume will significantly affect performance of the conditioner, because the controller will be using inaccurate settings for the actual size of the system.

NOTE: The resin/media volume is stored in memory that is not affected by power loss.

WARNING: The resin/media volume is used to control the regeneration cycle. This setting can be changed by entering into the history menu. See *History Values Programming Section*.

Setting the Time of Day

Action	Key	Duration	Display
Display Correct Time	UP or DOWN arrow	P/R	Increments time
Select time	SET	P/R	Selected time



After the resin/media volume has been programmed, the time of day will need to be entered. The display will flash 12:00, along with the cursor next to Time of Day.

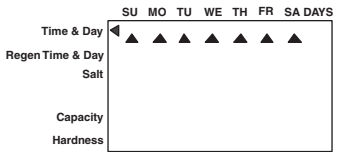
5. The UP and DOWN arrows are used to set the time of day. When the correct time is displayed, push SET.

NOTE: Push and hold the arrow button to quickly scroll through the time. PM is displayed next to the time (12-hour mode). AM is not designated.

Setting the Day of the Week

Action	Key	Duration	Display
Enter programming mode	SET	P/R	Cursor flashes below one of the days
Move to current day	UP or DOWN arrows	P/R	Flashing cursor moves
Select day	SET	P/R	Cursor steady below selected day

The display will show a small cursor at the top of the display. Push SET to enter the programming mode. The cursor is moved with the arrow buttons to a position below the day of the week.



6. Use the arrow buttons to move the cursor below the current day of the week, push SET to enter the day.

NOTE: The time of day and day of week are stored in a temporary (dynamic) memory. If power to the controller is lost, the running clock and day are maintained for at least 8 hours.

The system is now ready to operate.

The controller will default to regenerating every three days (on 740/742 controllers or volumetrically on 760/762 controllers), and to a standard salt (9 pounds per cubic foot of resin/media) setting. When programming in metric the standard salt setting will be 120 g/L.

If these settings are acceptable for the application, proceed on to *Placing the Conditioner into Operation*.

If the application requires additional refinement of the controller features (including regeneration frequency and salting amount), then see *Level II Programming* (Section E) for further instructions.

PLACING CONDITIONER INTO OPERATION

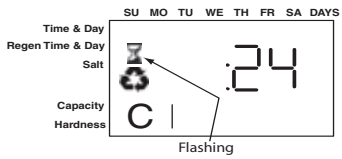
Conditioner Start-Up

After you have performed the previous initial power-up steps, you will need to place the conditioner into operation. Follow these steps carefully, as they differ from previous Autotrol valve instructions.

NOTE: The control valve can be started-up even if power is not yet available to the controller. The valve must be connected to water supply. The motor can be unmounted from the valve, and the camshaft can be indexed manually counterclockwise by hand. This will allow the tank to be filled and allows regenerant draw to be tested. See *Motor Removal* in *Maintenance And Service* (Section F) of this manual for further instructions.

1. Remove the cover from the valve. Removing the cover will allow you to see that the camshaft is turning, and in which cycle the camshaft is currently positioned.

2. With the supply water for the system still turned off, position the bypass valve to the “not in bypass” (normal operation) position.



3. Hold REGEN on the controller down for 5 seconds. This will initiate a manual regeneration.

   The controller will indicate that the motor is turning the camshaft to the cycle C1 (Backwash) position by flashing an hourglass. The controller will display the total regen time remaining.

   If you press and hold SET, the controller will indicate the time remaining in the current cycle.

4. Fill the media tank with water.

   A. While the controller is in cycle C1 (Backwash), open the water supply valve very slowly to approximately the 1/4 open position.

WARNING: If opened too rapidly or too far, media may be lost out of the tank into the valve or the plumbing. In the 1/4 open position, you should hear air slowly escaping from the valve drain line.

   B. When all of the air has been purged from the media tank (water begins to flow steadily from the drainline), open the main supply valve all of the way. This will purge the final air from the tank.

   C. Allow water to run to drain until the water runs clear from the drain line. This purges any refuse from the media bed.

D. Turn off the water supply and let the system stand for about five minutes. This will allow for any air trapped to escape from the tank.

5. Add water to the regenerant tank (initial fill) (conditioner only).

   A. With a bucket or hose, add approximately 4 gallons (15 liters) of water to the regenerant tank.

      If the tank has a salt platform in the bottom of the tank, add water until the water level is approximately 1 inch (25 mm) above the platform.

NOTE: We recommend that you do not put regenerant into the tank until after the control valve has been put into operation. With no regenerant in the tank, it is much easier to view water flow and motion in the tank.

Action	Key	Duration	Display
Display current cycle	SET	5 Sec	Current cycle
Advance to next cycle	SET and UP	P/R	Next cycle
Advance to CO	SET and UP	5 Sec	CO

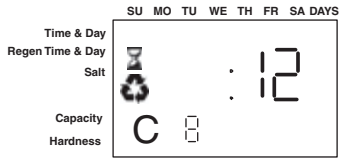
6. Engage the refill cycle to prime the line between the regenerant tank and the valve (conditioner only).

   A. Slowly open the main water supply valve again, to the fully open position. Be sure not to open too rapidly as that would push the media out of the media tank.

   B. Advance the controller to the Refill Position. From cycle C1 (Backwash), press and hold SET. This will display the current cycle.

      While pressing SET, press UP to advance to the next cycle. Continue to advance through each cycle until you have reached cycle C8 (Refill).

NOTE: As you advance through each cycle there will be a slight delay before you can advance to the next cycle. The hourglass icon will light while the camshaft is indexing. There may be a pause at cycle C4 (System Pause). This cycle allows the water/air pressure to equalize on each side of the valve discs before moving on. The hourglass will not be visible indicating that the system is paused.



C. With the water supply completely open, when you arrive at cycle C8 (Refill), the controller will direct water down through the line to the regenerant tank. Let the water flow through the line until all air bubbles have been purged from the line.

D. Do not let the water flow down the line to the tank for more than one to two minutes, or the tank may overfill.

E. Once the air is purged from the line, press SET and UP simultaneously to advance to cycle C0 (Treated Water) position.

7. Draw water from the regenerant tank.

Action	Key	Duration	Display
Advance to C1	REGEN	5 Sec	REGEN icon steady, C1 and time remaining
Advance to C2	SET and UP	P/R	Regen icon steady, C2 and time remaining

A. From the treated water position (cycle C0), advance the valve to the draw regenerant position. Hold REGEN down for five seconds.

The controller will begin a manual regen, and advance the control valve to the cycle C1 (Backwash). Press SET and UP to advance to cycle C2 (Draw).

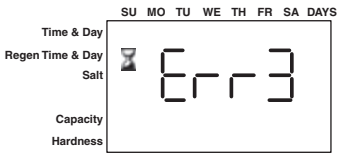
B. With the controller in this position, check to see that the water in the regenerant tank is being drawn out of the tank. The water level in the tank should recede very slowly.

C. Observe the water being drawn from the regenerant tank for at least three minutes. If the water level does not recede, or goes up, reference the *Troubleshooting* section.

8. If the water level is receding from the regenerant tank you can then advance the controller back to the treated water (C0) position by pressing SET and UP simultaneously to advance the controller to the C0 position.

9. Finally, turn on a faucet plumbed after the water conditioner. Run the faucet until the water runs clear.

Things You Might Need to Know



- When the controller is first plugged in, it may display a flashing hourglass and the message Err 3, this means that the controller is rotating to the home position. If the Err 2 is displayed, check that the incoming power frequency matches the controller. The North American controller will not run with 50 Hz input. See the *Troubleshooting* section of this manual.
- The preset default time of regeneration is 2:00 AM. If you want to change it, see the *Level II Programming* section.
- English or Metric? The World controller senses the electrical input and decides which is needed. The North American controller only runs on 60 Hz and defaults to English units. To make changes see the *Level II Programming* section regarding that particular item.
- The 740/760 controller can be programmed to regenerate on specific days of the week. See *Level II Programming* section.
- If electrical power is not available, the camshaft can be rotated counterclockwise by hand if the motor is removed. See *Motor Removal* in the *Maintenance* section.
- The 700 Logix series controllers send commands to the motor for camshaft movement. However, water pressure/flow are required during the regeneration cycle for backwash, purge and refill, and brine draw to actually take place.
- Make sure control power source is plugged in. The transformer should be connected to a non-switched power source.
- You can start programming at the beginning by resetting the amount of media. When viewing H0 (History Value) push and hold SET for five seconds. The display reverts back to **---** or 255 and any programmed information is lost. Return to *700 Series Initial Power Up*.
- The 742 and 762 are light gray in color and require a valve type to be selected at first power-up.

SECTION E—LOGIX PROGRAMMING

Section E describes the 700 series control display and the start-up sequence. This section also includes an explanation of the Level I and Level II programming.

700 SERIES PROGRAMMING

The Logix 700 Series controllers are designed to operate by only setting the time of day and the day of the week (Logix 742 and 762 controllers require a valve selection). The remaining settings have been set at the factory. These default settings will work for most applications.

The controller menu has three levels:

Level I Basic - This level is easily accessed by the user. The settings can be changed and saved as long as they are not locked.

Level II Professional - This level allows the installer to lock settings. The locked settings are viewable in the basic level but cannot be changed.

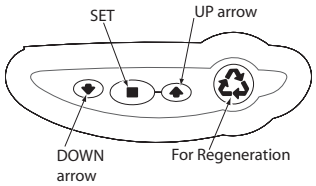
History Level - The operation history and the program are viewable. This information is used to troubleshoot and maintain the system.

740 BASIC PROGRAMMING

NOTE: If a button is not pushed for thirty seconds, the controller returns to normal operation mode. Pushing the regenerate button immediately returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. "PM" is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock "PM" is not displayed.

To change a setting:



Action	Key	Duration	Display
Enter basic programming	SET	P/R	Will show day of week
Move to desired display	UP or DOWN arrows	P/R	Will increment through the displays
Enable setting to be changed	SET	P/R	Display will flash
Change setting	UP or DOWN arrows	P/R	Value changes and continues to flash
Save setting	SET	P/R	Display stops flashing
Return to operation	REGEN	P/R	Normal operation display

This level of programming is accessible by pressing SET.

The UP and DOWN arrows will step through the settings.

Time of day

Day of week

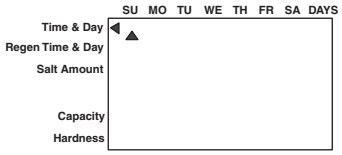
Time of regeneration

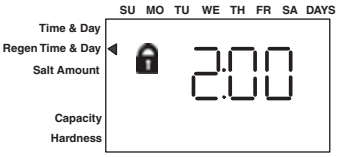
Number of days between regeneration (99 day timer)

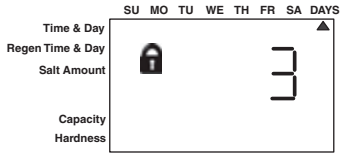
Day of week regeneration (Displays only when number of days between regeneration equals zero) (7 day timer)

Amount of regenerant used per regeneration or filter backwash time

System capacity (View only)







To make changes:

- **Time of day**

  When the Time of Day is displayed, push SET. The time will flash. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.

- **Day of the week**

  The day of the week does not have a default setting. It is entered at Power-up. To change the current day, push SET when day of week is displayed. A flag will flash beneath the current day. Use the arrow buttons to change. Push SET to enter the selection.

- **Time of regeneration**

  This is set for 2:00 AM as the default. The controller does not account for daylight savings time.

  To change this setting, push SET. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.

- **Number of days between regeneration**

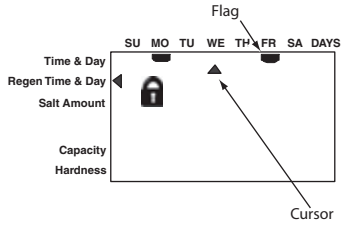
  The controller can be programmed to regenerate automatically from a 1/2 (.5) day to a 99 day frequency.

  The 1/2 day regeneration mode will regenerate at the "time of regeneration", as well as 12 hours opposite from that time. For example, the controller will regenerate at 2 AM and at 2 PM on the same day.

  The default setting is three days for the 740. To change, push SET when this setting is displayed. Use the arrow buttons to increase/decrease. Push SET to enter the selection.

WARNING: Setting days between regeneration to zero will cause the system to not regenerate. This setting is used for selecting regeneration on specific days or to use with a remote regeneration input. See below.

NOTE: Regeneration on specific day is used to provide regeneration when water demands are not steady. Example: If the weekdays have low usage and the weekend is high, then regeneration every three days will not meet the requirements.



- **Specific day of week regeneration (7-day timer)**

  To change the controller to regenerate on specific days, set the number of days between regeneration to zero.

  After this has been completed, the arrow on the left side of the display will be pointing to Regeneration Time/Day. Press SET and the display will show a flashing cursor at the top under Sunday. The day of week can be selected when the cursor is below it.

  To toggle the day on/off, the triangular cursor must be below that day and flashing.

  The UP or DOWN buttons are used to turn the days flag on/off. If the cursor is in position but steady on push SET to make the cursor flash.

  To move the cursor when it is steady on, use UP or DOWN.

  To move the cursor when it is flashing, push SET once. This will move the cursor one position to the right and change the status to steady on.

Example: To move the cursor and toggle a day to on/off:

1. The cursor should be steady on. If it is flashing push SET.
2. Use UP or DOWN to move the cursor under the day to be changed.
3. Push SET. The cursor will flash.
4. Use UP or DOWN to toggle on the flag for that day.
5. Push SET to move the cursor to the next day. The cursor will be steady on. When the cursor is under SA (Saturday) and flashing, pushing SET will complete the days of the week programming. The controller will move to the regenerant amount menu.

   To return to days between regeneration, the selected days to regenerate must be turned off. The setting for days between regeneration can then be changed from zero.

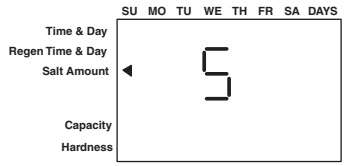
   The display shown to the left is programmed to regenerate on Monday and Friday.

WARNING: To properly set the controller for dry contact input, the number of days between regeneration will equal 0 and the specific day of week will not have any days selected.

If the installation is a 3-cycle filter, skip to *Filter Backwash Time*. The amount of regenerant does not apply.

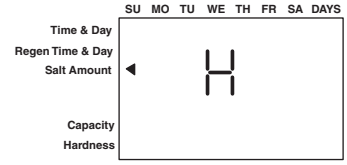
- **Amount of regenerant used per regeneration**

The Logix series controllers are set-up to automatically calculate the capacity of the system by multiplying the resin/media volume that was entered earlier into the controller, with the regenerant amount entered by the dealer/installer. This eliminates the need for salting efficiency tables.

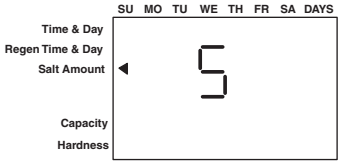


The default setting is S (Standard Salt).

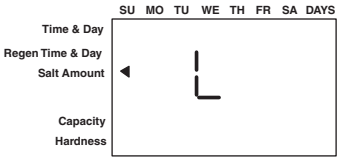
To enable the most simple programming possible on the 740 controllers, the dealer/installer has three salt amount options to choose from. These are set up to give the installation the maximum performance based on the inputs by the dealer/installer. The three salting options are:



High Salt - This setting gives the installation the highest capacity possible for that resin volume. This is a great setting for applications with very high hardness, many occupants or for applications where the dealer wants to always ensure that the application has soft water. This setting may tend to use less water over the course of a year, because it generally needs to be regenerated less often. This setting is displayed as an "H".



Standard Salt - This is the default setting for the controller. This setting fits most applications around the world. It gives you an efficient use of salt, while maintaining a large enough capacity to regenerate every three days for most applications. This setting is displayed as an "S".



Low Salt - This setting is provided to give your installation the maximum efficiency of salt usage, as measured in grains of hardness softened per pound of salt used (grams of $CaCO_3$ removed per kilogram of salt used). This setting is useful for markets where highly efficient conditioners are expected or required by the consumers or law. This setting is displayed as an "L".

The following tables show the estimated salt amount for each setting, as well as the estimated capacity of that salt setting for each resin amount.

North American Logix Settings

Media Volume (ft^3)	Salt Setting	Total Salt Amount per Regeneration (lbs)	Estimated Capacity (kg)
0.15	L	.5	2,000
	S	1	3,000
	H	2	4,000
0.25	L	1	4,000
	S	2	6,000
	H	4	8,000
0.5	L	1.5	6,000
	S	4.5	13,000
	H	7.5	15,000
0.75	L	2.5	11,000
	S	7	19,000
	H	11	23,000
1	L	3.5	15,000
	S	9	25,000
	H	15	30,000
1.25	L	4	17,000
	S	11	34,000
	H	19	38,000
1.5	L	5	22,000
	S	13.5	38,000
	H	22.5	45,000
2	L	6.5	28,000
	S	18	50,000
	H	30	60,000
3	L	10	44,000
	S	27	75,000
	H	45	90,000

H = High salt, approximately 15 lbs. per cu. ft. of media

S = Standard salt, approximately 9 lbs. per cu. ft. of media

L = Low salt, approximately 3.3 lbs. per cu. ft. of media

World Logix Settings

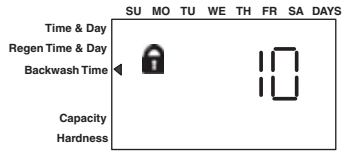
Media Volume (liters)	Salt Setting	Total Salt Amount per Regeneration (kgs)	Estimated Capacity (kg)
5	L	0.2	0.1
	S	0.37	0.2
	H	0.75	0.3
10	L	0.2	0.3
	S	0.75	0.4
	H	1.5	0.5
15	L	0.6	0.4
	S	1.7	0.8
	H	2.8	1.0
20	L	0.9	0.7
	S	2.6	1.2
	H	4.1	1.5
30	L	1.3	1.0
	S	3.4	1.6
	H	5.6	2.0
35	L	1.4	1.2
	S	4.2	2.1
	H	7	2.5
40	L	1.8	1.5
	S	5	2.5
	H	8.4	3.0
50	L	2.4	2.0
	S	6.7	3.2
	H	11.2	3.9
80	L	3.7	3.0
	S	10.1	4.9
	H	16.8	5.8

H = High salt, approximately 15 lbs. per cu. ft. of media

S = Standard salt, approximately 9 lbs. per cu. ft. of media

L = Low salt, approximately 3.3 lbs. per cu. ft. of media

To program the salt amount, press SET to enter the change mode. The S default will begin to flash. Use UP and DOWN to scroll through the three settings. Press SET to enter the amount.



- **Filter backwash time - when filter setting is chosen**

  If the system is set up as a 3-cycle filter, regenerant amount is unnecessary. The controller deactivates the regenerant amount setting, and changes to an adjustable backwash time in minutes.

  Press SET to change the time. The default time of 14 minutes will begin to flash. Use UP and DOWN to select the appropriate backwash time for the media type and amount used. The controller can use 0 to 99 minutes for backwash. Press SET again to enter that time.

  If using this controller as a filter, an alternate 740F faceplate overlay label is available that has the text “backwash time” instead of “salt” printed. See the *Spare Parts* section for the part number for this overlay label.

NOTE: If the controller was incorrectly set as a conditioner instead of a filter, press DOWN and SET for five seconds to display resin volume. Press and hold SET for five seconds to reset the resin volume to ---. Use the ARROW buttons to increment the display to F. Press SET.

- **Capacity**

  The 740 controller is designed to estimate capacity of the system by multiplying the initial resin/media volume by the regenerant amount programmed in under "*Amount of regenerant used per regeneration*".

  An estimated total system capacity is displayed in kilograins (kilograms CaCO3) that can be removed by the fully regenerated media bed. **This value is derived by standard water treatment industry norms**. The system capacity is displayed merely for the installers reference when determining regeneration frequency. This value is displayed, but cannot be directly changed on the 740 time clock controller.

NOTE: Capacity is the result of the amount of media in the tank and the salt setting. The default capacity will be changed by selecting a different regenerant setting.

PROGRAMMING THE 740 FOR 5-CYCLE FILTER APPLICATIONS MANGANESE GREENSAND SYSTEMS

Initial Resin Volume Setting

Programming for a manganese greensand system requires a few minor adjustments to the programming to operate the control correctly. The initial resin volume should be set to the volume of manganese greensand in the system. For example, if the system contains 2 cubic feet of manganese greensand, program in 2.00 for the resin volume.

Days Between Regeneration Setting

To set the days between regenerations, consult the media manufacturer for the actual capacity of the media.

In general, manganese greensand has a capacity of 10,000 ppm of removal capability per cubic foot of media. Calculate the capacity of the system by taking the number of cubic feet of media and multiply by 10,000.

For example, using a 1 cubic foot system provides 10,000 ppm of removal capability.

The next step is to calculate the demand for the system. Multiply the predicted daily water usage by the iron content in ppm.

For example, a person uses 75 gallons of water per day. Four people living in a home use 300 gallons of water (75 gallons x 4 people) per day. Assume the incoming water has 10 ppm of iron. Now calculate the daily demand: multiply the gallons of water used per day (300) by the ppm of iron content (10) = 3000 ppm of daily capacity usage.

Now take the system capacity (10,000), divided by the daily demand (3,000) = 3.3 days of capacity. Since you will run out of capacity before the beginning of the fourth day, the proper setting for days between regeneration is 3 days.

"Salt" Setting

Since the same injector is used for the filter application (FA) system and the conditioner system, be sure the regenerant (salt) setting is set to High “H” to allow adequate time to rinse the media.

All other settings will remain the same as mentioned in the previous programming sections.

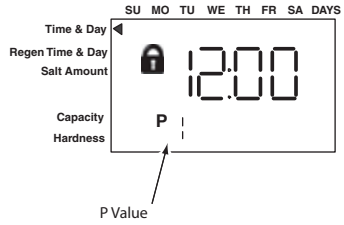
740 PROFESSIONAL PROGRAMMING

NOTE: If a button is not pushed for thirty seconds the controller returns to normal operation mode. Pushing UP and DOWN for 5 seconds returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. “PM” is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock: PM” is not displayed.

In this level all of the programming features of basic programming are available. In addition, the settings can be locked/unlocked.

A setting that is locked will display a lock icon when viewed in the basic level.



A locked setting is viewable in the basic programming menus but it cannot be changed.

When viewing a setting in this level the display will show a "P" value. This corresponds to the displayed setting.

Level II menus include:

P1 = Time of day

P2 = Day of week

P3 = Time of regeneration

P4 = Number of days between regeneration

P5 = Day of week regeneration (Displays only when number of days between regeneration equals zero)

P6 = Amount of regenerant used per regeneration or filter backwash time

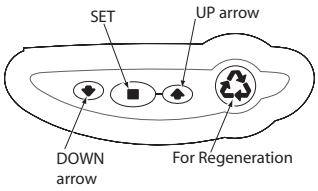
P7 = System capacity (View only)

P8 = Not used

P9 = Units of measure

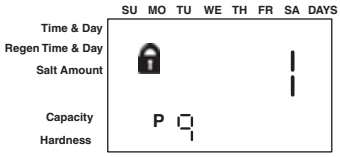
P10=Clock mode

To enter Level II (Professional Programming) and change a setting:



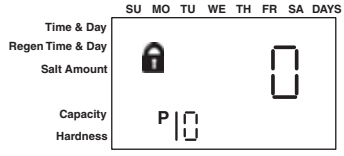
Action	Key	Duration	Display
Enter Level II programming	UP and DOWN	5 Sec.	P1 display
Return to operation	UP and DOWN	5 Sec.	Time and day of week
Increment through menus	UP or DOWN	P/R	Next parameter display
Enable setting to be changed	SET	P/R	Parameter will flash
Change value	UP or DOWN	P/R	Value changes
Save setting	SET	P/R	Records value and next parameter is displayed

English/Metric - P9 (only accessed in Professional level)



This setting is entered automatically at first power-up. The North American controller will default to English units. The World controller senses the electrical input and determines English or metric units. 0 is English units, 1 is metric units. Use the arrow buttons to change this setting. Press SET to accept the setting.

12 hour clock/24 hour clock - P10 (only accessed in Professional level)

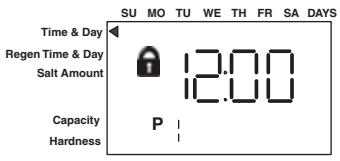


This setting is entered automatically at first power-up. The North American controller will default to English units. The World controller senses the electrical input and determines a 12 or 24 hour clock. 0 is 12-hour clock. 1 is 24-hour clock. Use the arrow buttons to change this setting. Press SET to accept the setting.

NOTE: Once SET is pressed in P10 the controller will change to treated water (normal operation) mode. The time of day is displayed and the colon is flashing.

To make changes:

- **Lock On/Off The Professional Level**



Settings locked in Professional Level can be viewed in Basic Level but not changed. To change the lock status of the displayed setting, push REGEN. This toggles the lock icon on and off. If the lock is illuminated or flashing in Professional Level, the parameter will be locked in Basic Level programming.

740 HISTORY LEVEL

This level displays settings and usage information that can be used by a service person to diagnose and troubleshoot the system

To enter the history level:

Action	Key	Duration	Display
Enter data mode	DOWN arrow and SET	5 Sec.	Value for HO
Reset value to factory default	SET	5 secs with value is displayed	Original factory default

History Data

	Description	Range
H0	Resin volume initial setting value	cubic feet or liters

When in history values mode a small "H" will be displayed in the lower left corner of the display. Next to the "H" will be the number that applies to the history value.

The 740 controller shows only one value, H0. Without a turbine, only non-water values can be displayed.

H0— System Resin Volume Setting

The Logix history value H0 displays the initial resin volume setting (programmed when the system was first set up.

If the value is incorrect and needs to be reset, press and hold SET for five seconds to reset the controller.

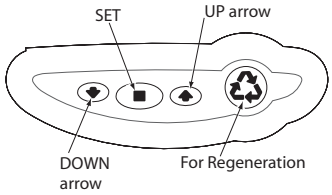
WARNING: Resetting the resin volume resets the entire controller back to the factory default. Only use if absolutely necessary. The control will need to be completely reprogrammed.

742 BASIC PROGRAMMING

NOTE: If a button is not pushed for thirty seconds, the controller returns to normal operation mode. Pushing the regenerate button immediately returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. "PM" is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock "PM" is not displayed.

To change a setting:



Action	Key	Duration	Display
Enter basic programming	SET	P/R	Will show day of week
Move to desired display	UP or DOWN arrows	P/R	Will increment through the displays
Enable setting to be changed	SET	P/R	Display will flash
Change setting	UP or DOWN arrows	P/R	Value changes and continues to flash
Save setting	SET	P/R	Display stops flashing
Return to operation	REGEN	P/R	Normal operation display

This level of programming is accessible by pressing SET.

The UP and DOWN arrows will step through the settings.

Time of day

Day of week

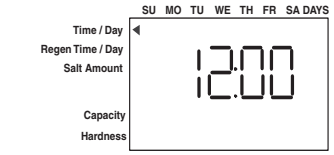
Time of regeneration

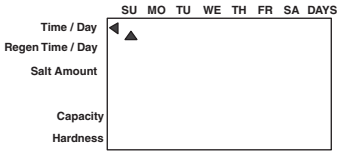
Number of days between regeneration (calendar override) (99 day timer)

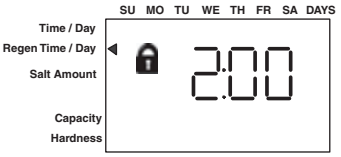
Day of week regeneration (Displays only when number of days between regeneration equals zero) (7 day timer)

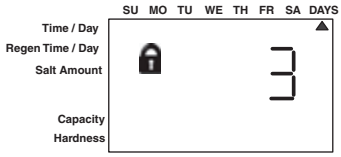
Amount of regenerant used per regeneration or filter backwash time (salt amount)

System capacity (View only)









To make changes:

- **Time of day**

  When the Time of Day is displayed, push SET. The time will flash. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.

- **Day of the week**

  The day of the week does not have a default setting. It is entered at Power-up. To change the current day, push SET when day of week is displayed. A flag will flash beneath the current day. Use the arrow buttons to change. Push SET to enter the selection.

- **Time of regeneration**

  This is set for 2:00 AM as the default. The controller does not account for daylight savings time.

  To change this setting, push SET. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.

- **Number of days between regeneration**

  The controller can be programmed to regenerate automatically from a 1/2 (.5) day to a 99 day frequency.

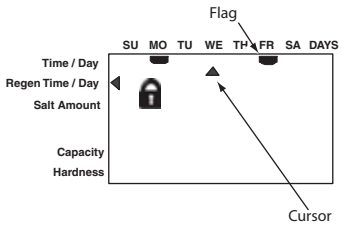
  The 1/2 day regeneration mode will regenerate at the "time of regeneration", as well as 12 hours opposite from that time. For example, the controller will regenerate at 2 AM and at 2 PM on the same day.

  The default setting is three days for the 742. To change, push SET when this setting is displayed. Use the arrow buttons to increase/decrease. Push SET to enter the selection.

CAUTION: Setting days between regeneration to zero will cause the system to not regenerate. This setting is used for selecting regeneration on specific days or to use with a remote regeneration input. See below.

NOTE: Regeneration on specific day is used to provide regeneration when water demands are not steady. Example: If the weekdays have low usage and the weekend is high, then regeneration every three days will not meet the requirements.

- **Specific day of week regeneration (7-day timer)**



To change the controller to regenerate on specific days, set the number of days between regeneration to zero.

After this has been completed, the arrow on the left side of the display will be pointing to Regeneration Time/Day. Press SET and the display will show a flashing cursor at the top under Sunday. The day of week can be selected when the cursor is below it.

To toggle the day on/off, the triangular cursor must be below that day and flashing.

The UP or DOWN buttons are used to turn the days flag on/off. If the cursor is in position but steady on push SET to make the cursor flash.

To move the cursor when it is steady on, use UP or DOWN.

To move the cursor when it is flashing push SET once. This will move the cursor one position to the right and change the status to steady on.

Example: To move the cursor and toggle a day to on/off:

1. The cursor should be steady on. If it is flashing push SET.
2. Use UP or DOWN to move the cursor under the day to be changed.
3. Push SET. The cursor will flash.
4. Use UP or DOWN to toggle on the flag for that day.
5. Push SET to move the cursor to the next day. The cursor will be steady on. When the cursor is under SA (Saturday) and flashing, pushing SET will complete the days of the week programming. The controller will move to the regenerant amount menu.

   To return to days between regeneration, the selected days to regenerate must be turned off. The setting for days between regeneration can then be changed from zero.

   The display shown to the left is programmed to regenerate on Monday and Friday.

CAUTION: To properly set the controller for dry contact input, the number of days between regeneration will equal 0 and the specific day of week will not have any days selected.

If the installation is a filter, skip to *Filter Backwash Time*. The amount of regenerant does not apply.

Amount of regenerant used per regeneration

The Logix 742 series controllers are set-up to automatically calculate the capacity of the system by multiplying the resin/media volume that was entered earlier into the controller, with the regenerant amount entered by the dealer/installer. This eliminates the need for salting efficiency tables.

The default setting is 9 lbs of salt per ft^3 of resin (110 grams/Liter).

Selecting the valve type will determine if standard efficiency or high efficiency exchange capacity will be used. The 278 and 298 valve settings will follow standard efficiency settings. The 255 and 268 valves will follow the high efficiency settings.

The Table 1 shows the estimated salt amount for each standard efficiency setting, as well as the estimated capacity of that salt setting for each resin amount.

Table 2 shows the high efficiency settings.

Table 1- Standard Efficiency Exchange Capacity

Salt lbs/cu ft	Exchange Capacity grains/cu ft	Salt grams/liter	Exchange Capacity grams/liter
3	12714	50	29.9
4	15495	60	34.0
5	17774	70	37.5
6	19661	80	40.6
7	21250	90	43.4
8	22618	100	45.9
9	23828	110	48.2
10	24930	120	50.2
11	25962	130	52.1
12	26950	140	53.8
13	27916	150	55.5
14	28873	170	58.5
15	29829	200	62.7
16	30796	230	66.9
17	31783	260	71.0
18	32806	290	75.3

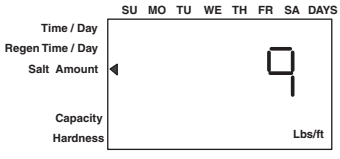
Table 2- High Efficiency Exchange Capacity

Salt lbs/cu ft	Exchange Capacity grains/cu ft	Salt grams/ liter	Exchange Capacity grams/liter
3	15000	50	35.3
4	18000	60	38.0
5	20200	70	42.7
6	22000	80	45.4
7	22500	90	46.0
8	23000	100	46.7
9	24000	110	48.5
10	24930	120	50.2
11	25962	130	52.1
12	26950	140	53.8
13	27916	150	55.5
14	28873	170	58.5
15	29829	200	62.7
16	30796	230	66.9
17	31783	260	71.0
18	32806	290	75.3

Table 3

To Convert Capacity in	Into Capacity in	Multiply by
kilograms (kg)	kilograins (kgr)	15.43
kilograins (kgr)	kilograms (kg)	0.0648
moles of CaCO3	kilograms (kg)	0.10
equivalents of CaCO3	kilograms (kg)	0.05

To program the salt amount, press SET to enter the change mode. The 9 (lbs/ft^3) default will begin to flash. Use UP and DOWN to scroll through the available settings. Press SET to enter the amount.



- **Filter backwash time - when filter setting is chosen**

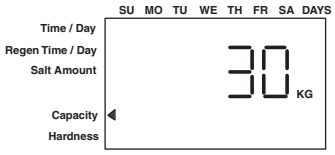
  If the system is set up as a filter, regenerant amount is unnecessary. The controller deactivates the regenerant amount setting, and changes to an adjustable backwash time in minutes.

  Press SET to change the time. The default time of 14 minutes will begin to flash. Use UP and DOWN to select the appropriate backwash time for the media type and amount used. The controller can use 0 to 99 minutes for backwash. Press SET again to enter that time.

  If using this controller as a filter, an alternate 742F faceplate overlay label is available that has the text “backwash time” instead of “salt amount” printed.

NOTE: If the controller was incorrectly set as a conditioner instead of a filter, press DOWN and SET for five seconds to display resin volume. Press and hold SET for five seconds to reset the resin volume to ---. Use the arrow buttons to increment the display to the filter valve type (263, 273, 293). Press SET.

- **Capacity**



The 742 controller is designed to estimate capacity of the system by multiplying the initial resin/media volume by the regenerant amount programmed in under "*Amount of regenerant used per regeneration*".

An estimated total system capacity is displayed in kilograins (kilograms CaCO3) that can be removed by the fully regenerated media bed. **This value is derived by standard water treatment industry norms**. The system capacity is displayed merely for the installers reference when determining regeneration frequency.

NOTE: Capacity is the result of the amount of media in the tank and the salt setting. The default capacity will be changed by selecting a different regenerant setting.

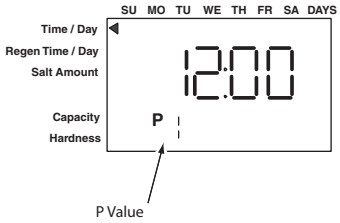
742 PROFESSIONAL PROGRAMMING

NOTE: If a button is not pushed for thirty seconds the controller returns to normal operation mode. Pushing UP and DOWN for 5 seconds returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. “PM” is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock :PM” is not displayed.

In this level all of the programming features of basic programming are available. In addition, the settings can be locked/unlocked.

A locked setting will display a lock icon when viewed in the basic level.



A locked setting is viewable in the basic programming menus but it cannot be changed.

When viewing a setting in this level the display will show a "P" value. This corresponds to the displayed setting.

Level II menus include:

P1 = Time of day

P2 = Day of week

P3 = Time of regeneration

P4 = Number of days between regeneration (99 day calendar override)

P5 = Day of week regeneration 742 only (Displays only when number of days between regeneration equals zero)

P6 = Amount of regenerant used per regeneration or filter backwash time (salt setting)

P7 = System capacity (View only)

P8 = Not used (762 only)

P9 = Units of measure

P10 = Clock mode

P11= Service interval

P12 = Remote regeneration switch delay

P13 = Salt detector (conditioner only)

P14 = Refill rate (conditioner only)

P15 = Draw rate (conditioner only)

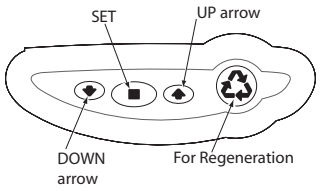
P16 = Reserve type (762 only)

P17 = Initial average or fixed reserve (762 only)

P18 = Flow sensor select (762 only)

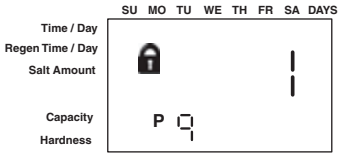
P19 = K-factor or pulse equivalent (762 only)

To enter Level II (Professional Programming) and change a setting:



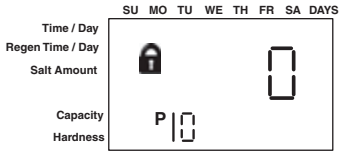
Action	Key	Duration	Display
Enter Level II programming	UP and DOWN	5 Sec.	P1 display
Return to operation	UP and DOWN	5 Sec.	Time and day of week
Increment through menus	UP or DOWN	P/R	Next parameter display
Enable setting to be changed	SET	P/R	Parameter will flash
Change value	UP or DOWN	P/R	Value changes
Save setting	SET	P/R	Records value and next parameter is displayed

English/Metric - P9 (only accessed in Professional level)



This setting is entered automatically at first power-up. The North American controller will default to English units. The World controller senses the electrical input and determines English or metric units. 0 is English units, 1 is metric units. Use the arrow buttons to change this setting. Press SET to accept the setting.

12 hour clock/24 hour clock - P10 (only accessed in Professional level)



This setting is entered automatically at first power-up. The North American controller will default to English units. The World controller senses the electrical input and determines a 12 or 24 hour clock. 0 is 12-hour clock. 1 is 24-hour clock. Use the arrow buttons to change this setting. Press SET to accept the setting.

Service Interval - P11 (only accessed in Professional level)

The default setting is 0 months which can be changed up to 250 months. Use the arrow buttons to change this setting, press SET to accept the setting.

Remote Regeneration Switch Delay - P12 (only accessed in Professional level)

When using the remote signal to start a regeneration, this valve is used to determine the amount of time in seconds the signal must be active. Can be set from 3 to 250 seconds. The default setting is 60 seconds. Use the arrow buttons to change this setting, press SET to accept the setting.

Salt Detector - P13 (only accessed in Professional level)

This setting is not used for filters. The default setting is 0. Set this to 1 if a salt detector is being used. Use the arrow buttons to change the setting. Press SET to accept the setting.

Refill Rate - P14 (only accessed in Professional level)

This setting is not used for filters. The default setting is 1. This value has a range of 1 to 700. The value entered is in increments of gallons per minute times 100. Use the arrow buttons to change the setting. Press SET to accept the setting.

Drain Rate - P15 (only accessed in Professional level)

This setting is not used for filters. The default setting is 1. This value has a range of 1 to 700. The value entered is in increments of gallons per minute times 100. Use the arrow buttons to change the setting. Press SET to accept the setting.

Reserve Type - P16 (Not used on 742)

Initial Average or Fixed Reserve - P17 (Not used on 742)

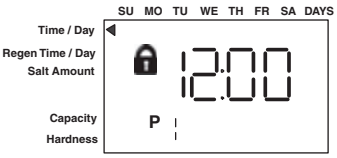
Flow Sensor Select - P18 (Not used on 742)

K-Factor or Pulse Equivalent - P19 (Not used on 742)

NOTE: Once SET is pressed in P19 the controller will change to treated water (normal operation) mode. The time of day is displayed and the colon is flashing.

To make changes:

- **Lock On/Off The Professional Level**



Settings locked in Professional Level can be viewed in Basic Level but not changed. To change the lock status of the displayed setting, push REGEN. This toggles the lock icon on and off. If the lock is illuminated or flashing in Professional Level, the parameter will be locked in Basic Level programming.

742 HISTORY LEVEL

This level displays settings and usage information that can be used by a service person to diagnose and troubleshoot the system

To enter the history level:

Action	Key	Duration	Display
Enter data mode	DOWN arrow and SET	5 Sec.	Value for H0
Reset value to factory default	SET	5 Secs with value is displayed	Original factory default

History Data

	Description	Range
H0	Resin volume initial setting value	cubic feet or liters

When in history values mode a small "H" will be displayed in the lower left corner of the display. Next to the "H" will be the number that applies to the history value.

The 742 controller shows only one value, H0. Without a turbine, only non-water values can be displayed.

H0— System Resin Volume Setting

The Logix history value H0 displays the initial resin volume setting (programmed when the system was first set up).

If the value is incorrect and needs to be reset, press and hold SET for five seconds to reset the controller.

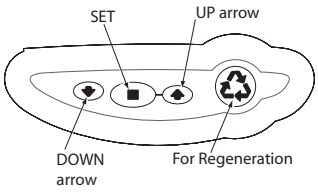
CAUTION: Resetting the resin volume resets the entire controller back to the factory default. Only use if absolutely necessary. The control will need to be completely reprogrammed.

760 BASIC PROGRAMMING

NOTE: If a button is not pushed for thirty seconds, the controller returns to normal operation mode. Pushing the regenerate button immediately returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. "PM" is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock "PM" is not displayed.

To change a setting:



Action	Key	Duration	Display
Enter basic programming	SET	P/R	Will show day of week
Move to desired display	UP or DOWN arrows	P/R	Will increment through the displays
Enable setting to be changed	SET	P/R	Display will flash
Change setting	UP or DOWN arrows	P/R	Value changes and continues to flash
Save setting	SET	P/R	Display stops flashing
Return to operation	REGEN	P/R	Normal operation display

This level of programming is accessible by pressing SET.

The UP and DOWN arrows will step through the settings.

Time of day

Day of week

Time of regeneration

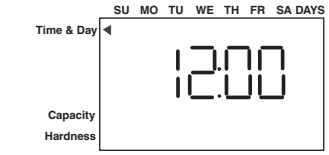
Number of days between regeneration (99 day calendar override timer)

Amount of regenerant used per regeneration or filter backwash time

System capacity

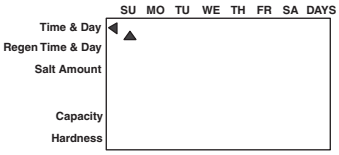
Hardness

To make changes:



- **Time of day**

  When the Time of Day is displayed, push SET. The time will flash. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.



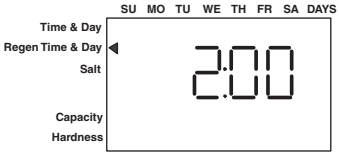
- **Day of the week**

  The day of the week does not have a default setting. It is entered at Power-up. To change the current day, push SET when day of week is displayed. A flag will flash beneath the current day. Use the arrow buttons to change. Push SET to enter the selection.

- **Time of regeneration**

  This is set for 2:00 AM as the default. The controller does not account for daylight savings time.

  To change this setting, push SET. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.

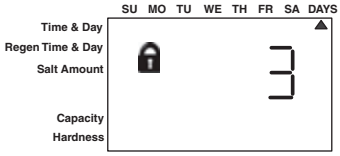


- **Calendar override**

  The controller can be programmed to regenerate automatically from a 1/2 (.5) day to a 99 day frequency.

  The 1/2 day regeneration mode will regenerate at the "time of regeneration", as well as 12 hours opposite from that time. For example, the controller will regenerate at 2 AM and at 2 PM on the same day.

  The default setting is 0 days. To change, push SET when this setting is displayed. Use the arrow buttons to increase/decrease. Push SET to enter the selection.



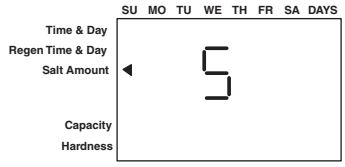
If the installation is a 3-cycle filter, skip to *Filter Backwash Time*. Amount of backwash does not apply.

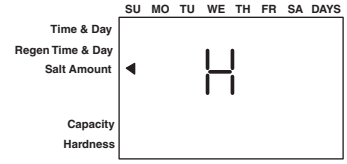
- **Amount of regenerant used per regeneration**

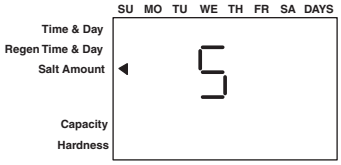
  The Logix series controllers are set-up to automatically calculate the capacity of the system by multiplying the resin/media volume that was entered earlier into the controller, with the regenerant amount entered by the dealer/installer. This eliminates the need for salting efficiency tables.

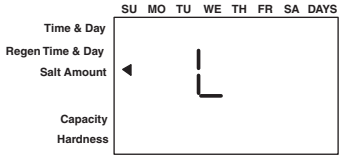
  The default setting is S (Standard Salt).

  To enable the most simple programming possible on the 760 controllers, the dealer/installer has three salt amount options to choose from. These are set up to give the installation the maximum performance based on the inputs by the dealer/installer. The three salting options are:









  High Salt - This setting gives the installation the highest capacity possible for that resin volume. This is a great setting for applications with very high hardness, many occupants or for applications where the dealer wants to always ensure that the application has soft water. This setting may tend to use less water over the course of a year, because it generally needs to be regenerated less often. This setting is displayed as an "H".

  Standard Salt - This is the default setting for the controller. This setting fits most applications around the world. It gives you an efficient use of salt, while maintaining a large enough capacity to regenerate every three days for most applications. This setting is displayed as an "S".

  Low Salt - This setting is provided to give your installation the maximum efficiency of salt usage, as measured in grains of hardness softened per pound of salt used (grams of $CaCO_3$ removed per kilogram of salt used). This setting is useful for markets where highly efficient conditioners are expected or required by the consumers or law. This setting is displayed as an "L".

The following tables show the estimated salt amount for each setting, as well as the estimated capacity of that salt setting for each resin amount.

North American Logix Settings

Media Volume (ft^3)	Salt Setting	Total Salt Amount per Regeneration (lbs)	Estimated Capacity (kg)
0.15	L	.5	2,000
	S	1	3,000
	H	2	4,000
0.25	L	1	4,000
	S	2	6,000
	H	4	8,000
0.5	L	1.5	6,000
	S	4.5	13,000
	H	7.5	15,000
0.75	L	2.5	11,000
	S	7	19,000
	H	11	23,000
1	L	3.5	15,000
	S	9	25,000
	H	15	30,000
1.25	L	4	17,000
	S	11	34,000
	H	19	38,000
1.5	L	5	22,000
	S	13.5	38,000
	H	22.5	45,000
2	L	6.5	28,000
	S	18	50,000
	H	30	60,000
3	L	10	44,000
	S	27	75,000
	H	45	90,000

H = High salt, approximately 15 lbs. per cu. ft. of media

S = Standard salt, approximately 9 lbs. per cu. ft. of media

L = Low salt, approximately 3.3 lbs. per cu. ft. of media

World Logix Settings

Media Volume (liters)	Salt Setting	Total Salt Amount per Regeneration (kgs)	Estimated Capacity (kg)
5	L	0.2	0.1
	S	0.37	0.2
	H	0.75	0.3
10	L	0.37	0.3
	S	0.75	0.4
	H	1.5	0.5
15	L	0.6	0.4
	S	1.7	0.8
	H	2.8	1.0
20	L	0.9	0.7
	S	2.6	1.2
	H	4.1	1.5
30	L	1.3	1.0
	S	3.4	1.6
	H	5.6	2.0
35	L	1.4	1.2
	S	4.2	2.1
	H	7	2.5
40	L	1.8	1.5
	S	5	2.5
	H	8.4	3.0
50	L	2.4	2.0
	S	6.7	3.2
	H	11.2	3.9
80	L	3.7	3.0
	S	10.1	4.9
	H	16.8	5.8

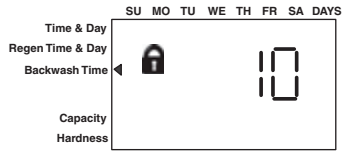
H = High salt, approximately 15 lbs. per cu. ft. of media

S = Standard salt, approximately 9 lbs. per cu. ft. of media

L = Low salt, approximately 3.3 lbs. per cu. ft. of media

To program the salt amount, press SET to enter the change mode. The S default will begin to flash. Use UP and DOWN to scroll through the three settings. Press SET to enter the amount.

- **Filter backwash time - when filter setting is chosen**



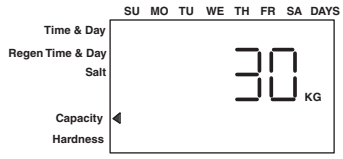
If the system is set up as a 3-cycle filter, regenerant amount is unnecessary. The controller deactivates the regenerant amount setting, and changes to an adjustable backwash time in minutes.

Press SET to change the time. The default time of 14 minutes will begin to flash. Use UP and DOWN to select the appropriate backwash time for the media type and amount used. The controller can use 0 to 99 minutes for backwash. Press SET again to enter that time.

If using this controller as a filter, an alternate 760F faceplate overlay label is available that has the text “backwash time” instead of “salt” printed. See the Spare Parts section for the part number for this overlay label.

NOTE: If the controller was incorrectly set as a conditioner instead of a filter, press DOWN and SET for five seconds to display resin volume. Press and hold SET for five seconds to reset the resin volume to ---. Use the arrow buttons to increment the display to F. Press SET.

- **Capacity**



The 760 controller is designed to estimate capacity of the system by multiplying the initial resin/media volume by the regenerant amount programmed in under "*Amount of regenerant used per regeneration”.*

An estimated total system capacity is displayed in kilograins (kilograms CaCO3) that can be removed by the fully regenerated media bed. **This value is derived by standard water treatment industry norms**. The system capacity is displayed merely for the installers reference when determining regeneration frequency.

NOTE: Capacity is the result of the amount of media and the tank and the salt setting. The default capacity will be changed by selecting a different regenerant setting.

- **Hardness setting**

  The hardness setting is set in grains per gallon (ppm $CaCO_3$). The hardness is divided into the total capacity setting, giving a total volume of water that can be conditioned before a regeneration is needed. To set, press SET when P8 is displayed, and use UP or DOWN to increment. Press SET again to accept the setting.

PROGRAMMING THE 760 FOR 5-CYCLE FILTER APPLICATIONS MANGANESE GREENSAND SYSTEMS

Initial Resin Volume Setting

Programming for a manganese greensand system requires a few minor adjustments to the programming to operate the control correctly. The initial resin volume should be set to the volume of manganese greensand in the system. For example, if the system contains 2 cubic feet of manganese greensand, program in 2.00 for the resin volume.

"Salt" Amount Setting

Since the same injector is used for the filter application (FA) system and the conditioner system, be sure the regenerant (salt) setting is set to High “H” to allow adequate time to rinse the media.

Capacity and Hardness Settings

To set the capacity and hardness, consult the media manufacturer for the actual capacity of the media.

In general, manganese greensand has a capacity of 10,000 ppm of removal capability per cubic foot of media. Calculate the capacity of the system by taking the number of cubic feet of media and multiply by 10,000.

For example, using a 1 cubic foot system provides 10,000 ppm of removal capability. The incoming iron content of our water supply is 15 ppm.

With this information, we can program the capacity and hardness setting. Capacity for this example system, which is programmed in thousands, needs to be programmed to 10. 10 represents a system capacity of 10,000 ppm removal capability. Hardness needs to be set at 15 to represent the 15 ppm of iron in the incoming water supply.

All other settings will remain the same as mentioned in the previous programming sections.

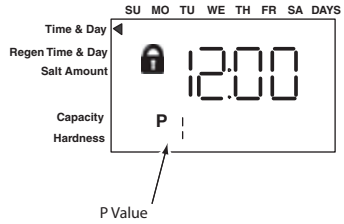
760 PROFESSIONAL PROGRAMMING

NOTE: If a button is not pushed for thirty seconds the controller returns to normal operation mode. Pushing the UP and DOWN arrows for 5 seconds returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. "PM" is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock: "PM" is not displayed.

In this level all of the programming features of basic programming are available. In addition, the settings can be locked/unlocked.

A setting that is locked will display a lock icon when viewed in the basic level.



A locked setting is viewable in the basic programming menus but it cannot be changed.

When viewing a setting in this level the display will show a "P" value. This corresponds to the displayed setting.

Level II menus include:

P1 = Time of day

P2 = Day of week

P3 = Time of regeneration

P4 = Number of days between regeneration

P5 = Not used

P6 = Amount of regenerant used per regeneration or filter backwash time

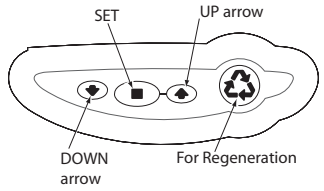
P7 = System capacity

P8 = Hardness

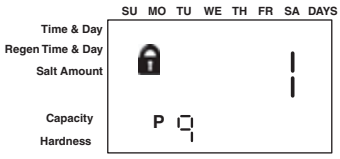
P9 = Units of measure

P10=Clock mode

To enter Level II (Professional Programming) and change a setting:

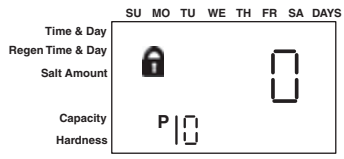


Action	Key	Duration	Display
Enter Level II programming	UP and DOWN	5 Sec.	P1 display
Return to operation	UP and DOWN	5 Sec.	Time and day of week
Increment through menus	UP or DOWN	P/R	Next parameter display
Enable setting to be changed	SET	P/R	Parameter will flash
Change value	UP or DOWN	P/R	Value changes
Save setting	SET	P/R	Records value and next parameter is displayed



English/Metric - P9 (Only accessed in Professional Level)

This setting is entered automatically at first power-up. The North American controller will default to English units. The World controller senses the electrical input and determines English or metric units. 0 is English units, 1 is metric units. Use the arrow buttons to change this setting. Press SET to accept the setting.



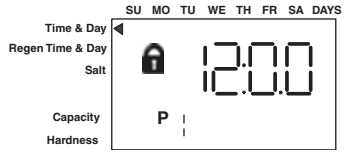
12 hour clock/24 hour clock - P10 (Only accessed in Professional Level)

This setting is entered automatically at first power-up. The North American controller will default to English units. The World controller senses the electrical input and determines a 12 or 24 hour clock. 0 is 12-hour clock. 1 is 24-hour clock. Use the arrow buttons to change this setting. Press SET to accept the setting.

NOTE: Once SET is pressed in P10 the controller will change to treated water (normal operation) mode. The time of day is displayed and the colon is flashing.

To make changes:

- **Lock On/Off**



Settings locked in the Professional Level can be viewed in the Basic Level but not changed. To change the lock status of the displayed setting, push REGEN. This toggles the lock icon on and off. If the lock is illuminated or flashing in Professional Level, the parameter will be locked in Basic Level programming.

760 HISTORY LEVEL

This level displays settings and usage information that can be used to diagnose and troubleshoot the system

To enter the history level:

Action	Key	Duration	Display
Enter data mode	DOWN arrow and SET	5 Sec.	Value for HO
Scroll through history	UP or DOWN arrows P/R	P/R	Next history value
Reset value to factory default	SET	5 secs with value is displayed	Original factory default

History Data

	Description	Range
H0	Resin volume initial setting value	cubic feet or liters
H1	Days since last regeneration	0 - 255
H2	Current flow rate	0 - 47 GPM or 0 -177 Lpm
H3	Water used today in gallons/m^3 since Time of Regeneration	0 - 65536 gallons or 0 - 6553.6 m^3
H4	Water used since last regeneration in gallons/m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H5	Total water used since reset in 100s	0 - 65536 gallons or 0 - 6553.6 m^3
H6	Total water used since reset in 1,000,000	0 - 65536 gallons or 0 - 6553.6 m^3
H7	Average usage for Sunday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H8	Average usage for Monday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H9	Average usage for Tuesday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H10	Average usage for Wednesday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H11	Average usage for Thursday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H12	Average usage for Friday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3
H13	Average usage for Saturday in gallons or m^3	0 - 65536 gallons or 0 - 6553.6 m^3

When in history values mode a small "H" will be displayed in the lower left corner of the display. Next to the “H” will be the number that applies to the history value.

H0— System Resin Volume Setting

The Logix history value H0 displays the initial resin volume setting (programmed when the system was first set up.

If the value is incorrect and needs to be reset, press and hold SET for five seconds to reset the controller.

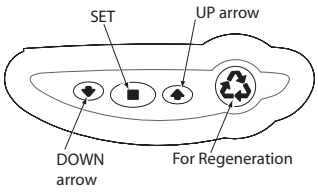
WARNING: Resetting the resin volume resets the entire controller back to the factory default. Only use if absolutely necessary. The control will need to be completely reprogrammed.

762 BASIC PROGRAMMING

NOTE: If a button is not pushed for thirty seconds, the controller returns to normal operation mode. Pushing the regenerate button immediately returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. "PM" is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock "PM" is not displayed.

To change a setting:



Action	Key	Duration	Display
Enter basic programming	SET	P/R	Will show day of week
Move to desired display	UP or DOWN arrows	P/R	Will increment through the displays
Enable setting to be changed	SET	P/R	Display will flash
Change setting	UP or DOWN arrows	P/R	Value changes and continues to flash
Save setting	SET	P/R	Display stops flashing
Return to operation	REGEN	P/R	Normal operation display

This level of programming is accessible by pressing SET.

The UP and DOWN arrows will step through the settings.

Time of day

Day of week

Time of regeneration

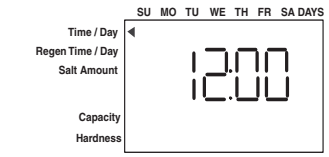
Number of days between regeneration (99 day calendar override timer)

Amount of regenerant used per regeneration or filter backwash time

System capacity

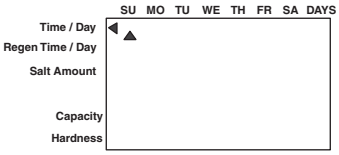
Hardness

To make changes:



- **Time of day**

  When the Time of Day is displayed, push SET. The time will flash. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.



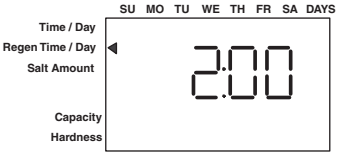
- **Day of the week**

  The day of the week does not have a default setting. It is entered at Power-up. To change the current day, push SET when day of week is displayed. A flag will flash beneath the current day. Use the arrow buttons to change. Push SET to enter the selection.

- **Time of regeneration**

  This is set for 2:00 AM as the default. The controller does not account for daylight savings time.

  To change this setting, push SET. Use the arrow buttons to increase/decrease the time. Push SET to enter the selection.

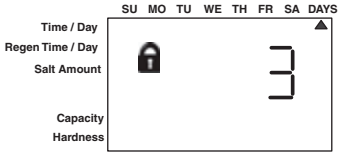


- **Calendar override**

  The controller can be programmed to regenerate automatically from a 1/2 (.5) day to a 99 day frequency.

  The 1/2 day regeneration mode will regenerate at the "time of regeneration", as well as 12 hours opposite from that time. For example, the controller will regenerate at 2 AM and at 2 PM on the same day.

  The default setting is three days. To change, push SET when this setting is displayed. Use the arrow buttons to increase/decrease. Push SET to enter the selection.



CAUTION: Setting days between regeneration to zero will cause the system to not regenerate. This setting is used for selecting regeneration on specific days or to use with a remote regeneration input. See below.

NOTE: Regeneration on a specific day is used to provide regeneration when water demands are not steady. Example: If the weekdays have low usage and the weekend is high, then regeneration every three days will not meet the requirements.

If the installation is a filter, skip to *Filter Backwash Time*. The amount of regenerant does not apply.

Amount of Regenerant used per Regeneration

The following table shows the estimated regenerant amount for each setting, as well as the estimated capacity of that regenerant setting for each resin amount.

The Logix 762. series controllers are set-up to automatically calculate the capacity of the system by multiplying the resin/media volume that was entered earlier into the controller, with the regenerant amount entered by the dealer/installer. This eliminates the need for salting efficiency tables.

The default setting is 9 lbs of salt per ft^3 of resin (110 grams/Liter).

Selecting the valve type will determine if standard efficiency or high efficiency exchange capacity will be used. The 278 and 298 valve settings will follow standard efficiency settings. The 255 and 268 valves will follow the high efficiency settings.

The Table 1 shows the estimated salt amount for each standard efficiency setting, as well as the estimated capacity of that salt setting for each resin amount.Table 2 shows the high efficiency settings.

Table 4 - Standard Efficiency Exchange Capacity

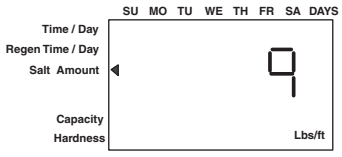
Regenerant lbs/cu ft	Exchange Capacity grains/cu ft	Regenerant grams/liter	Exchange Capacity grams/liter
3	12714	50	29.9
4	15495	60	34.0
5	17774	70	37.5
6	19661	80	40.6
7	21250	90	43.4
8	22618	100	45.9
9	23828	110	48.2
10	24930	120	50.2
11	25962	130	52.1
12	26950	140	53.8
13	27916	150	55.5
14	28873	170	58.5
15	29829	200	62.7
16	30796	230	66.9
17	31783	260	71.0
18	32806	290	75.3

Table 5- High Efficiency Exchange Capacity

Salt lbs/cu ft	Exchange Capacity grains/cu ft	Salt grams/ liter	Exchange Capacity grams/liter
3	15000	50	35.3
4	18000	60	38.0
5	20200	70	42.7
6	22000	80	45.4
7	22500	90	46.0
8	23000	100	46.7
9	24000	110	48.5
10	24930	120	50.2
11	25962	130	52.1
12	26950	140	53.8
13	27916	150	55.5
14	28873	170	58.5
15	29829	200	62.7
16	30796	230	66.9
17	31783	260	71.0
18	32806	290	75.3

Table 6

To Convert Capacity in	Into Capacity in	Multiply by
kilograms (kg)	kilograins (kgr)	15.43
kilograins (kgr)	kilograms (kg)	0.0648
moles of CaCO3	kilograms (kg)	0.10
equivalents of CaCO3	kilograms (kg)	0.05



To program the regenerant amount, press SET to enter the change mode. The 9 (lbs/ft^3) default will begin to flash. Use UP and DOWN to scroll through the available settings. Press SET to enter the amount.

- **Filter backwash time - when filter setting is chosen**

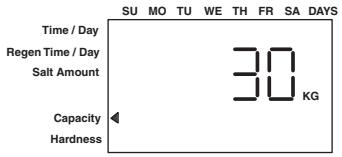
  If the system is set up as a filter, regenerant amount is unnecessary. The controller deactivates the regenerant amount setting, and changes to an adjustable backwash time in minutes.

  Press SET to change the time. The default time of 14 minutes will begin to flash. Use UP and DOWN to select the appropriate backwash time for the media type and amount used. The controller can use 0 to 99 minutes for backwash. Press SET again to enter that time.

  If using this controller as a filter, an alternate 762F faceplate overlay label is available that has the text "backwash time" instead of salt amount printed. See *Spare Parts* for the part number for this overlay label.

NOTE: If the controller was incorrectly set as a conditioner instead of a filter, press DOWN and SET for five seconds to display resin volume. Press and hold SET for five seconds to reset the resin volume to ---. Use the arrow buttons to increment the display to the filter valve type (263,273,293). Press SET.

- **Capacity**



The 762 controller is designed to estimate capacity of the system by multiplying the initial resin/media volume by the regenerant amount programmed in under "*Amount of regenerant used per regeneration".*

An estimated total system capacity is displayed in kilograins (kilograms CaCO3) that can be removed by the fully regenerated media bed. **This value is derived by standard water treatment industry norms**. The system capacity is displayed merely for the installers reference when determining regeneration frequency.

NOTE: Capacity is the result of the amount of media and the tank and the salt setting. The default capacity will be changed by selecting a different regenerant setting.

- **Hardness setting**

The hardness setting is set in grains per gallon (ppm $CaCO_3$). The hardness is divided into the total capacity setting, giving a total volume of water that can be conditioned before a regeneration is needed. To set, press SET when P8 is displayed, and use UP or DOWN to increment. Press SET again to accept the setting.

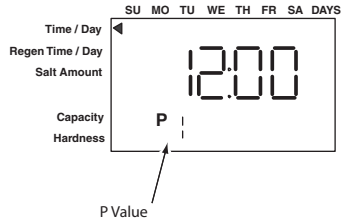
762 PROFESSIONAL PROGRAMMING

NOTE: If a button is not pushed for thirty seconds the controller returns to normal operation mode. Pushing UP and DOWN for 5 seconds returns the controller to normal operation.

NOTE: Any setting that is a time display will not show "AM" for times between 12:00 midnight and 12:00 noon. "PM" is displayed to the right of the time for times between 12:00 noon and 12:00 midnight. When using the 24 hour clock: "PM" is not displayed.

In this level all of the programming features of basic programming are available. In addition, the settings can be locked/unlocked.

A locked setting will display a lock icon when viewed in the basic level.



A locked setting is viewable in the basic programming menus but it cannot be changed.

When viewing a setting in this level the display will show a "P" value. This corresponds to the displayed setting.

Level II menus include:

P1 = Time of day

P2 = Day of week

P3 = Time of regeneration

P4 = Number of days between regeneration (99 day calendar override)

P5 = Not used (742 only)

P6 = Amount of regenerant used per regeneration or filter backwash time (salt setting)

P7 = System capacity

P8 = Hardness

P9 = Units of measure

P10 = Clock mode

P11 = Service interval

P12 = Remote regeneration switch delay

P13 = Salt detector (conditioner only)

P14 = Refill rate (conditioner only)

P15 = Draw rate (conditioner only)

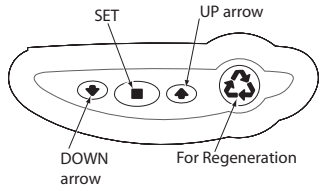
P16 = Reserve type

P17 = Initial average or fixed reserve

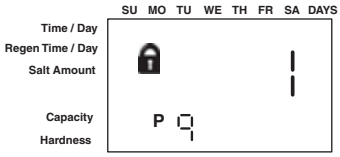
P18 = Flow sensor select

P19 = K-factor or pulse equivalent

To enter Level II (Professional Programming) and change a setting:

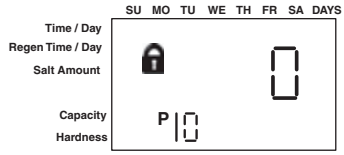


Action	Key	Duration	Display
Enter Level II programming	UP and DOWN	5 Sec.	P1 display
Return to operation	UP and DOWN	5 Sec.	Time and day of week
Increment through menus	UP or DOWN	P/R	Next parameter display
Enable setting to be changed	SET	P/R	Parameter will flash
Change value	UP or DOWN	P/R	Value changes
Save setting	SET	P/R	Records value and next parameter is displayed



English/Metric - P9 (Only accessed in Professional Level)

The controller senses the electrical input and determines English or metric units. 0 is English units, 1 is metric units. Use the arrow buttons to change this setting. Press SET to accept the setting.



12 hour clock/24 hour clock - P10 (Only accessed in Professional Level)

This setting is entered automatically at first power-up. The controller senses the electrical input and determines a 12 or 24 hour clock. 0 is 12-hour clock. 1 is 24-hour clock. Use the arrow buttons to change this setting. Press SET to accept the setting.

Service Interval - P11 (only accessed in Professional level)

The default setting is 0 months which can be changed up to 250 months. Use the arrow buttons to change this setting. Press SET to accept the setting.

Remote Regeneration Switch Delay - P12 (only accessed in Professional level)

When using the remote signal to start a regeneration this valve is used to determine the amount of time in seconds the signal must be active. Can be set from 3 to 250 seconds. The default setting is 60 seconds. Use the arrow buttons to change this setting. Press SET to accept the setting.

Salt Detector - P13 (only accessed in Professional level)

This setting is not used for filters. The default setting is 0. Set this to 1 if a salt detector is being used. Use the arrow buttons to change the setting. Press SET to accept the setting.

Refill Rate - P14 (only accessed in professional level)

This setting is not used for filters. The default setting is determined by the valve type and resin volume selected. This value has a range of 1 to 700. The value entered is in increments of gallons per minute times 100. Use the arrow buttons to change the setting. Press SET to accept the setting.

Drain Rate - P15 (only accessed in professional level)

This setting is not used for filters. The default setting is determined by the valve type and resin volume selected. This value has a range of 1 to 700. The value entered is in increments of gallons per minute times 100. Use the arrow buttons to change the setting. Press SET to accept the setting.

Reserve Type - P16 (Not used on 742)

This setting is used to set the type of media reserve and timing of the regeneration cycle. The range of the setting is 0 to 3.

Setting	Regeneration Type
0	Variable reserve with delayed regeneration
1	Fixed reserve with delayed regeneration
2	Variable reserve with immediate regeneration
3	Fixed reserve with immediate regeneration

Initial Average or Fixed Reserve - P17 (Not used on 742)

This setting is used with the settings for P16. Use P17 to set the amount of fixed reserve as a percentage of the capacity. The default settings is 30%. The range is 0 to 70.

Flow Sensor Select - P18 (Not used on 742)

For demand systems, this setting is used to establish the type of sensor used to calculate flow. The default setting is determined by the valve type and resin volume selected. The range is 0 to 5.

Setting	Flow Sensor Type
0	Internal Magnum NHWB
1	1-inch Autotrol turbine
2	2-inch Autotrol turbine
3	User defined K-factor
4	User defined pulse equivalent
5	Internal Magnum HWB

K-Factor or Pulse Equivalent - P19 (Not used on 742)

This setting is used with the settings for P18.

If P18 is set to 3:

The default K-factor setting is 0.01.

The range is 1.00 to 99.99.

If P18 is set to 4:

The default pulse equivalent setting is 1.

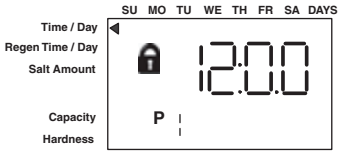
The range is 0 to 9999.

NOTE: Once SET is pressed in P10 the controller will change to treated water (normal operation) mode. The time of day is displayed and the colon is flashing.

To make changes:

- **Lock On/Off**

  Settings locked in the Professional Level can be viewed in the Basic Level but not changed. To change the lock status of the displayed setting, push REGEN. This toggles the lock icon on and off. If the lock is illuminated or flashing in Professional Level, the parameter will be locked in Basic Level programming.



762 HISTORY LEVEL

This level displays settings and usage information that can be used to diagnose and troubleshoot the system

To enter the history level:

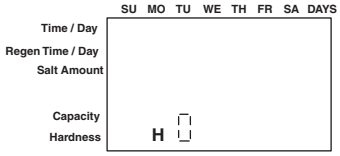
Action	Key	Duration	Display
Enter data mode	DOWN arrow and SET	5 Sec.	Value for H0
Scroll through history	UP or DOWN arrows	P/R	Next history value
Reset value to factory default	SET	5 Secs with value is displayed	Original factory default

History Data

	Description	Range
H0*	Resin volume initial setting value	cubic feet or liters
H1	Days since last regeneration	0 - 255
H2	Current flow rate	0 - 47 GPM or 0 -177 Lpm
H3	Water used today in gallons/m^3 since Time of Regeneration	0 - 1,300,000 gallons or 0 - 13,107 m^3
H4	Water used since last regeneration in gallons/m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H5*	Total water used since reset in 100s	0 - 999900 gallons or 0 - 9999 m^3
H6*	Total water used since reset in 1,000,000	4,294 x 10^6 gallons or 4264 x $10^4 m^3$
H7	Average usage for Sunday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H8	Average usage for Monday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H9	Average usage for Tuesday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H10	Average usage for Wednesday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H11	Average usage for Thursday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H12	Average usage for Friday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H13	Average usage for Saturday in gallons or m^3	0 - 1,300,000 gallons or 0 - 13,107 m^3
H14	Average service cycle	0 - 255 days
H15*	Peak flow rate	0 - 200 gpm or 1000 Lpm
H16	Day / Time of peak flow rate	Time of day that peak flow occurred
H17*	Months since service	0 - 2184 months

* H0, H5, H6, H15, H17 values can all be reset by pressing and holding SET for 3 seconds while they are being displayed.

When in history values mode a small "H” will be displayed in the lower left corner of the display. Next to the “H” will be the number that applies to the history value.



H0 — System Resin Volume Setting

The Logix history value H0 displays the initial resin volume setting (programmed when the system was first set up).

If the value is incorrect and needs to be reset, press and hold SET for five seconds to reset the controller.

CAUTION: Resetting the resin volume resets the entire controller back to the factory default. Only use if absolutely necessary. The control will need to be completely reprogrammed.

SECTION F—MAINTENANCE AND SERVICE

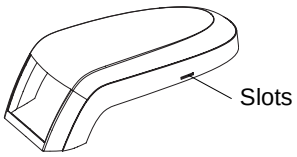
Section F includes instructions on servicing, maintaining, and cleaning the 255, 268, 263, 278, and 273 valves.

VALVE SERVICE

Cover

The cover provides protection for the controller, wiring, and other components. This cover will be removed for most service and maintenance.

When installed, the cover provides NEMA 3 water protection. This protects from falling water up to 30 degrees from vertical.



To remove cover:

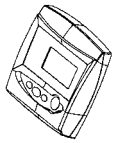
1. Grasp side edges toward rear of the valve.
2. Pull outwards until the slots in the cover clears the projections on the top plate.
3. Lift up on the rear and pull forward to clear the control module.

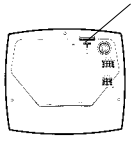
To install cover:

1. Position cover to be low in front and under the bottom edge of the control module.
2. The cover will hook on the bottom of the controller and drop down over the camshaft.
3. To finish, grasp the side edges and pull outward to clear the projections on the top plate.
4. Drop down until the cover snaps in place.

Electronic Control Module

The purpose of the electronic control module is to control the regeneration cycle. The control module has several variations. When replacing the controller, use the same model or some functions may not work. This is an electronic controller that is programmable and uses input/output signals.

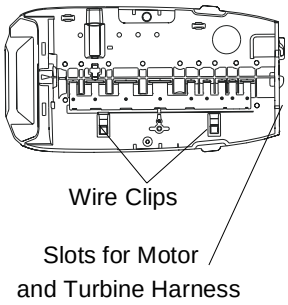




To remove control module:

1. Disconnect power to the unit.
2. Remove valve cover.
3. Press trip lever to release module from top plate.
4. Pivot the top forward and up.
5. Remove any wire connections. Wire connectors have a locking tab that must be squeezed before removing.

NOTE: There is no need to label the wires. The keyed connectors will only plug back into one site.



To install control module:

1. Be sure the power is disconnected.
2. Check model.
3. Check routing of wires and plug them into the controller. Connectors will snap in place. Be sure that wires are properly managed through the clips on top plate. This will prevent the wires from being caught in the camshaft.
4. Place bottom of module in position. The bottom will fit into a clip.
5. Pivot the top into position and snap in place. The controller should be secure.

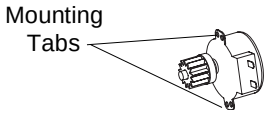
   If you are ready to program the controller, then power can be applied by plugging in transformer.

Drive Motor

The drive motor is open loop and receives commands from the control module. The motor has a pinion gear that meshes with the camshaft gear to drive (rotate) the camshaft.

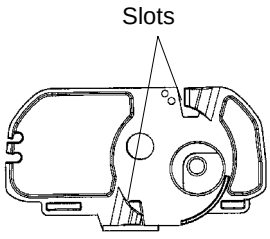
During operation, rotation forces the motor into its mounting position and screws or bolts are not needed.

NOTE: Some units will have a shipping peg in the top motor mount. The peg can be removed and discarded. This peg is not required for motor operation.



To remove motor:

1. Disconnect power to the unit.
2. Remove cover.
3. Pull off wiring connector.
4. Grasp the motor body and rotate counterclockwise.
5. Pull motor out.



To install motor:

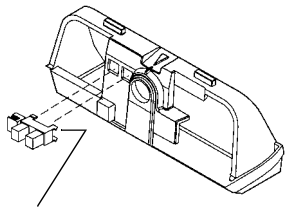
1. Insert gear through hole on top plate and mesh with camshaft. Cam may need to be rotated slightly.
2. With motor ears flat to the rear of the top plate, rotate clockwise until mounting tabs are engaged in slots.
3. Reconnect wires.

NOTE: It is not necessary to pre-position the camshaft or the motor. When the controller is powered up the camshaft will be rotated to the "home" position.

Optical Sensor

The optical sensor is mounted to the top plate. The camshaft cup rotates through the sensor and the slots are detected. A signal is sent to the controller for each slot.

NOTE: Damaged sensors should be replaced. Sensors may be cleaned with compressed air or a soft brush.



Do not bend the legs on the optical sensor

To remove optical sensor:

1. Disconnect power to the unit.
2. Remove cover.
3. Remove controller.
4. From the controller side, pinch the legs of the sensor holder in the top plate.
5. Pull the holder away from the mounting surface.
6. Remove wires.

To install optical sensor:

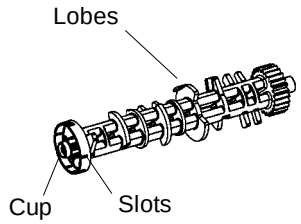
1. Attach wires. Wires should point away from camshaft.
2. Place leading edge of sensor holder into opening.
3. Pivot holder into place. Legs should enter slots and snap in place.

WARNING: The optical sensor legs are fragile and may break. If the optical sensor legs break or crack, we recommend replacement. A damaged sensor may result in improper regeneration.

Camshaft

The camshaft has several lobes that push open the valve discs as the camshaft rotates. Rotation is controlled by a drive motor that drives a gear at the rear of the camshaft. The front end has a cup with markings and slots.

WARNING: The camshaft slots are molded to exact dimensions. Do not attempt to modify the cam cup slots. Improper regen will occur!



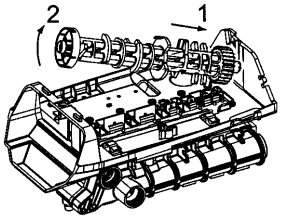
The outside surface of the cup has an arrow mark. When the arrow is at top center, the camshaft is in the loading position. 90 degrees clockwise on the cup an optical sensor is mounted to the top plate. This sensor reads the slots as they pass through. The largest slot is “Home” and the remaining slots are positioned to signal the regeneration cycles.

When looking at the end of the camshaft, numbers are visible in the hollow of the cup. An arrow on the top plate points to the current marking. The numbers represent regeneration cycles as follows:

C0 =Treated water-normal operation mode
C1 = Backwash
C2 = Regenerant draw (not used in filter mode)
C3 = Slow rinse (not used in filter mode)
C4 = System pause
C5 = Fast rinse cycle 1
C6 = Backwash cycle 2 (not used in filter mode)
C7 = Fast rinse cycle 2 (not used in filter mode)
C8 = Regenerant refill (not used in filter mode)

These numbers are offset rotationally 90 degrees from the matching slot. The offset enables the service person to view the number at the top of the cup and determine which slot is at the optical sensor.

NOTE: If any part of the camshaft is broken or damaged the camshaft should be replaced. Do not repair or modify damaged cam lobes, gears or timing cup.



To remove camshaft:

1. Disconnect power to the unit.
2. Remove cover.
3. Remove motor.
4. Camshaft should be in the treated water position. Rotate counterclockwise as needed.
5. Use a screwdriver to hold open the #1 valve disc.

NOTE: When replacing/removing camshaft, make sure not to damage or mis-align the optical sensor. Hold the sensor in position while removing camshaft.

6. Move the camshaft backwards, away from the controller.
7. Lift the loose front end up and out.

To install camshaft:

1. Check that the optical sensor is in position.
2. Position camshaft above the valve discs. The arrow on the cup should be up.
3. Slide the rear of the camshaft into place.
4. Pivot the camshaft close to its final position.

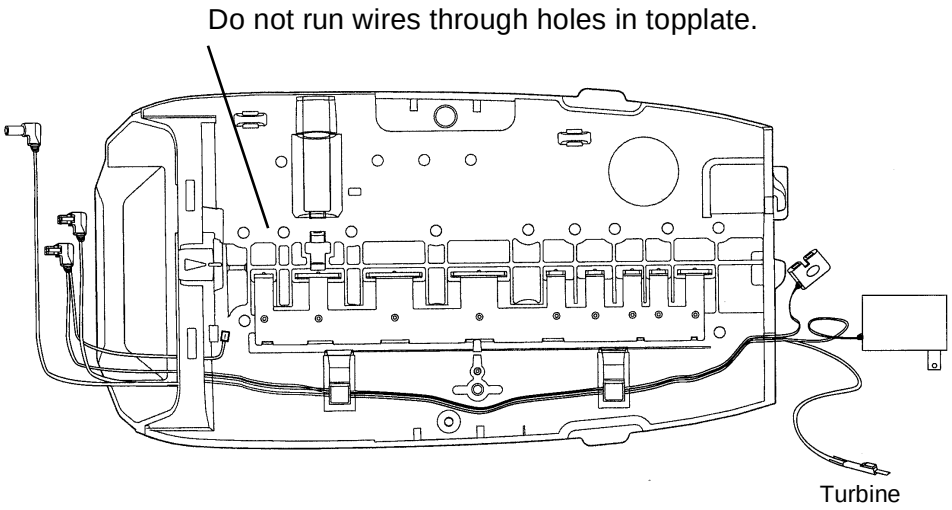
   The camshaft will push on one or more valve discs. You will feel resistance as you complete the installation.
5. Move the camshaft down and into position. Force valve discs to move as needed.
6. Move the camshaft forward. Check that the optical sensor is in position.
7. Install motor.

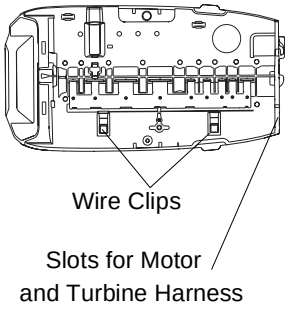
NOTE: The camshaft will position itself to C0 (treated water) when the controller is powered up.

Wiring Harnesses

The wiring harnesses are designed to fit one way. The connectors are unique to the port they plug into. The wires are held in place by clips and the connectors latch in place.

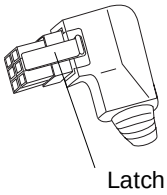
Figure 1 - Wire Harness Routing





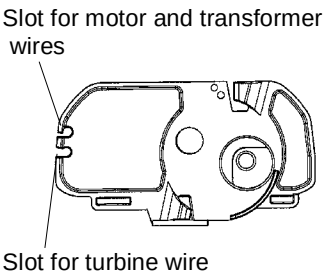
To remove a wiring harnesses:

1. Disconnect power to the unit.
2. Remove cover.
3. Remove controller.
4. Remove connections by squeezing the latch on the connector and pulling out.
5. Pull the harness out of the clips on the top plate.



To install a wiring harness:

NOTE: Start at the back of the valve and work toward the controller. This will place any slack behind the controller. Slack or loose wires can become tangled in the camshaft.



1. Depending on which harness is being installed, plug the connector into the motor or turbine.
2. Route the harness through the opening at the back of the top plate.
3. Place the harness into the clips on the top plate. Do not leave any slack. Put the motor wire in first, then the turbine sensor cable second.
4. Feed the wire through the opening on the front of the top plate.
5. If installing the motor harness the connector to the optical sensor can be clipped in place.
6. Connect the harness to the back of the controller.

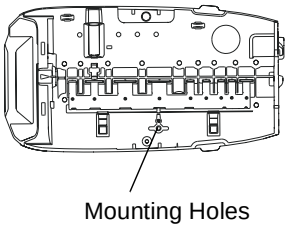
NOTE: If using both a motor and turbine cable harness, install the smaller motor cable first. Install the larger turbine cable second. This will lock the motor cable beneath in the wire management clips.

Microswitch (Optional Under the Cover)

The microswitch is located under the cover and is screwed to the top plate. This switch is turned on/off by a cam lobe on the camshaft. Its function is to signal that the unit is in-service or out-of-service (regenerating).

Microswitches are available as kits from GE Water Technologies, or a standard microswitch can be used as well.

WARNING: This switch will normally control an event on another piece of equipment. Be certain of what effect your actions will have on the other equipment.



To install microswitch:

1. Connect wires.
2. Use self-tapping screws to secure the switch base to the blind boss top plate.
3. Adjust microswitch distance to cam.

NOTE: Proper procedure for replacing a self-tapping screw:

A. Drop screw into hole.

B. With a screwdriver, back the screw up (counterclockwise) until the threads click.

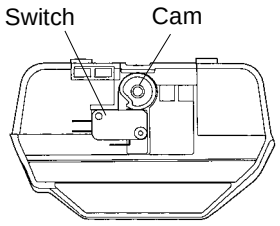
C. Rotate the screw forward (clockwise) until finger tight.

WARNING: The Autotrol valve is rated for low voltage (less than 48 volts) microswitch components only. Using a high voltage switch may result in damaged valves or fire and may interfere with electronic control function.

To remove microswitch:

1. Disconnect power to the switch.
2. Remove cover.
3. Unscrew switch base from top plate.
4. Disconnect wires.

Microswitch (Optional - Front of Camshaft)



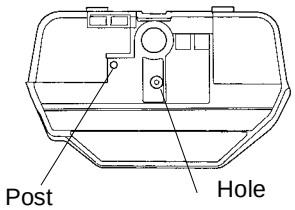
This microswitch is mounted behind the controller at the front end of the camshaft. The switch is mounted to the top plate. The cam for this switch is screwed to the front of the camshaft. This cam can be adjusted to activate the microswitch at any time during the regeneration cycle.

The front end cam switch is available as a kit from GE Water Technologies.

WARNING: This switch will normally control an event on another piece of equipment. Be certain of what effect your actions will have on the other equipment.

To remove microswitch:

1. Disconnect power to the switch.
2. Remove cover.
3. Remove controller.
4. Unscrew switch from top plate.
5. Disconnect wires.



Optional Microswitch Mount

To install microswitch:

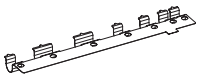
1. Connect wires.
2. Screw switch base to top plate using the switch guide pin over screw boss.
3. Attach the switch cam to front of the camshaft with a self-tapping screw. Adjust to the appropriate cycle and tighten.

NOTE: The cam for this switch is adjustable. To have the microswitch activate at a different point in the cycle, rotate the cam as needed. To rotate the cam loosen the center screw, tighten when the cam is in the new position.

Spring (Valve Discs)

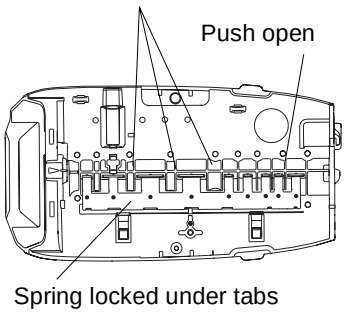
This spring is a one-piece metal spring that applies pressure to the valve discs holding them closed. The rotating camshaft overcomes this pressure to open the valve discs as needed. The shape of the spring is critical for proper operation.

WARNING: Do not attempt to straighten or repair this spring. If this spring is damaged, valve discs may not operate correctly.

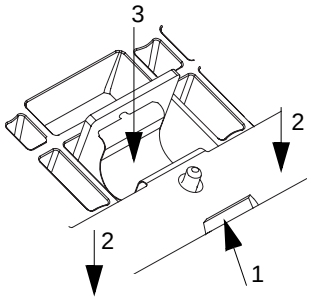


To remove spring:

1. Disconnect power to the unit.
2. Remove cover.
3. Remove motor.
4. Remove camshaft.
5. Place unit in bypass.
6. Release water pressure by pushing the last valve discs open with a screw driver.



7. Locate valve discs 2, 3 and 4 for 255 valve or valve discs 3, 4 and 5 for Performa valves.
8. Position yourself on the spring side of the valve discs.
9. Place two (or more) fingers on the flat part of the spring.
10. Move the fingers toward the valve discs and into the spring valley between the previously located valve discs.
11. By pulling back and up on the spring, the spring will pop out of the valley.
12. Pull back further to remove the spring.



To install spring:

1. Inspect the spring for damage. Do not attempt to repair a bent spring.
2. Position yourself on the spring side of the valve discs.
3. Position the spring over the valve body close to final position. The wide spring segments will be located at the wide valve discs. The curve of the spring will be down into the valley.

   The long flat close edge is inserted first. This edge slides into a channel on the valve body.
4. Rock the spring back and place the flat edge into the channel.
5. Lower the springs until they rest on top of the valve discs.

   A tool (phillips screwdriver) will be needed to push the springs in place.

   The spring posts will guide the spring into position.
6. Hold the flat part down with one hand.
7. Spread your fingers apart to cover the length and push down.
8. With the other hand use the tool to push down in the valley of each spring segment.

The spring will slide off the top of the valve disc downward. The small projection on the end of the spring will drop into the hole in the valve disc to provide secure positioning. Repeat for all spring segments.

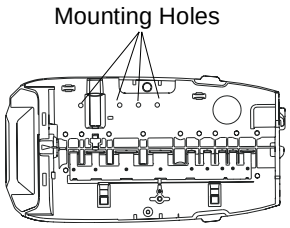
NOTE: If a spring segment goes beyond the locating hole, it can be pulled back using a small flat blade screwdriver.

NOTE: In high pressure (80 psi and higher) applications, the standard single valve disc springs can be installed on top of the one piece spring.

Relay (Optional)

WARNING: The Autotrol valve is rated for low voltage (less than 48 volts) microswitch components only. Using a high voltage switch may result in damaged valves or fire and may interfere with electronic control function.

Holes are provided to mount a standard relay. It is located under the cover on the top plate. This relay is wired to the controller and changes the digital signal from controller into a signal that can be used to run accessories.



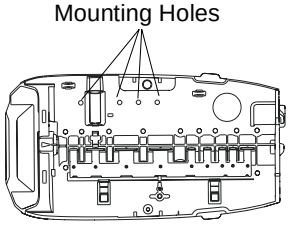
To install relay:

1. Disconnect power to the unit.
2. Remove cover.
3. Remove controller.
4. Use self-tapping screws to secure the relay to the left side of top plate. Screw bosses are available for connecting relay.
5. Connect wires to the controller.
6. Clip wires with plastic tie-wrap to ensure that the wires do not tangle in camshaft.

Terminal Block (Optional)

WARNING: The Autotrol valve is rated for low voltage microswitch components only. Using a high voltage switch may result in damaged valves or fire and may interfere with electronic control function.

Holes are provided to mount standard terminal blocks. The location is under the cover on the top plate.

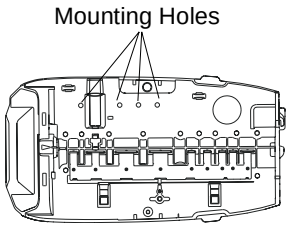


To install terminal blocks:

1. Disconnect power to unit.
2. Remove cover.
3. Use self-tapping screws to secure terminal block to top plate.
4. Clip wires with plastic tie-wrap to ensure that the wires do not tangle in camshaft.

Transformer (Optional)

A transformer is available to be mounted under the cover. Holes are provided on the top plate for a standard 24 VAC to 12 VAC transformer. This type of transformer is used when the plug-in AC adapter is not acceptable.



To install transformer:

1. Disconnect power to unit.
2. Remove cover.
3. Use self-tapping screws to secure transformer to top plate.
4. Clip wires with plastic tie-wrap to ensure that the wires do not tangle in camshaft.

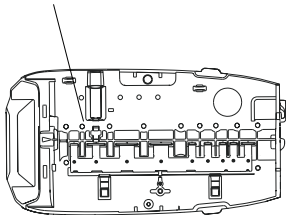
Top Plate

The top plate holds the valve discs in place during operation. This plate is removed to allow cleaning and replacing the valve discs.

NOTE: The Autotrol valve discs are made from a chloramine resistant severe service rubber. The valve discs will usually not need to be changed. Before removing the top plate for valve disc service be certain that one of the discs is not operating correctly.

To remove top plate:

1. Disconnect power to unit.
2. Remove cover.
3. Remove motor.
4. Remove camshaft.
5. Place unit in bypass.
6. Release water pressure by pushing the last valve disc open with a screwdriver.
7. Any optional items may be removed.
8. Wiring harnesses should be removed.
9. Remove valve disc and spring.
10. Use a phillips screwdriver to remove the screws from the top plate.
11. Lift the top plate off. All the valve discs can be pulled straight out.



Inspect valve discs for wear. The sealing surface is the raised ridge on the underside of the top shoulder.

Check each valve disc cavity in the valve for debris. Remove any foreign objects before replacing the valve disc.

To install valve discs:

NOTE: If the valve disc fits properly in the cavity, it will work correctly.

1. Put the valve disc into the correct (based on shoulder size) valve port cavity. The metal end without rubber coating should be visible.
2. Push down on the shoulder to position the valve disc completely into the port cavity.

   The metal portion will be positioned straight up and the top of the shoulder will be level with the valve.

To install the top plate:

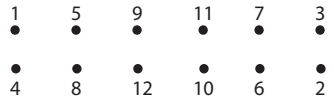
NOTE: All valve discs should be in position. Use the same screws that were removed to reassemble the top plate.

WARNING: Follow the procedure to engage the screws with the existing threads. If the same threads are not used, the holding power of the screw is lost. Under pressure the valve can leak. Screws that have the same diameter but have different threads should not be used.

1. Position the top plate on top of the valve and over the valve discs.
2. Insert a screw at one of the corner positions.

WARNING: This procedure for reinserting screws must be followed to ensure proper holding strength of the screws.

   A. Drop screw of same size and thread into the hole.
   B. Use a phillips screwdriver and lightly rotate the screw backwards (counterclockwise).
   C. When the thread of the screw and the thread of the hole match, the screw will “click” and slightly drop down.
   D. The threads are lined up. Lightly rotate the screw to tighten and engage threads.
   E. Once the threads have engaged the screw can be tightened. Minimal resistance will be present as the screw is turned in. Resistance indicates new threads are being formed. Back the screw out and rematch the threads.
3. Turn the screw in but do not tighten.



Screw Tightening Pattern

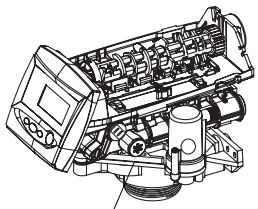
4. Place a second screw into the hole diagonally opposite the first screw and turn in but do not tighten.
5. Insert another screw into one of the remaining corners and turn it in.
6. The fourth screw goes into the hole diagonally opposite. Turn it in.
7. Put the remaining screws in following the same criss-cross pattern working from the ends toward the center. When all the screws are in place they can be tightened down.
8. Start at the corner of the screw pattern and tighten that screw. Work the same pattern from the ends toward center and criss-crossing as each screw is tightened. Check that each valve disc moves smoothly before replacing the spring and camshaft.
9. Replace spring.
10. Replace camshaft and motor.
11. Replace controller and wiring harnesses.

MAINTENANCE AND CLEANING—255, Performa (268, 263, 278, 273, Valves)

NOTE: Many of the maintenance procedures involve O-rings. When re-assembling two parts with an O-ring seal, care must be taken with the placement of the O-ring. To properly install O-rings they should be lightly lubricated with silicone. Place the O-ring over the part feature that will be inserted into the hole. Do not start the assembly with the O-ring in the hole.

Preventive Maintenance (255 and Performa Valves)

Injector Screen and Injector

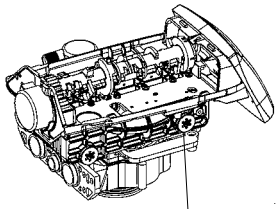


Injector and Cap

Inspect and clean brine tank and screen filter on end of brine pickup tube once a year or when sediment appears in the bottom of the brine tank.

Clean injector screen and injector once a year:

1. Unplug the wall-mount transformer.
2. Remove cover. Shut off water supply or put bypass valve(s) into bypass position.
3. Relieve system and valve pressure:
   A. For the 255 valve, use a screwdriver to press valve disc #5 slightly open. The pressure will escape quickly.
   B. For the Performa valve, use a screwdriver to press valve disc #7 slightly open. The pressure will escape quickly.
4. Using a T-50 torx driver (recommended), or large flat blade screwdriver, remove injector screen and injector cap.
5. Clean injector screen using a fine brush. Flush under running water until clean.
6. Using a needle-nose pliers, pull injector straight out.
7. Flush water into the injector screen recess of the valve body to flush debris out through the injector recess.
8. Clean and flush the injector with water. Inspect for any debris in the venturi.
9. Lubricate the O-rings on the injector, injector cap and injector screen with silicone lubricant only!
10. Reinstall the injector, injector cap and injector screen. Be careful not to crimp or bend the O-rings.



Injector Screen Filter

NOTE: 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 evident.

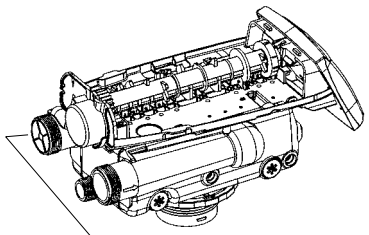
11. Plug the wall-mount transformer into outlet; reset clock if necessary.
12. Slowly open water supply valve or return bypass valve(s) to the “service” position.

Water Meter Maintenance

Demand Systems

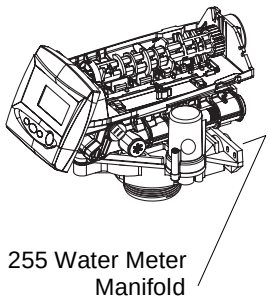
The Performa and 255 valve metering devices are used with the demand controls, and may require simple maintenance. In rare instances, the turbine wheel of the water meter can collect small particles of oxidized iron, eventually preventing the wheel from turning.

Performa Valve Water Meter



Performa Water Meter

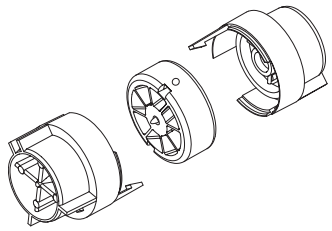
1. Shut off the water supply or put the bypass valve(s) into the bypass position.
2. Relieve pressure by opening the backwash drain valve (the seventh back from the controller) with a screwdriver.
3. Loosen and remove the pipe/tube adapters or bypass from the inlet and outlet of the valve body.
4. Using a needle-nose pliers, remove the turbine from the outlet housing. Grasp one of the four vanes of the outer gland and pull straight out to remove turbine assembly from the outlet of the valve.
5. Carefully remove the turbine wheel from the housing. Use a toothbrush to lightly scrub debris or iron off the magnet. Iron buildup on the surfaces can be removed by soaking the wheel in mild sodium hydrosulfite (such as RoVer*) solution for a few minutes. Flush thoroughly with water.
6. Carefully reinstall the turbine wheel into the turbine cage housing. Make sure that the shaft of the wheel seats into the bearing of the cage. Reassemble the turbine cage and check that the wheel rotates freely.
7. Reinstall the turbine cage into the outlet of the valve.
8. Reinstall the pipe/tube adapters or bypass to the inlet and outlet of the valve.
9. Turn on the water supply or put the bypass valve(s) into the service position and purge the air out of the system.
10. The system will require the startup procedure to be performed in order to operate appropriately.



255 Water Meter Manifold

255 Valve water meter

1. Shut off the water supply or put the bypass valve (s) into the bypass position.
2. Relieve system pressure by opening the backwash drain valve disc #5, with a screwdriver.



Turbine Assembly

3. Remove the four screws and nuts that are attaching the turbine manifold to the bypass valve or piping boss manifold. Pull the system away from the plumbing.
4. Using a needle-nose pliers, remove the turbine assembly from the outlet in the manifold. Grasp one of the vanes of the outer gland, and pull straight out to remove the assembly.
5. Carefully remove the turbine wheel from the housing. Use a toothbrush to lightly scrub debris or iron off the magnet. Iron buildup on the surface of the wheel can be removed by soaking the wheel in mild sodium hydrosulfite (such as RoVer*) solution for a few minutes. Flush thoroughly with water.
6. Carefully reinstall the turbine wheel into the turbine cage housing. Make sure that the shaft of the wheel seats into the bearing of the cage. Reassemble the turbine cage, and check that the wheel rotates freely.
7. Reinstall the turbine cage into the outlet of the turbine manifold.
8. Line the system up with the bypass or piping boss manifold. Verify that the O-rings are in place at the inlet, outlet and drain ports. Reattach the manifold using the four screws and nuts.
9. Turn on the water supply or put bypass valve(s) in the service (normal operation) position slowly, and allow air to purge from the system.
10. The system will require the startup procedure to be performed in order to operate appropriately.

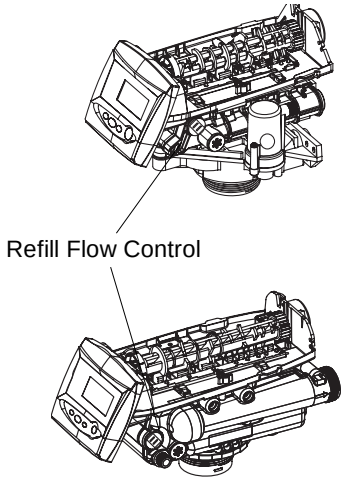
**RoVer is a trademark of Hach Chemical Company.*

Check Turbine Operation

After the turbine has been cleaned, verify that the turbine is accurately working. Repressurize the conditioner system, and verify that the controller is plugged in. Completely turn on a faucet that is plumbed after the conditioning system. After a few seconds, the display should be flashing a small faucet icon with water drops. If this is flashing, the turbine is operating properly.

If the faucet icon does not flash, then the system may have a faulty turbine probe cable wire harness. Replace that harness and repeat the steps above for checking for turbine operation.

Refill Flow Control

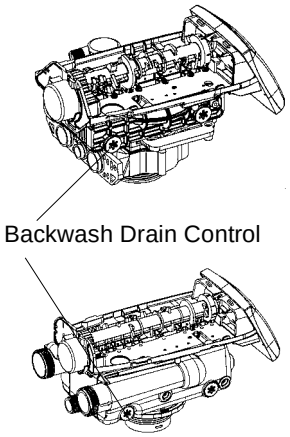


If the brine tank is not refilling correctly (too much or too little water) the refill flow control should be cleaned and inspected.

To clean the refill flow control:

1. Place unit in bypass. Relieve water pressure by pushing open one of the last two valve discs.
2. Remove cap.
3. Pull refill flow control parts out.
4. Inspect parts for damage.
5. Flush with water and clean with soft brush.
6. Replace refill flow control parts.
7. Replace cap (hand tight).

Drain Flow Control

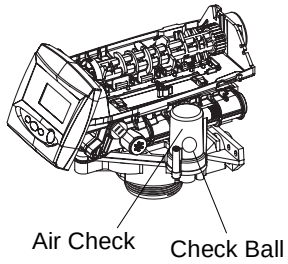


If the unit is not supplying conditioned water for as long as when it was first set-up, then the drain flow control should be cleaned.

To clean the drain flow control:

1. Place unit in bypass. Relieve water pressure by pushing open one of the last two valve discs.
2. Remove the drain flow control and ball.
3. Inspect parts for damage.
4. Flush with water and clean with a soft brush.
5. Orifice should be open not plugged.
6. Replace ball and drain flow control (hand tight).

Air Check - 255 only



The 255 valve has an air check chamber with a ball that seats itself at the bottom when the regenerant tank is empty of water. If the system is pulling in air or prematurely checking, the air check should be cleaned.

To clean the air check:

1. Place system in bypass.
2. Relieve water pressure by pushing open one of the last two valve discs.
3. Unscrew the clear top of the air check.
4. Remove the ball.
5. Flush with water and clean with a soft brush.
6. Inspect ball and O-ring for damage.

   The ball and the seat at the bottom of the air check must fit tightly together. If this seal has a gap then air will be drawn in during regeneration.

7. Place ball on seat.
8. Check O-ring on air check housing and place it in position.
9. Hand tighten screws. If you removed the regenerant draw hose, replace it.

AFTER SERVICE START-UP

Whenever the controller is unplugged or the system is put in bypass for maintenance, a start-up is required. This start-up is not normally as extensive as the new system start-up procedure needs to be followed.

The initial power-up procedure should be used if a new controller or a new valve has been installed. This procedure is explained in the users manual.

The following service start-up procedure can be used when the controller was programmed prior to servicing the unit and removing power. The unit should be fully assembled with the cover off.

To start-up after service:

1. Plug the transformer into the controller. Resin/media volume should not need to be entered. If the display is flashing three dashes and a decimal point, refer to initial power-up procedure.
2. Set time of day and day of week if necessary.

NOTE: Time of day and day of week settings are stored in a temporary memory and will be maintained at least 8 hours.

The display will flash four dashes and a colon if the time of day needs to be set. If the display shows the correct time, proceed to step 5.

3. The UP and DOWN arrows are used to set the time of day. When the correct time is displayed push SET. If using the 12 hour setting PM will be displayed behind the time. AM is not designated.
4. Use the UP and DOWN arrow buttons to move a small flag (box) at the top of the display under the day of the week. When the correct day is flagged push SET.

   The controller is ready to operate. The media tank should be ready for operation.
5. Hold the REGEN button on the controller down for five seconds. This will initiate a manual regeneration. The controller will indicate that the motor is turning the camshaft to the C1 cycle (Backwash) position. The display will show the total regen time remaining and the hourglass will flash when the motor is running.
6. Open the supply valve to the 1/4 open position. Any air in the media tank and valve will escape from the valves' drain line.
7. Open supply valve to full open.
8. Advance the controller to the Refill Position. From cycle C1 (Backwash), press and hold the SET button. This will display the current cycle. Press the UP arrow to advance to the next cycle.

Continue to advance through each cycle until you have reached cycle C9 (Refill).

NOTE: As you advance through each cycle there will be a slight delay before you can advance to the next cycle. The hourglass icon will flash while the camshaft is indexing to each cycle. There may be a pause at cycle C4 (System Pause). This cycle allows the water pressure to equalize on each side of the valve discs before moving on to the next cycle. The hourglass will flash indicating that the system is paused.

9. Allow a small amount of water to flow into the regenerant tank. Press SET and UP buttons simultaneously to advance to the treated water position.
10. Turn on a faucet and run the water until it is clear.

The unit is ready for operation.

CONTROLLER TROUBLESHOOTING

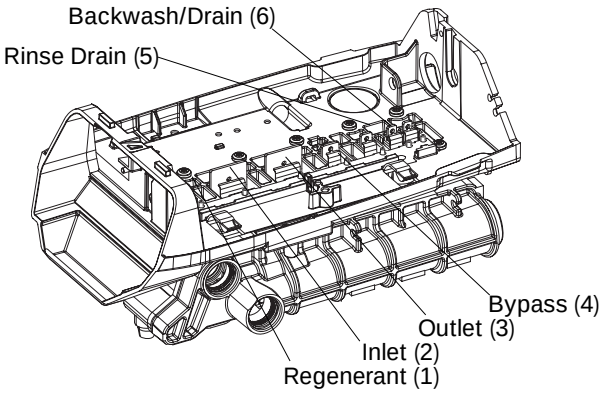
Problem		Solution
ERR 1 displayed	Controller power has been connected and the control is not sure of the state of operation.	Press the UP arrow and the control should reset.
ERR 2 displayed	Controller power does not match 50 or 60 Hz.	Disconnect and reconnect the power. If problem persists, obtain the appropriate controller for either 50 or 60 Hz power.
ERR 3 displayed	Controller does not know the position of the camshaft. Camshaft should be rotating to find home position.	Wait for 2 minutes for the controller to return to HOME position. The hourglass should be flashing on the display indicating the motor is running.
	Camshaft is not turning during ERR 3 display	Check that motor is connected. Verify that motor wire harness is connected to motor and controller module. Verify that optical sensor is connected and in place. Verify that motor gear has engaged cam gear. If everything is connected, try replacing in this order: — Wire harness — Motor — Optical sensor —Controller
	If camshaft is turning for more than 5 minutes to find HOME position:	Verify that optical sensor is in place and connected to wire. Verify that camshaft is connected appropriately. Verify that no dirt or rubbish is clogging any of the cam slots. If motor continues to rotate indefinitely, replace the following components in this order: — Optical sensor — Wire harness — Motor — Controller

SECTION G—255 VALVE SPECIFICATIONS

Section G includes the flow diagrams, exploded views and parts list for the 255 valves.

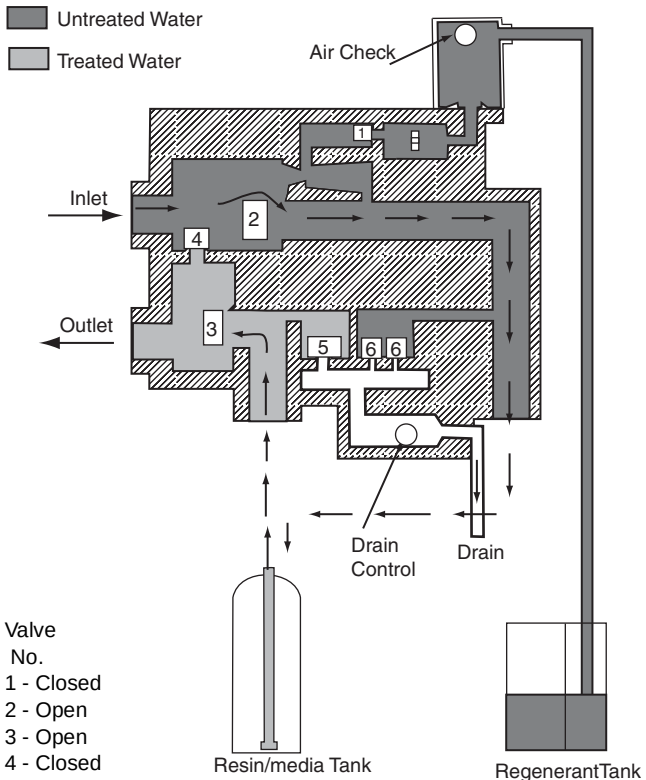
255 VALVE FLOW DIAGRAMS

Control Valve Identification



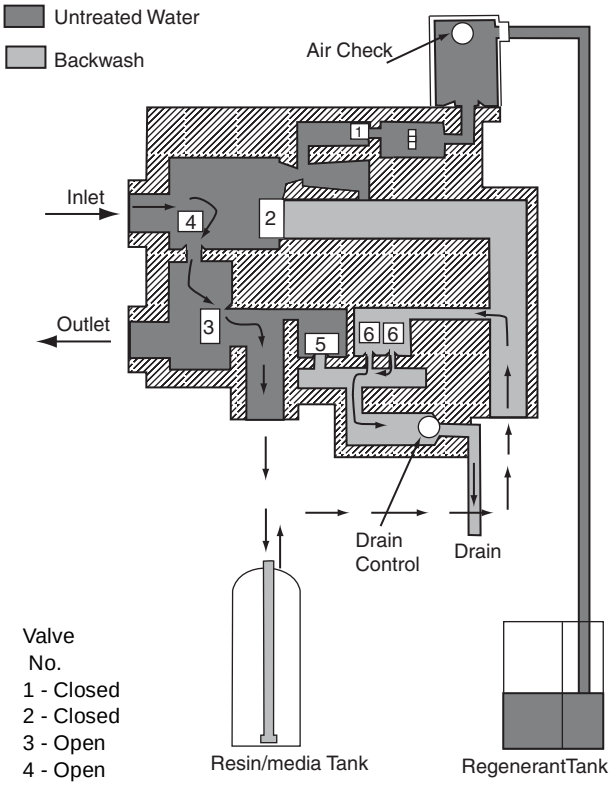
255 Valve Flow Diagrams

C0 Treated Water Position
(normal operation)



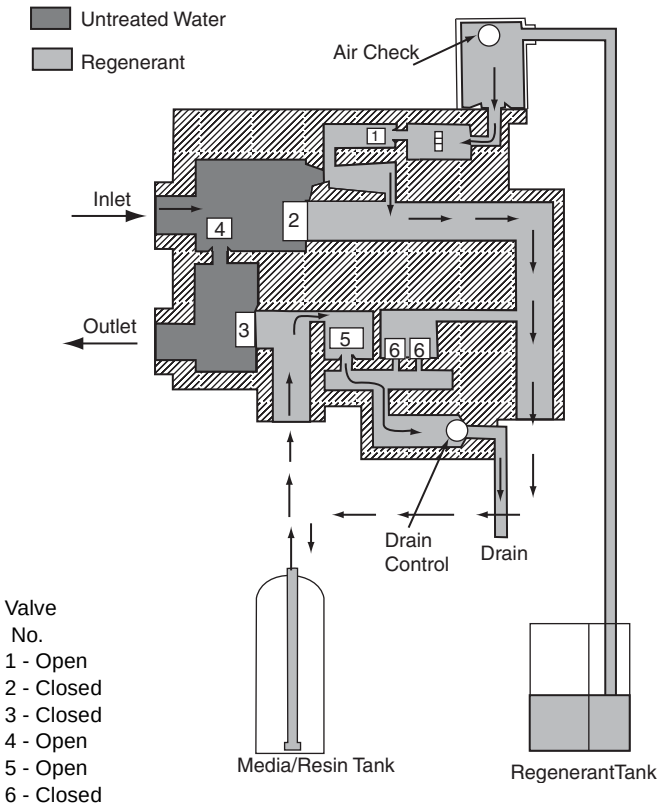
Valve
No.
1 - Closed
2 - Open
3 - Open
4 - Closed
5 - Closed
6 - Closed

C1 Backwash 1 Position



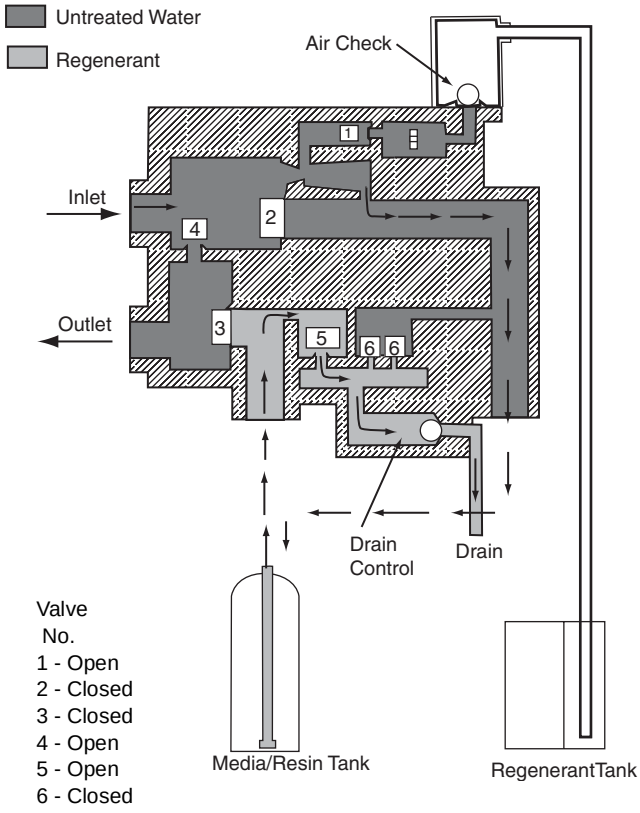
Valve
No.
1 - Closed
2 - Closed
3 - Open
4 - Open
5 - Closed
6 - Open

C2 Draw Position



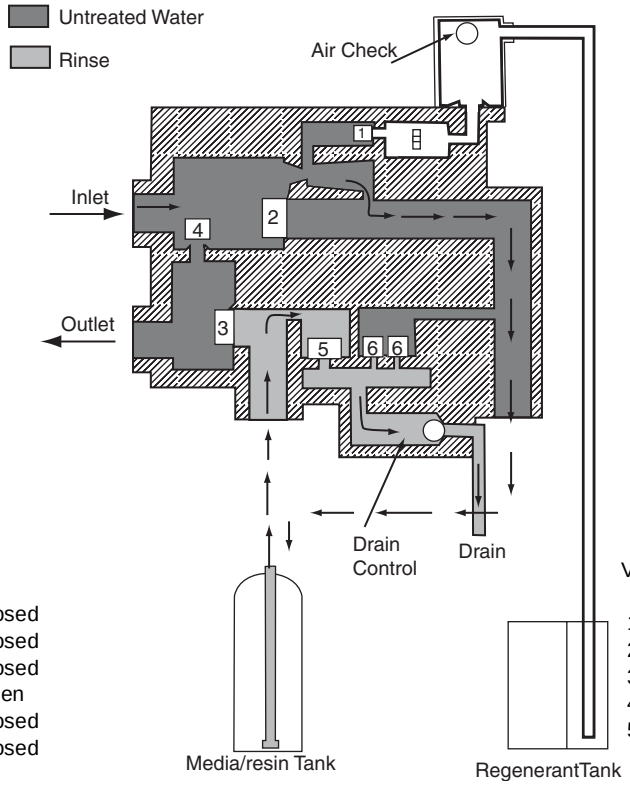
Valve No.
1 - Open
2 - Closed
3 - Closed
4 - Open
5 - Open
6 - Closed

C3 Slow Rinse Position



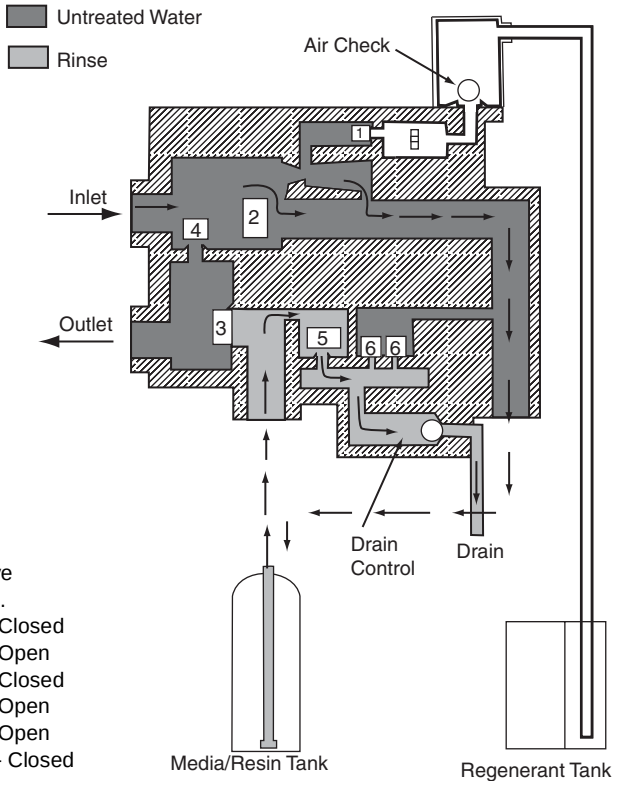
Valve No.
1 - Open
2 - Closed
3 - Closed
4 - Open
5 - Open
6 - Closed

C4 System Pause Position (repressurize)



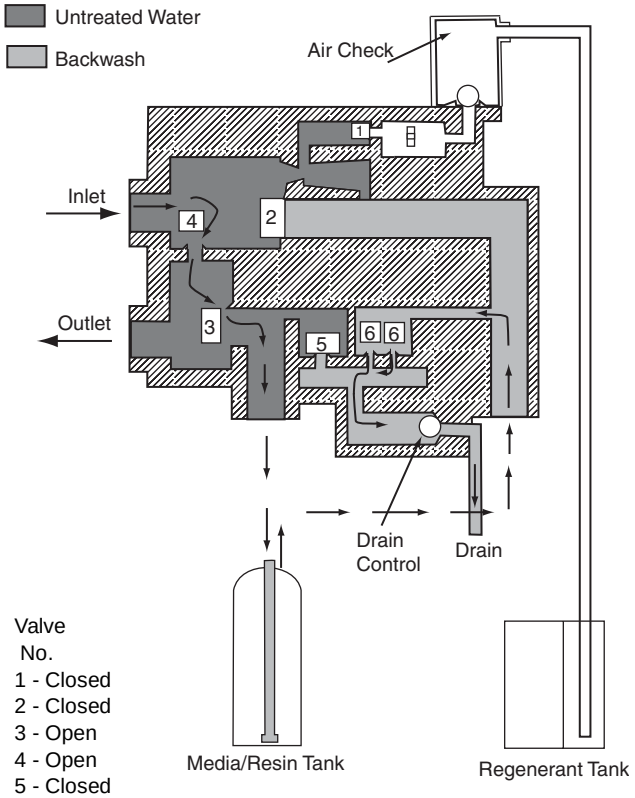
Valve No.
1 - Closed
2 - Closed
3 - Closed
4 - Open
5 - Closed
6 - Closed

C5 Fast Rinse 1 Position



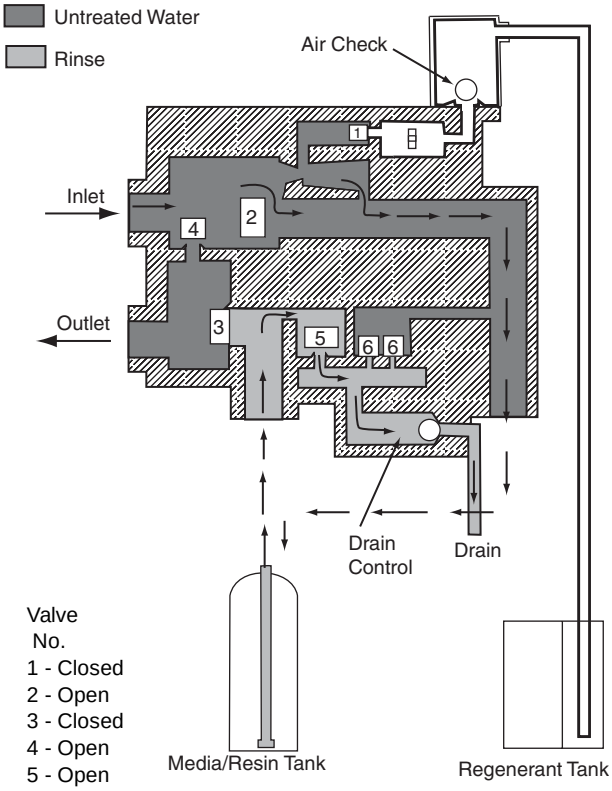
Valve No.
1 - Closed
2 - Open
3 - Closed
4 - Open
5 - Open
6 - Closed

C6 Backwash 2 Position



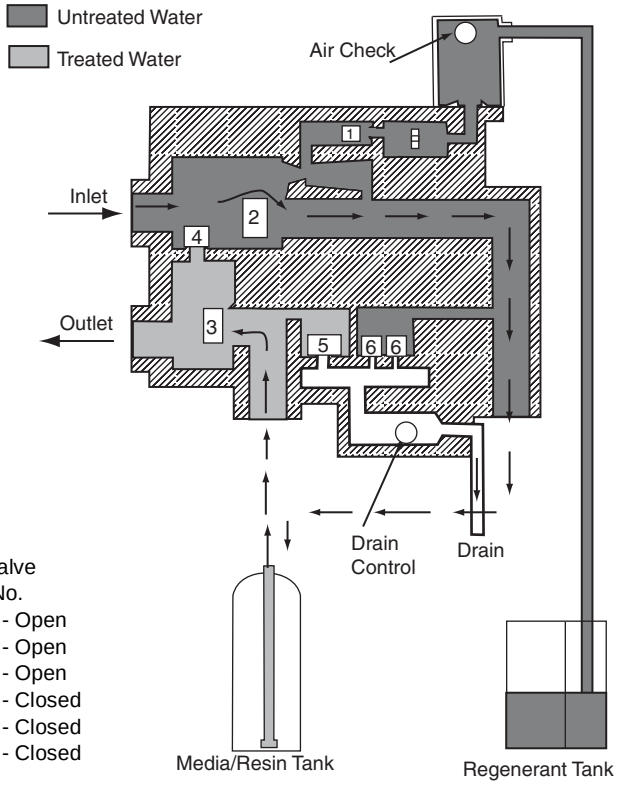
Valve No.
1 - Closed
2 - Closed
3 - Open
4 - Open
5 - Closed
6 - Open

C7 Fast Rinse 2 Position



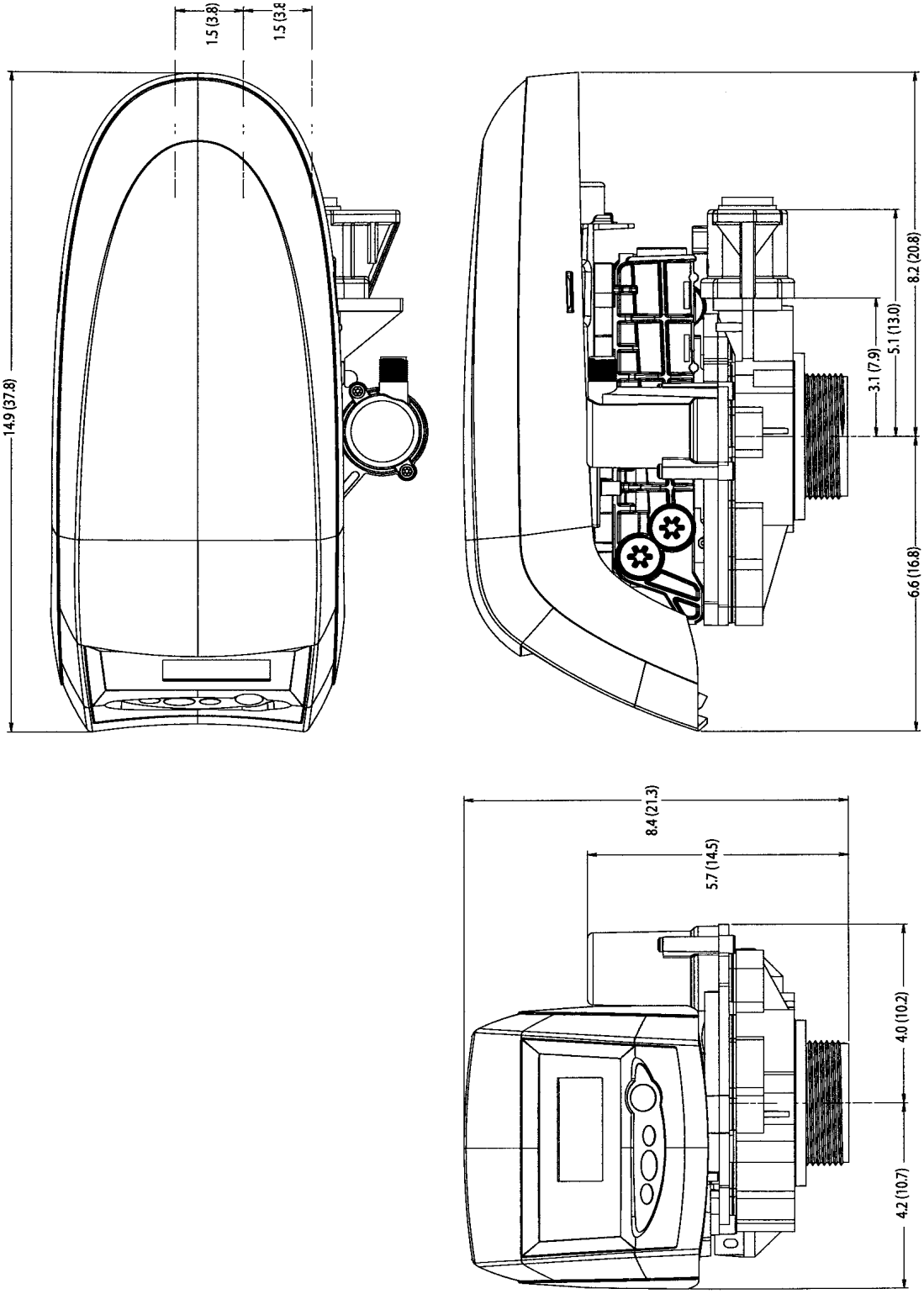
Valve No.
1 - Closed
2 - Open
3 - Closed
4 - Open
5 - Open
6 - Closed

C8 Refill

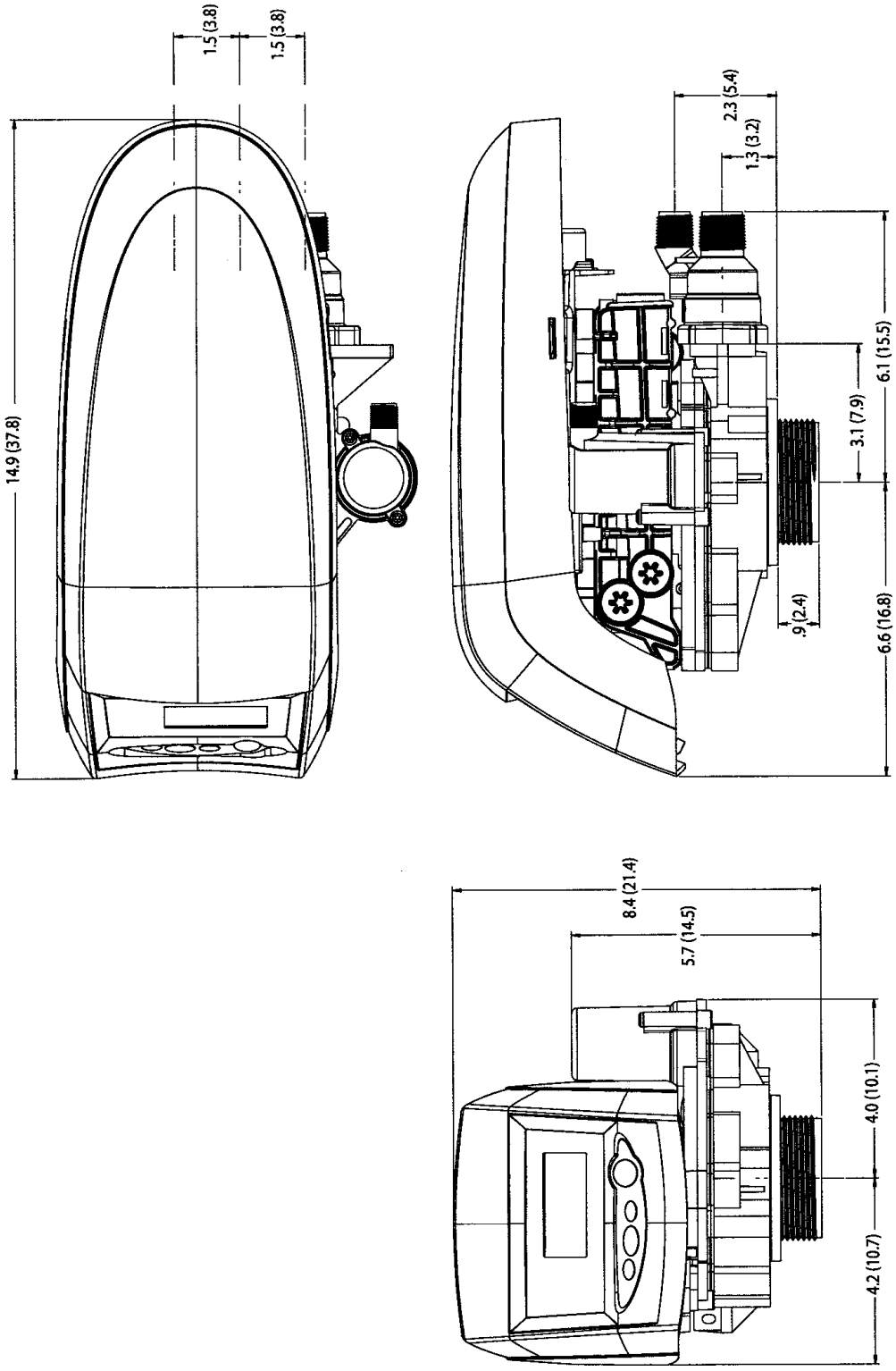


Valve No.
1 - Open
2 - Open
3 - Open
4 - Closed
5 - Closed
6 - Closed

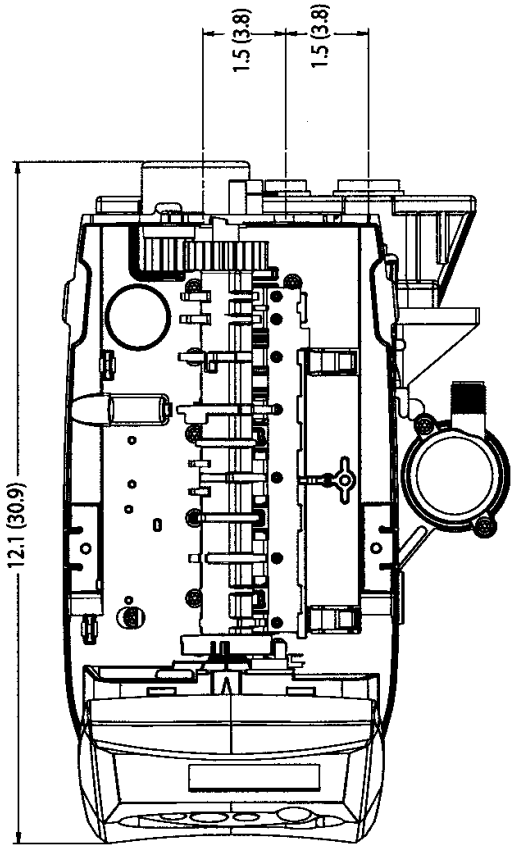
255 VALVE SPECIFICATIONS
With Turbine Manifold

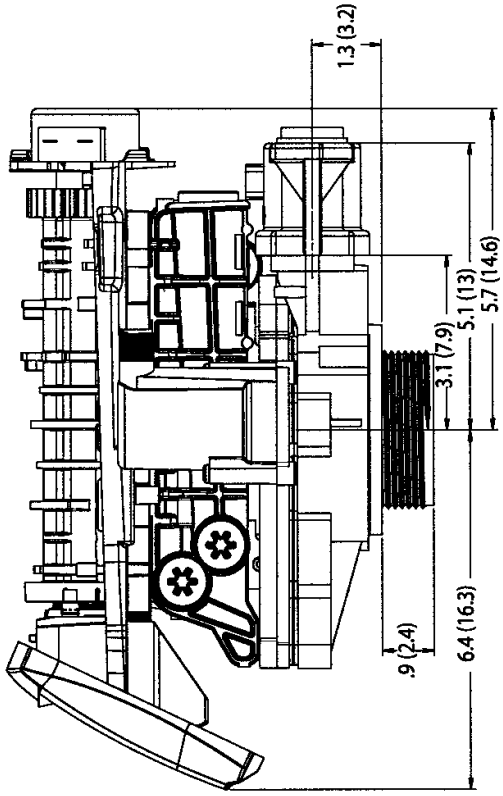


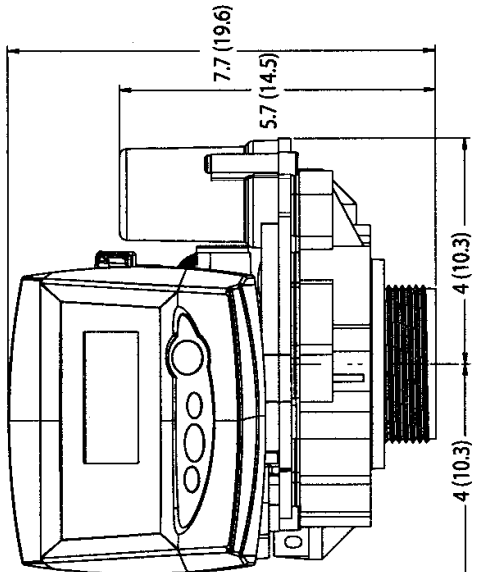
255 Valve with Male Manifold



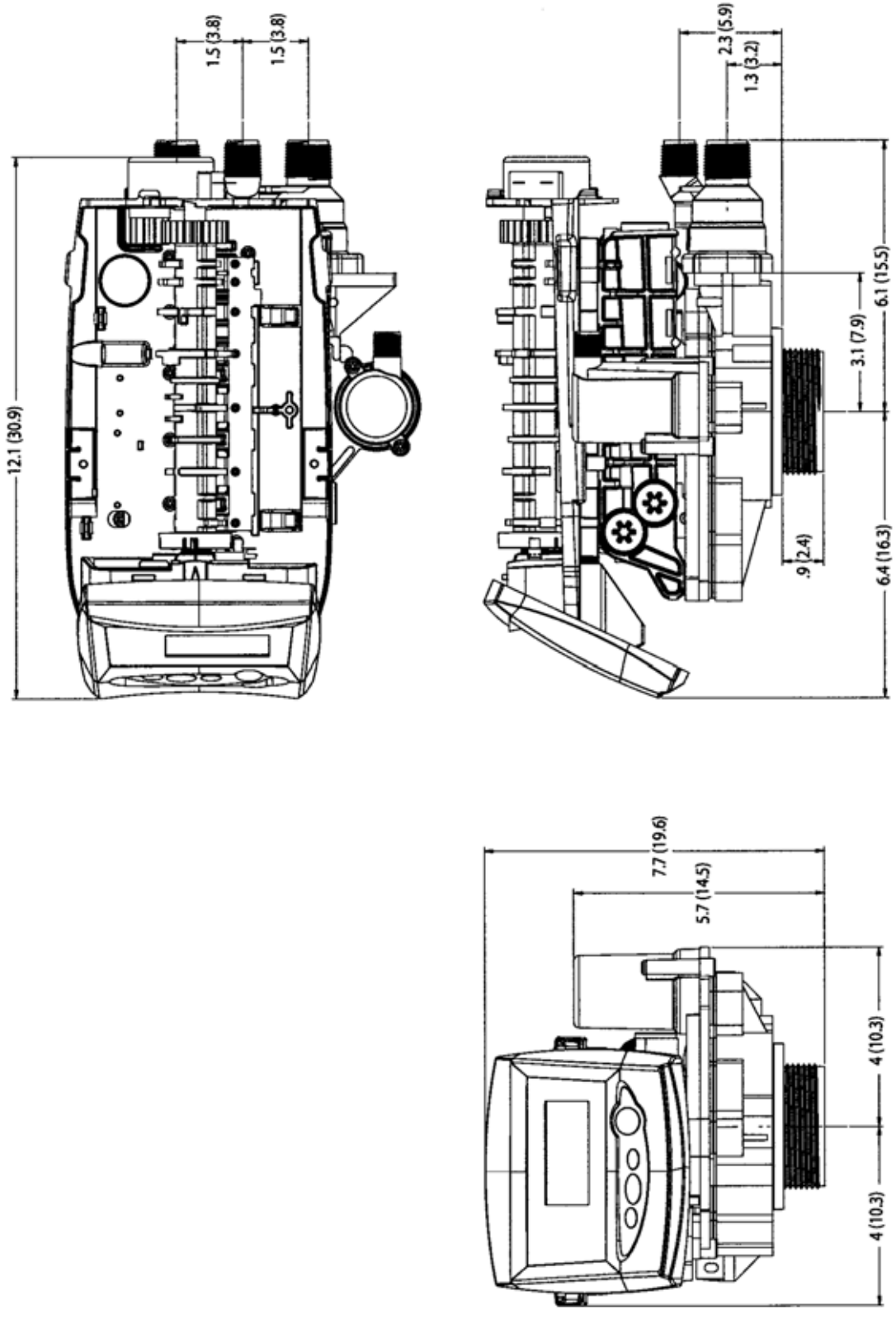
255 Valve with Turbine Manifold, No Cover



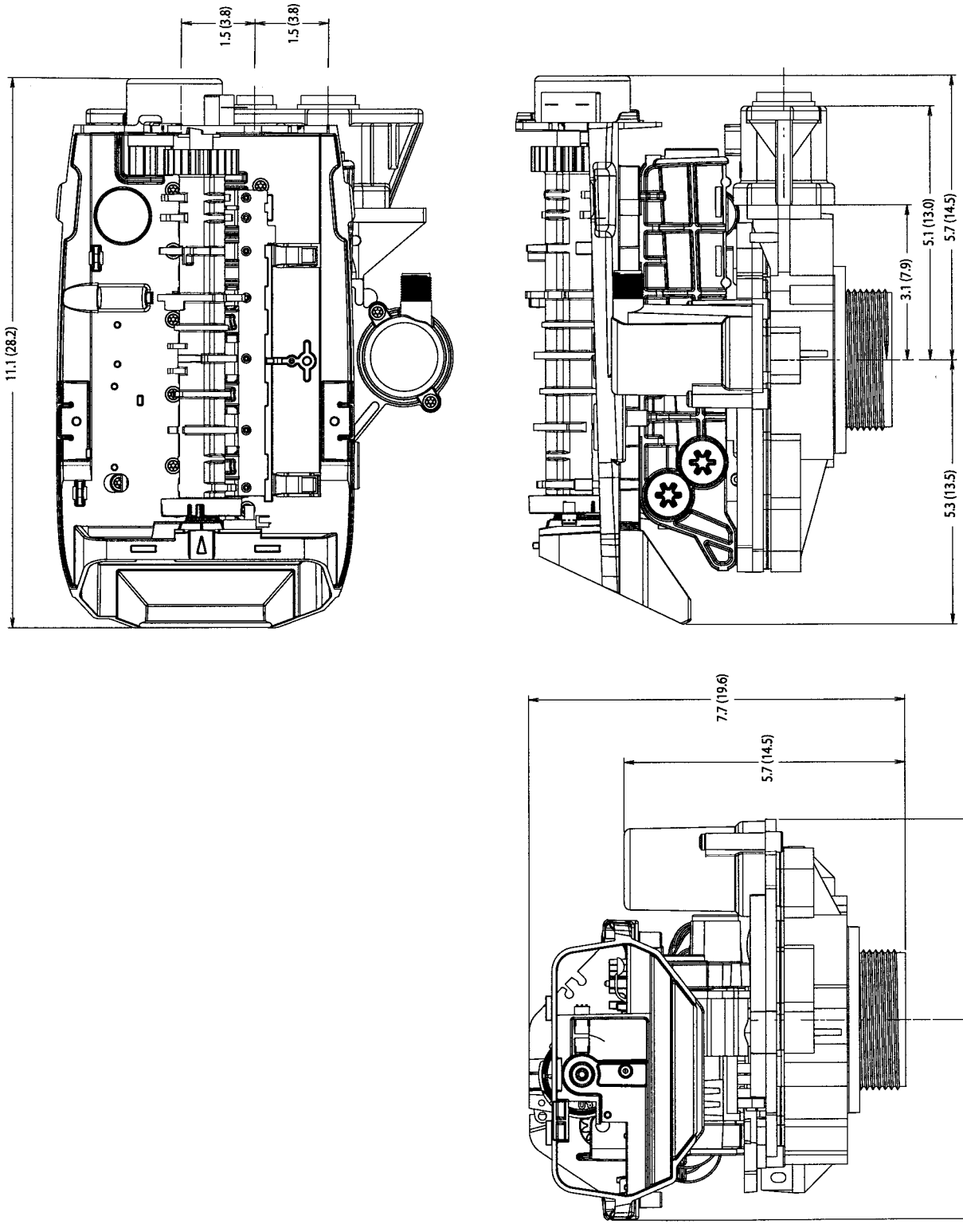




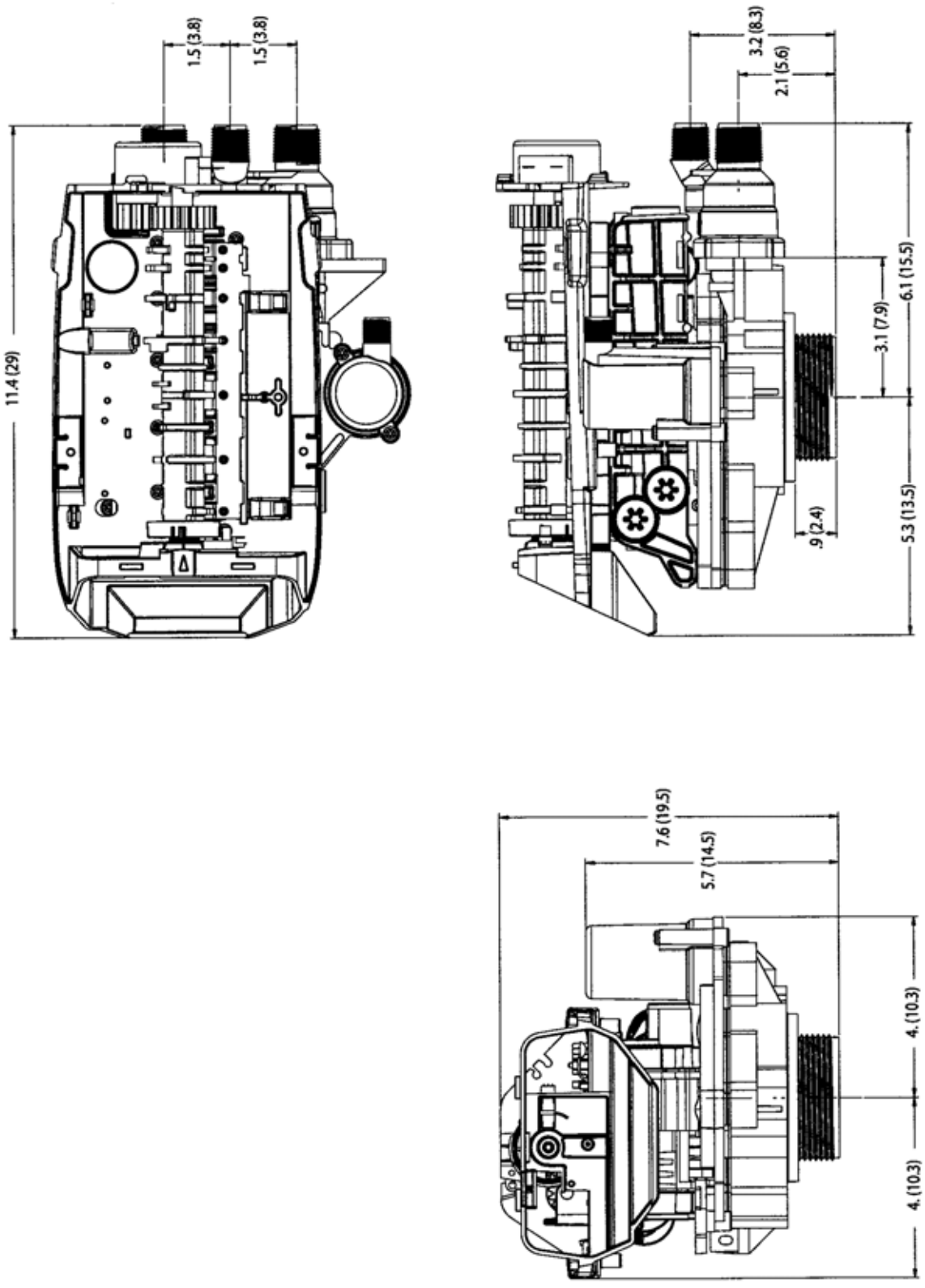
255 Valve with Male Manifold, No Cover



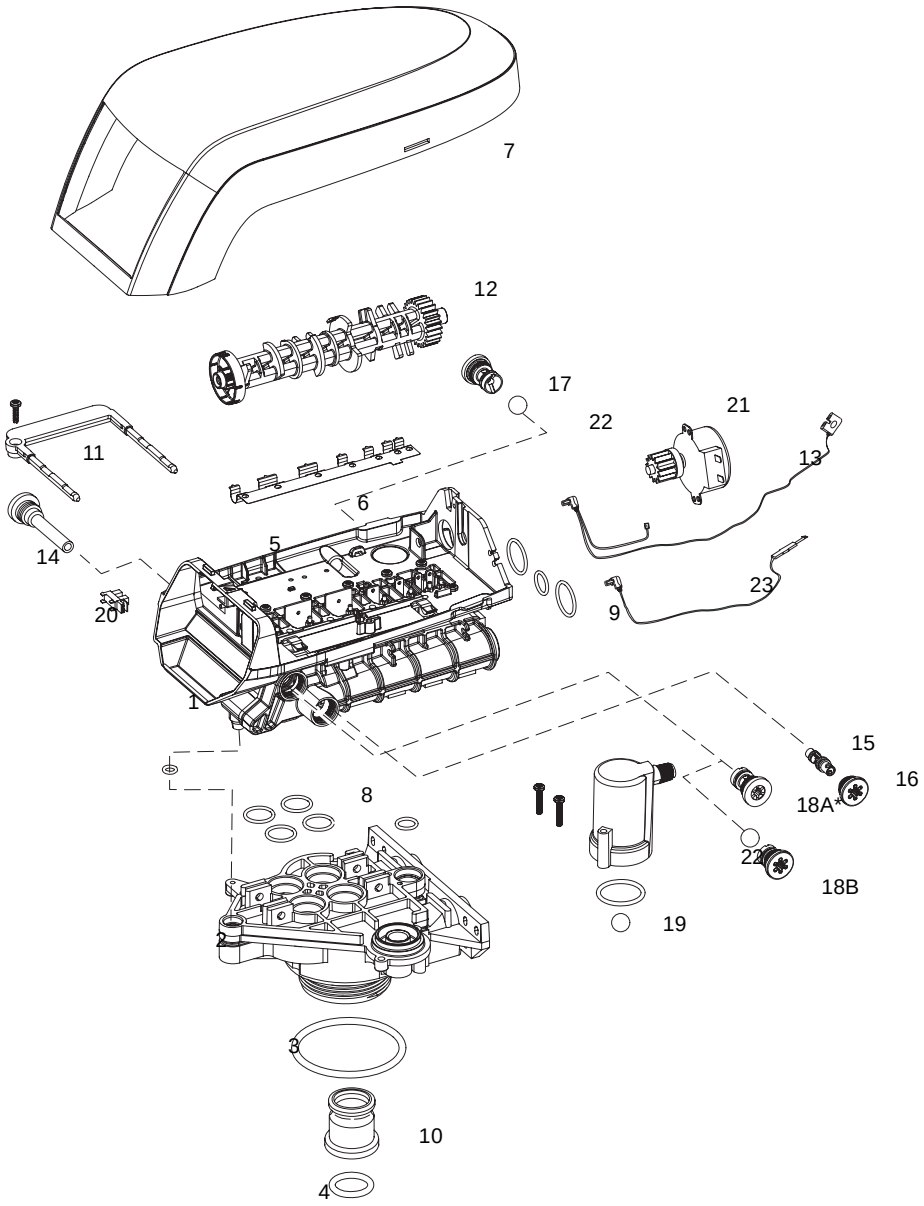
255 Valve with Turbine Manifold, No Cover, No Controller



255 Valve with Male Manifold, No Cover, No Controller



255 VALVE EXPLODED VIEW



*Warning: Do not use flow control ball with #18A.

255 VALVE PARTS LIST

Code	Part No.	Description	Qty.
1	1244650	255 Valve Assembly, w/o Flow Controls	1
2	1033784	255 Tank Adapter New Style	1
3	1010429	O-Ring BN	1
4	1010428	O-Ring EP	
5	1235340	Top Plate, 255 Valve, 700/860 Series Controller	1
6	1235341	Spring, One Piece, 255 Valve	1
7	1236246*	Cover, Valve, 255/Performa, 700/860 Series Controller	1
8	1001404	O-Ring Group: Tank Adapter	1
9	1040459	O-Ring Group: Piping Boss	1
10	1001986	13/16 inch Rubber Insert (Optional)	1
*	1000250	Valve Disk Kit - Standard	1
*	1239760	Blending Valve Kit 900/700 Series	1
11		Locking Bar	1
	1031402	English Language Locking Bar	
	1031403	French Language Locking Bar	
	1031404	German Language Locking Bar	
	1031405	Italian Language Locking/Bar	
	1031406	Japanese Language Locking Bar	
	1031407	Spanish Language Locking Bar	
	1006093	Locking Bar Screw - No. 8-9/16 inch	
12		Camshaft Options	1
	1235353	Cam 255/700-860 Series Valve, STD, Black	
	1236251	Cam 255/700-860 Series Valve, TWIN, Tan (insert)	
13	1235269	Motor/Optical Cable Assembly, 700 Series Controller	1
14	1000226	Screen/Cap Assembly w/ O-Ring	1
15		Injector (High Efficiency) Options	1
	1035730	“E” Injector (HIgh Efficiency) - Yellow (6-inch tank)	
	1035731	“F” Injector (High Efficiency) - Peach (7-inch tank)	
	1035732	“G” Injector (High Efficiency) - Tan (8-inch tank)	
	1035733	“H” Injector (High Efficiency) - Lt Purple (9-inch tank)	
	1035734	“J” Injector (High Efficiency) - Lt Blue (10-inch tank)	
	1035735	“K” Injector (High Efficiency) - Pink (12-inch tank)	
	1035736	“L” Injector (High Efficiency) - Orange (13 - 14-inch tank)	
16	1000269	Injector Cap with O-Ring	1
17		Drain Control Assembly with O-Ring	1
	1000209	No. 7 (1.3 gpm; 4.9 Lpm)	
	1000210	No. 8 (1.7 gpm; 6.4 Lpm)	
	1000211	No. 9 (2.2 gpm; 8.3 Lpm)	
	1000212	No. 10 (2.7 gpm; 10.2 Lpm)	
	1002130	No. 12 (3.9 gpm; 14.76 Lpm)	
	1000214	No. 13 (4.5 gpm; 17 Lpm)	
	1000215	No. 14 (5.3 gpm; 20 Lpm)	
18A	1000222	Regenerant Refill Controller, No Ball, 0.33 gal.	1
18B	1243510	Regenerant Refill Controller	
19		Air Check Kit	1
	1032416	Air Check Kit 3/8-inch male	
	1032417	Air Check Kit 1/4-inch male	
20	1235373	Module, Sensor, Photo Interrupter	1
21	1235361	Motor w/Spacer, Pinion, and Cable, 700 Series Controller, 12 V, 50/60 Hz	1
22	1030502	Ball, Flow Control	1
*	1033066	New to Old Style Aircheck Adapter	1
23	1235446	Turbine Cable	1
*	1233187	Motor Locking Pin	
*	1244336	Chlorine Generator Kit, 0.33 gpm	
*	1242411	Extension Cord for Cabinet	
*	1239711	Service Kit, Front Mount, 0.1 amp	
*	1239752	Service Kit, Front Mount, 5 amp	
*	1239753	Service Kit, Top Plate Mount, 0.1 amp	
*	1239754	Service Kit, Top Plate Mount, 5 amp	

*Not Shown

255 Valve Parts List (Continued)

Code	Part No.	Description	Qty.
*		Piping Boss	
		Piping Boss Kit (includes hardware):	
	1040277	3/4-inch NPT, Brass 3/8-inch NPT Drain	
	1040278	1-inch NPT, Brass 1/2-inch NPT Drain	
	1040281	3/4-inch BSPT, Brass 3/8-inch BSPT Drain	
	1040282	1-inch BSPT, Brass 1/2-inch BSPT Drain	
	1040279	3/4-inch NPT, Noryl 1/2-inch NPT Drain	
	1040280	1-inch NPT, Noryl 1/2-inch NPT Drain	
	1040283	3/4-inch BSPT, Noryl 1/2-inch BSPT Drain	
	1040284	1-inch BSPT, Noryl 1/2-inch BSPT Drain	
*	1040339	Piping Boss Installation Kit	1
*		Meter Adapter	
	1032350	Kit, Meter Adapter	1
	1032351	Meter Install Kit	1
*		Bypass Valve	
	1040769	Bypass Body Assembly with Install Kit	1
	1040524	Bypass Installation Kit	1
		Tube Adapter Kits	
*	1001606	3/4-inch Copper Tube Adapter Kit	1
*	1001670	1-inch Copper Tube Adapter Kit	1
*	1001608	22-mm Copper Tube Adapter Kit	1
*	1001613	3/4-inch CPVC Tube Adapter Kit	1
*	1001614	1-inch CPVC Tube Adapter Kit	1
*	1001615	25-mm CPVC Tube Adapter Kit	1
*	1001769	3/4-inch NPT Plastic Pipe Adapter Kit	1
*	1001603	1-inch NPT Plastic Pipe Adapter Kit	1
*	1001604	3/4-inch BSPT Plastic Pipe Adapter Kit	1
*	1001605	1-inch BSPT Plastic Pipe Adapter Kit	1
*	1001611	3/4-inch BSPT Brass Pipe Adapter Kit	1
*	1001610	1-inch NPT Brass Pipe Adapter Kit	1
*	1001612	1-inch BSPT Brass Pipe Adapter Kit	1

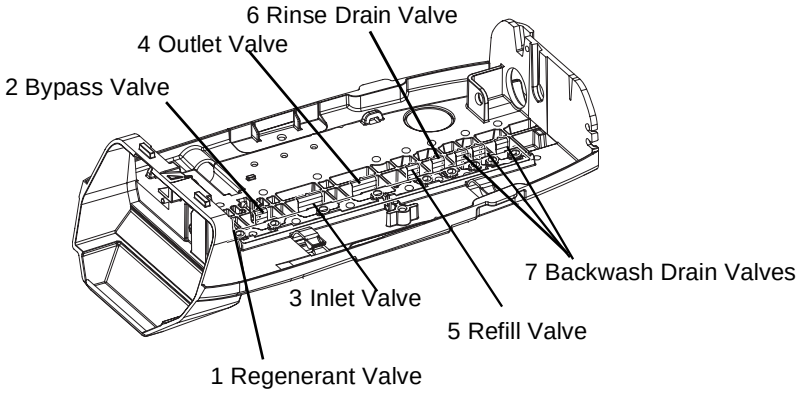
*Not Shown

SECTION H—PERFORMA VALVE SPECIFICATIONS

Section H includes the flow diagrams, exploded views, and parts lists for the Performa valves.

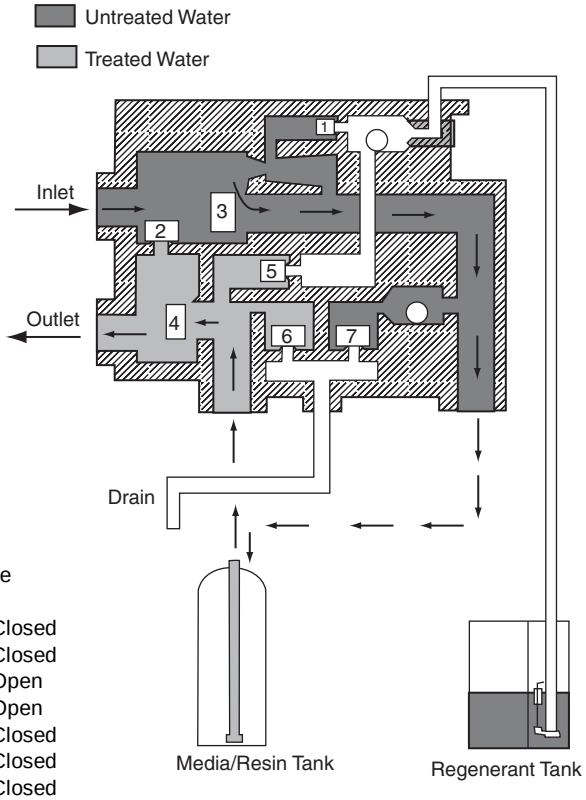
PERFORMA VALVE FLOW DIAGRAMS

Control Valve Identification



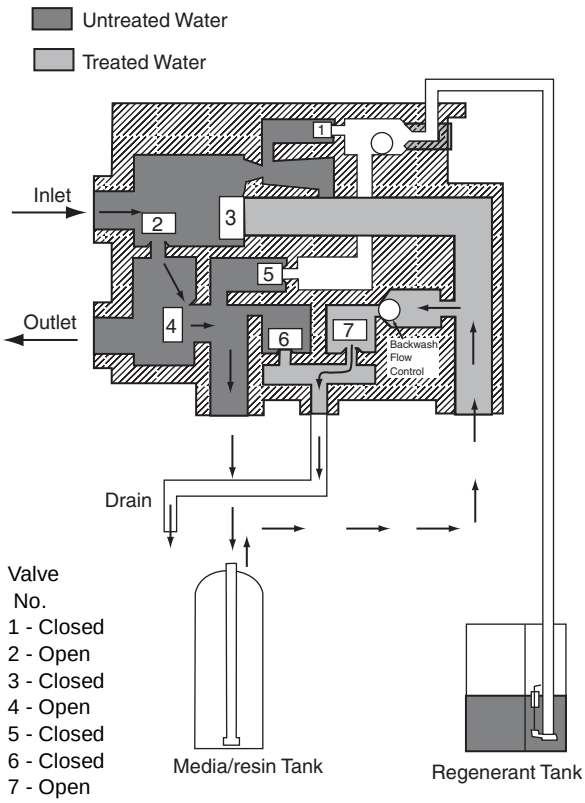
Performa Conditioner/Softener Flow Diagrams

C0 Treated Water Position
(normal operation)



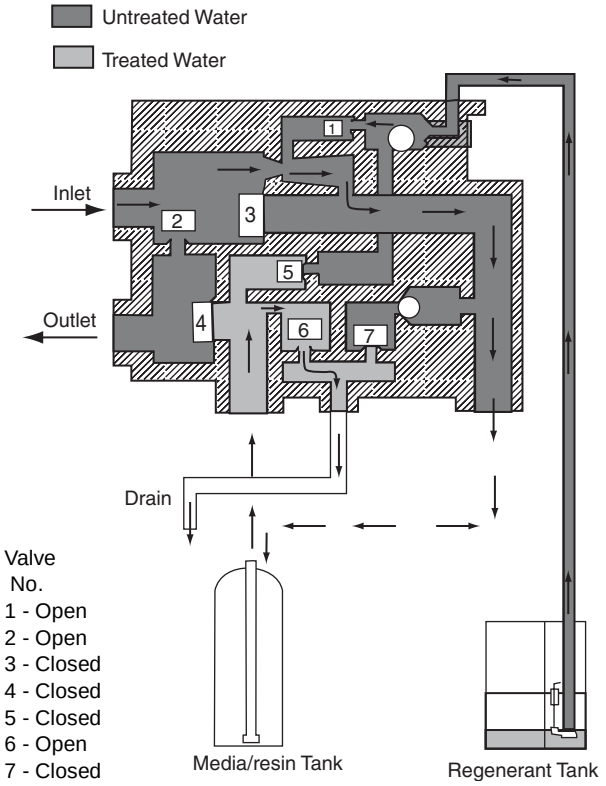
Valve
No.
1 - Closed
2 - Closed
3 - Open
4 - Open
5 - Closed
6 - Closed
7 - Closed

C1 Backwash 1 Position

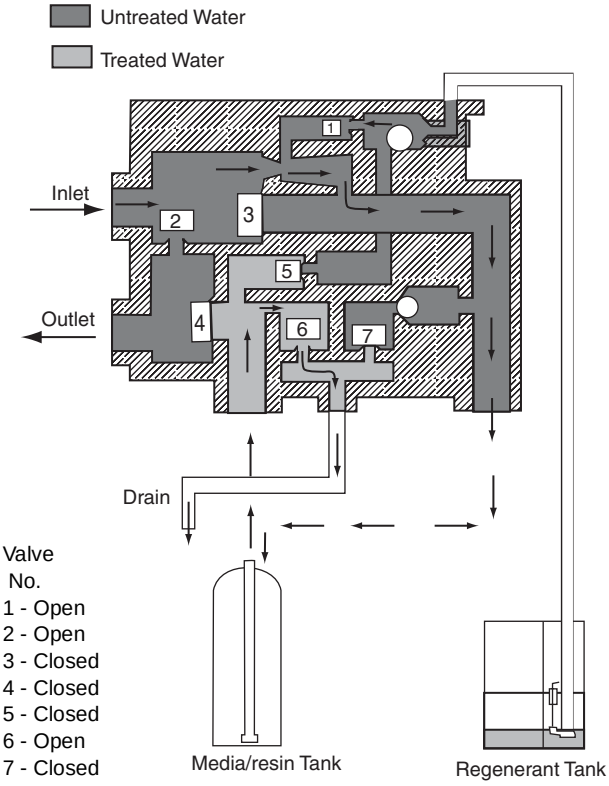


Valve
No.
1 - Closed
2 - Open
3 - Closed
4 - Open
5 - Closed
6 - Closed
7 - Open

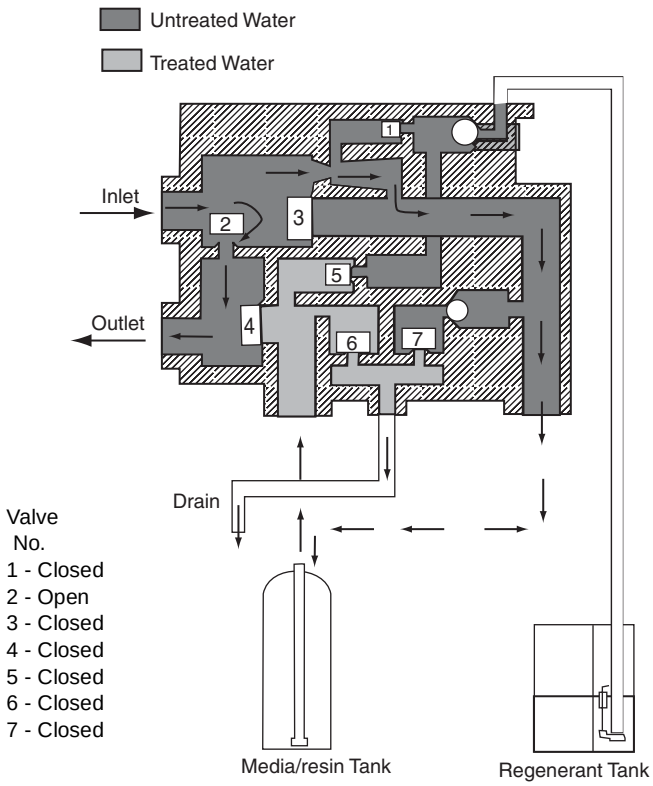
C2 Regenerant Draw Position



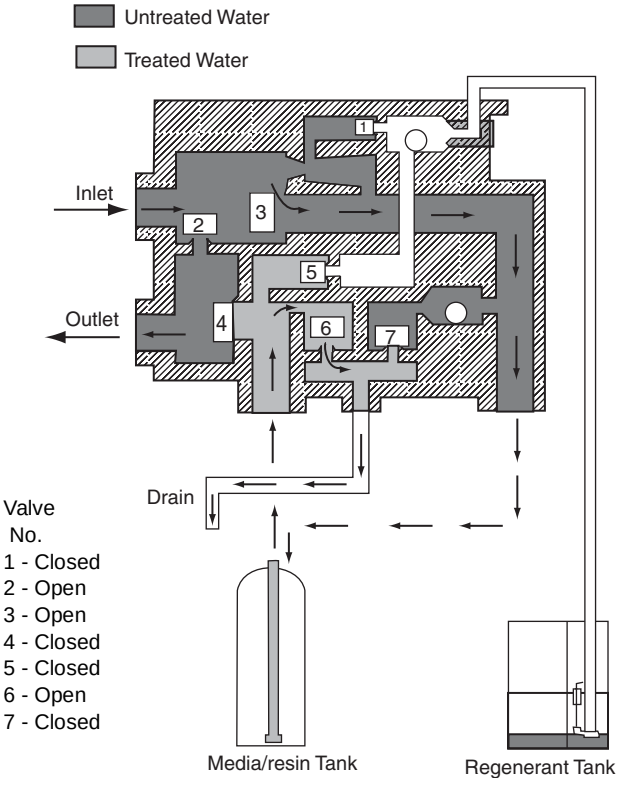
C3 Slow Rinse Position



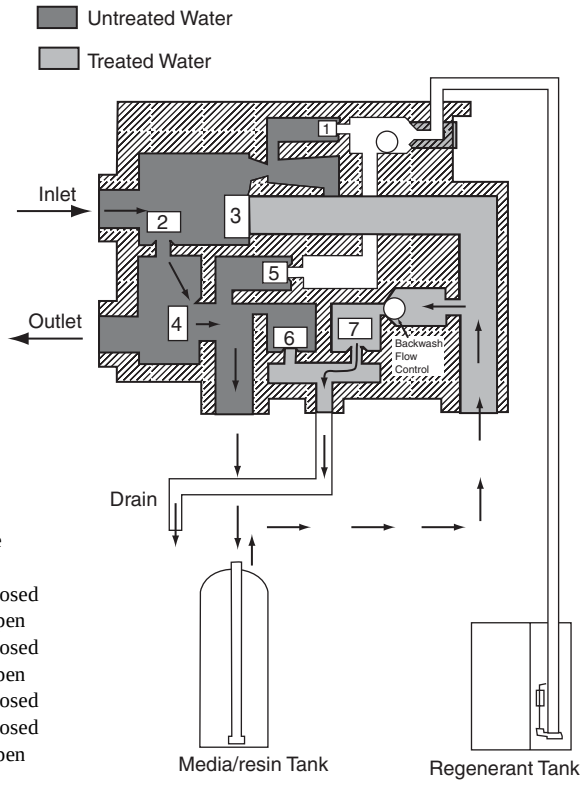
C4 System Pause Position (repressurize)



C5 Fast Rinse 1 Position

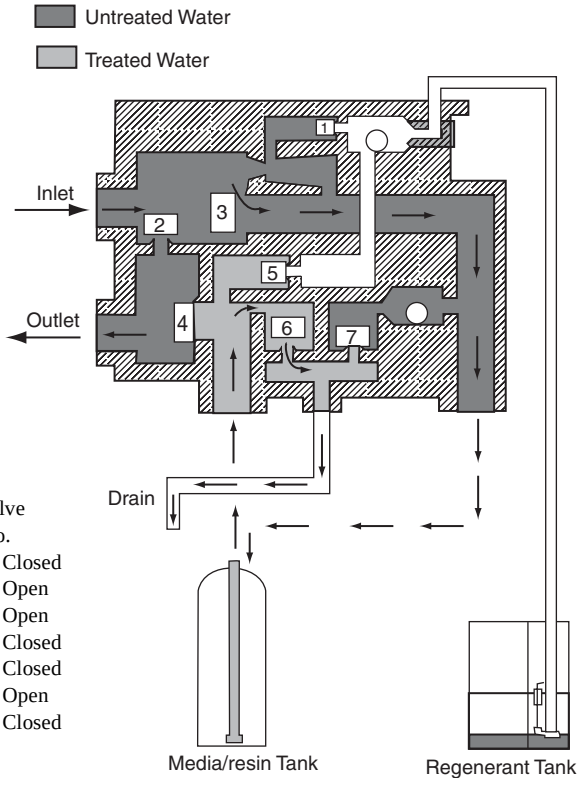


C6 Backwash 2 Position



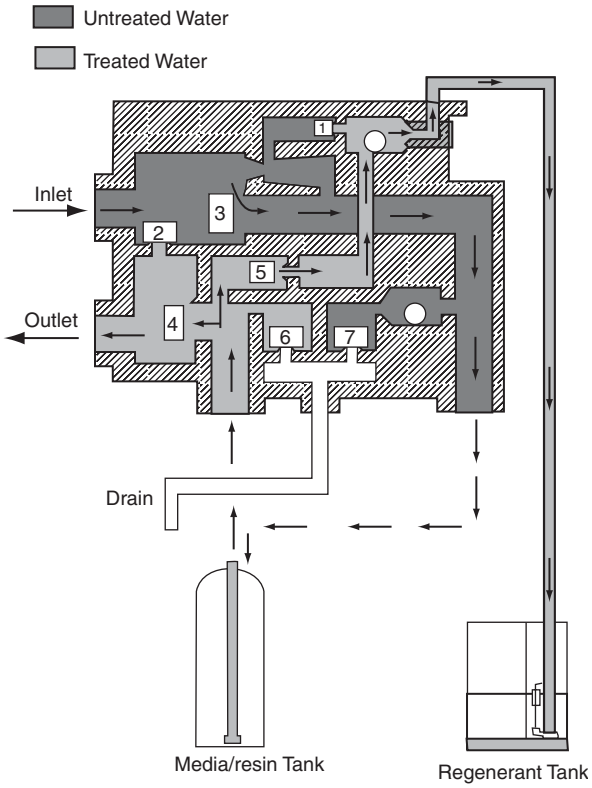
Valve No.
1 - Closed
2 - Open
3 - Closed
4 - Open
5 - Closed
6 - Closed
7 - Open

C7 Fast Rinse 2 Position



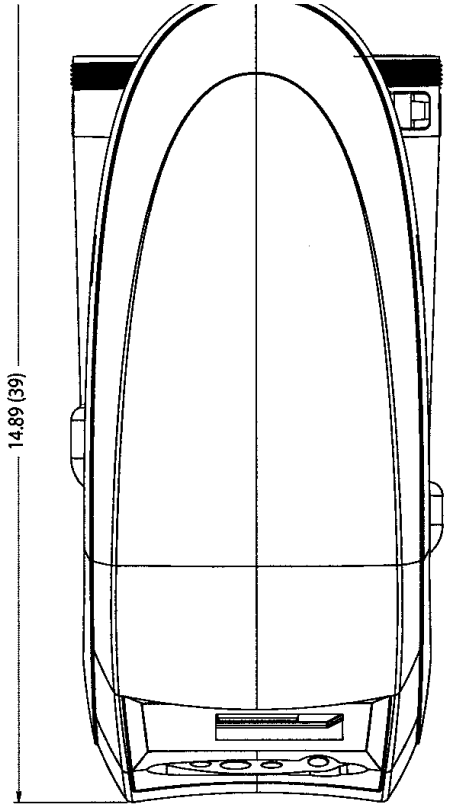
Valve No.
1 - Closed
2 - Open
3 - Open
4 - Closed
5 - Closed
6 - Open
7 - Closed

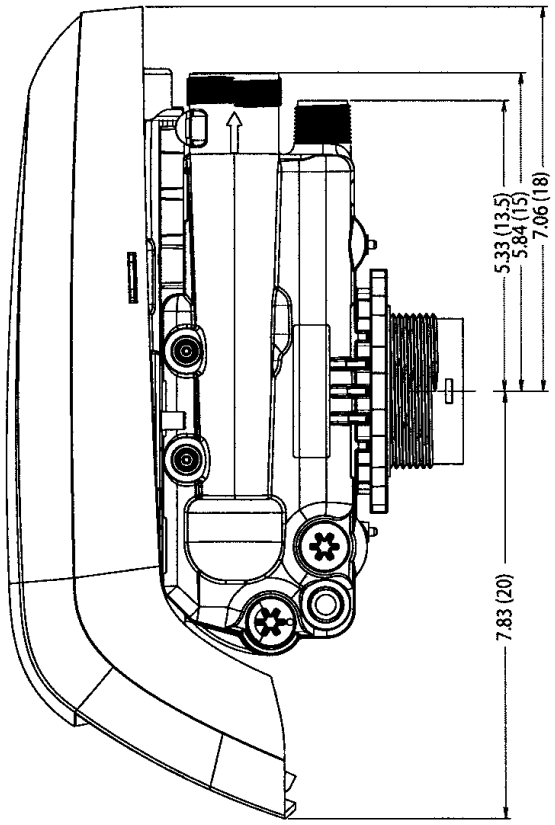
C8 Refill Position

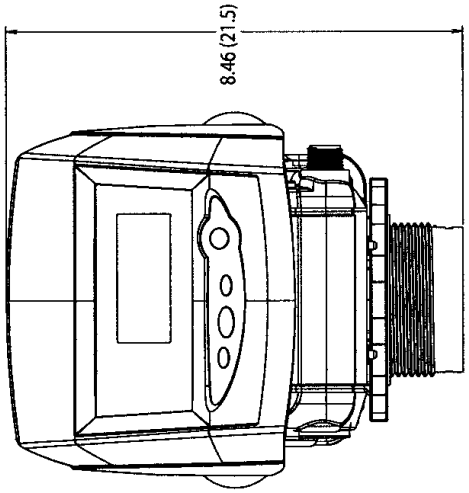


Valve No.
1 - Closed
2 - Closed
3 - Open
4 - Open
5 - Open
6 - Closed
7 - Closed

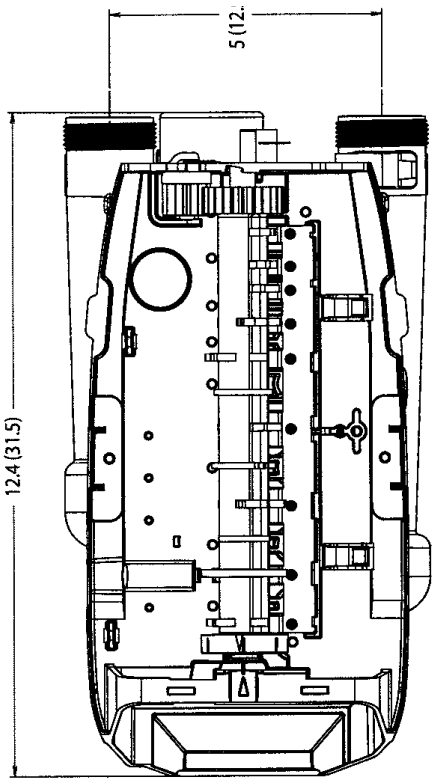
PERFORMA VALVE SPECIFICATIONS
with Logix Controllers

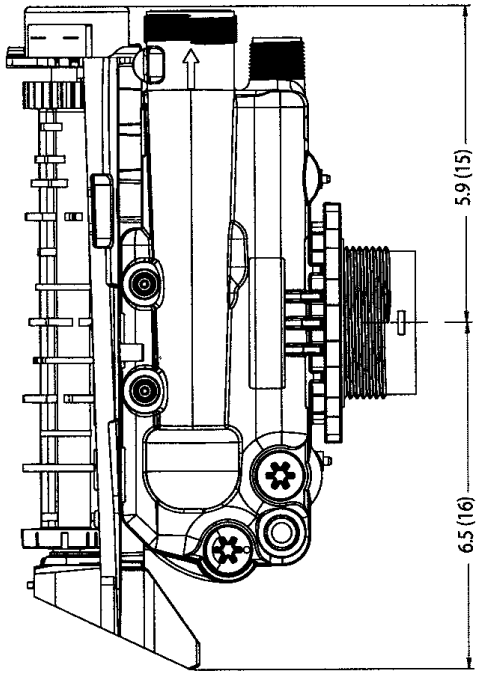


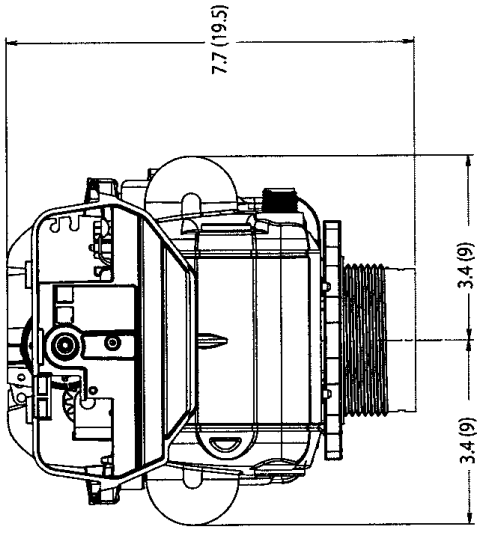




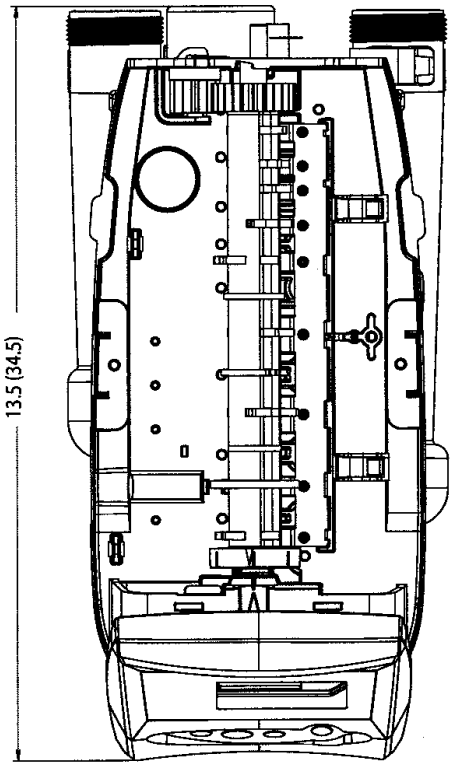
Performa Valve, No Cover, No Controller

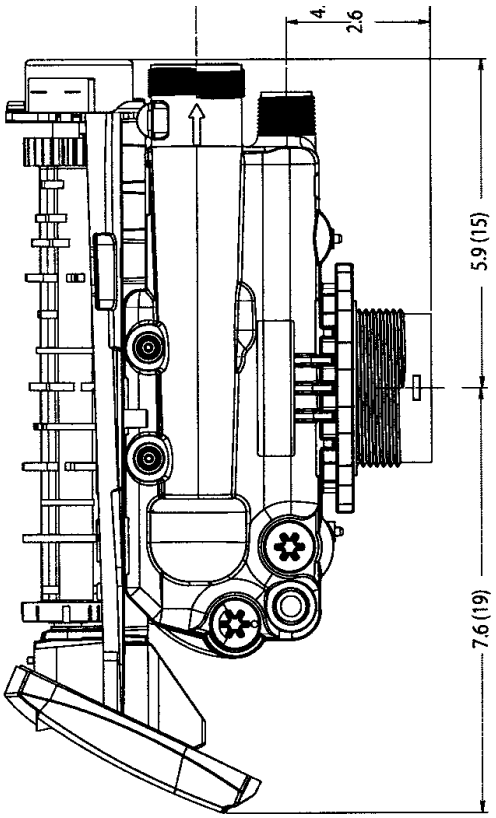


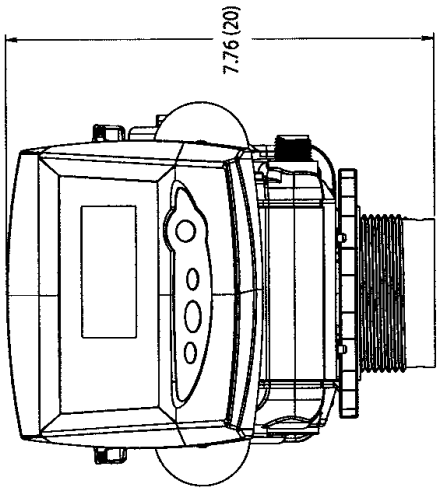




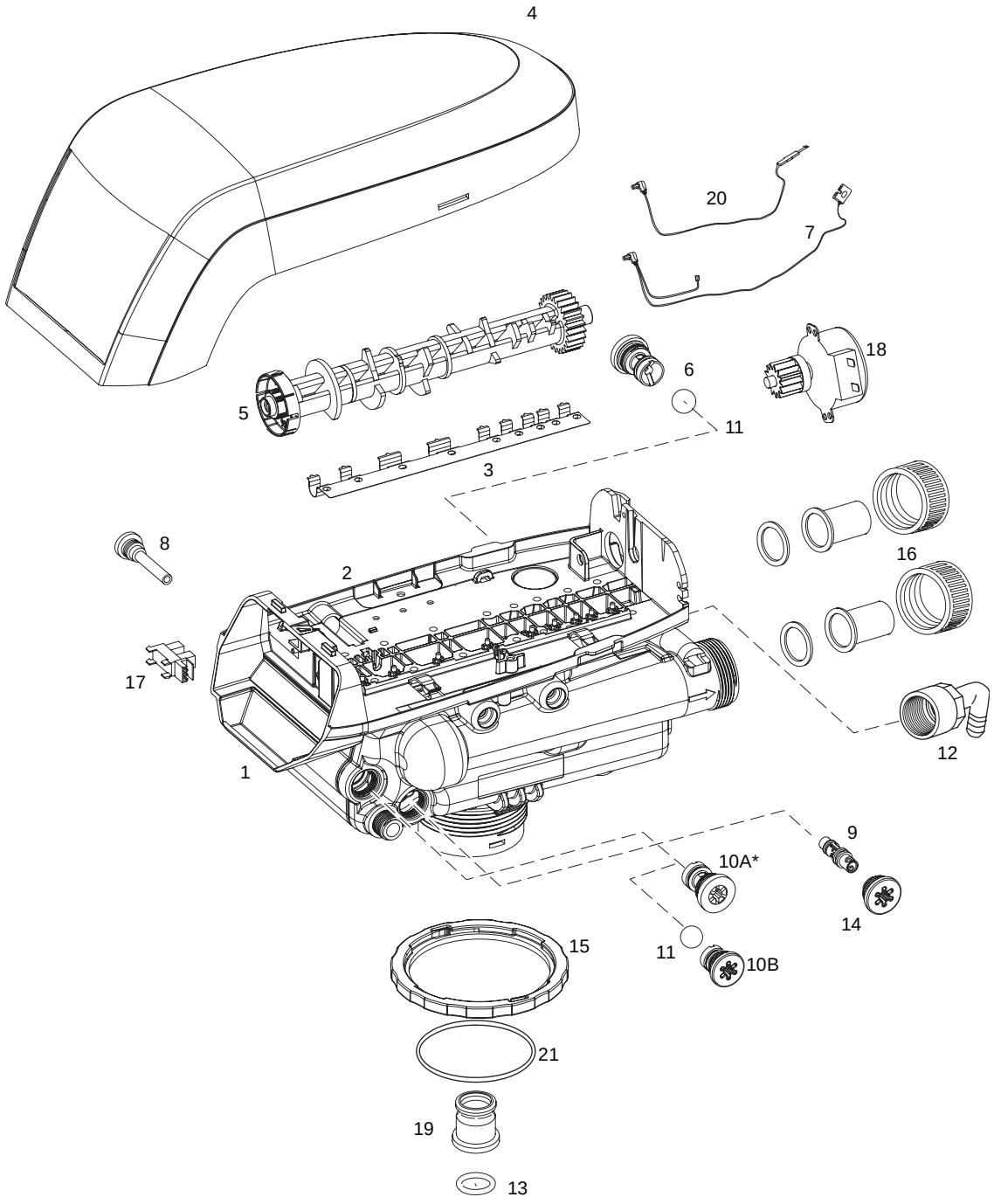
Performa Valve, No Cover







PERFORMA EXPLODED VIEW



*Warning: Do not use the flow control ball with #10A.

PERFORMA PARTS LIST

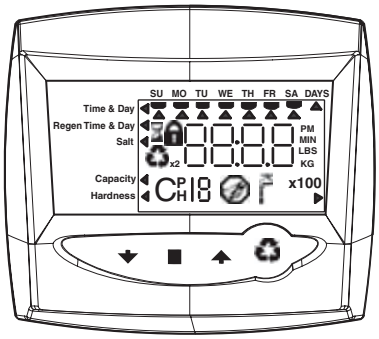
Code	Part No.	Description	Qty.
1	1035807	Valve Assembly w/o Flow Controls	1
2	1235338*	Top Plate, 268/700 Series Valves	1
3	1235339*	Valve Disc Spring, One Piece, Performa Valve	1
4	1236246*	Cover, Valve, 255/Performa 700/860 Series Controller	1
5		Performa Logix Camshafts	1
	1235352*	Cam, 263-268/700-860 Series Valve, STD, Black	
	1237402*	Cam, 269/700-860 Series Valve, STD, Green	
	1237403*	Cam, 273/700-860 Series Valve, STD, Gray	
	1237404*	Cam, 273/700-860 Series Valve, TWIN (insert)	
	1237405*	Cam, 278/700-860 Series Valve, STD, Brown	
	1237406*	Cam, 278/700-860 Series Valve, TWIN, Tan (insert)	
6		Drain Control Assembly:	1
	1000209	No. 7 (1.3 gpm; 4.9 Lpm)	
	1000210	No. 8 (1.7 gpm; 6.4 Lpm)	
	1000211	No. 9 (2.2 gpm; 8.3 Lpm)	
	1000212	No. 10 (2.7 gpm; 10.2 Lpm)	
	1000213	No. 12 (3.9 gpm; 14.76 Lpm)	
	1000214	No. 13 (4.5 gpm; 17 Lpm)	
	1000215	No. 14 (5.3 gpm; 20 Lpm)	
	1239760	Blending Valve Kit 900/700 Series Top Plate	
*		Drain Line Flow Control (External)	1
	1030355	Drain Line Flow Control, 5 gpm (19 Lpm)	
	1030356	Drain Line Flow Control, 6 gpm (22.5 Lpm)	
	1030357	Drain Line Flow Control, 7 gpm (26.5 Lpm)	
	1030358	Drain Line Flow Control, 8 gpm (30 Lpm)	
	1030359	Drain Line Flow Control, 9 gpm (34 Lpm)	
	1030360	Drain Line Flow Control, 10 gpm (38 Lpm)	
7	1235269	Motor/Optical Cable Assembly, 700 Series Controller	1
8	1000226	Screen/Cap Assembly w/ O-Ring	1
9		Injector (High Efficiency) Options	
	1035730	“E” Injector (HIgh Efficiency) - Yellow (6-inch tank)	
	1035731	“F” Injector (High Efficiency) - Peach (7-inch tank)	
	1035732	“G” Injector (High Efficiency) - Tan (8-inch tank)	
	1035733	“H” Injector (High Efficiency) - Lt Purple (9-inch tank)	
	1035734	“J” Injector (High Efficiency) - Lt Blue (10-inch tank)	
	1035735	“K” Injector (High Efficiency) - Pink (12-inch tank)	
	1035736	“L” Injector (High Efficiency) - Orange (13 & 14-inch tanks)	
	1032978	Plugged Injector for 263 Filter	
	1032985	Plugged Injector Cap	
10A	1000222	Regenerant Refill Controller, No Bal, 0.33 gpm	1
10B	1243510	Regenerant Refill Controller	
11	1030502	Ball, Refill Flow Control	
*	1030334	Plugged Refill Flow Control - for 263 Valve	
12	1002449	Drain Fitting Elbow (3/4-inch hose barbed)	1
13	1010428	O-Ring	1
14	1000269	Injector Cap with O-Ring	1
15	1035622	Tank Ring	1
*	1041174	Valve Disc Kit: Standard	
16	Plumbing Adapter Kits:		1
	1001606	3/4-inch Copper Tube Adapter Kit	
	1001670	1-inch Copper Tube Adapter Kit	
	1001608	22-mm Copper Tube Adapter Kit	
	1001613	3/4-inch CPVC Tube Adapter Kit	
	1001614	1-inch CPVC Tube Adapter Kit	
	1001615	25-mm CPVC Tube Adapter Kit	
	1001769	3/4-inch NPT Plastic Pipe Adapter Kit	
	1001603	1-inch NPT Plastic Pipe Adapter Kit	
	1001604	3/4-inch BSPT Plastic Pipe Adapter Kit	
	1001605	1-inch BSPT Plastic Pipe Adapter Kit	
	1001611	3/4-inch BSPT Brass Pipe Adapter Kit	
	1001610	1-inch NPT Brass Pipe Adapter Kit	
	1001612	1-inch BSPT Brass Pipe Adapter Kit	
17	1235373	Module, Sensor, Photo Interrupter	1
18	1235361	Motor w/Spacer & Pinion, 700 Series Controller, 12 V, 50/60 Hz	1 1
19	1001986	13/16 inch Rubber Insert (Optional)	1
20	1235446	Turbine Cable	1
21	1010154	Tank O-Ring	1
*	1033444	Internal Turbine Meter	
*	1233187	Motor Locking Pin	
*	1299336	Chlorine Generator Kit	
*	1033444	Turbine Assemby	
*	1041174	Valve Disc Kit, Standard	
*	1239979	Cable Harness, Remote Regen 740F	
*	1239711	Switch Kit, Front Mount, 0.1 amp	
*	1239752	Switch Kit, Front Mount 5 amp	
*	1239753	Switch Kit, Top Plate Mount, 0.1 amp	
*	1239754	Switch Kit, Top Plate Mount, 5 amp	

*Not shown on drawing.

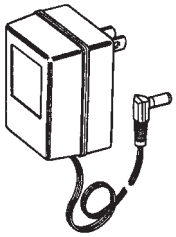
SECTION I—ACCESSORIES

Section I includes the injector performance curves, the Logix 700 series controller parts list, and the accessories.

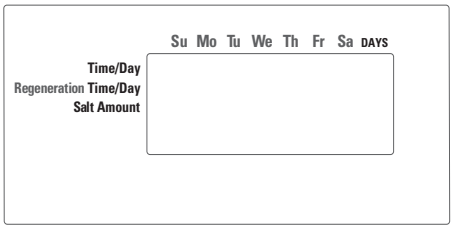
LOGIX 700 SERIES CONTROLLERS PARTS LIST



740 Control



AC Adapter



740 Control Overlays

Code	Part No.	Description	Qty.
		Electronics Modules/Controllers	1
	1242146	Logix 740 Controller	
	1242148	Logix 740 F Controller	
	1242163	Logix 760 Controller	
	1242166	Logix 760F Controller	
	TBD	Logix 742 Controller w/Chlorine Generator - Available Spring 2005	
		Electrical Components	
	1235269	Motor/Optical Cable Assembly, 700 Series Control	
	1235373	Module, Sensor, Photo Interrupter	
	1235361	Motor w/Spacer & Pinion, 700 Series Controller 12V, 50/60 Hz	
		Transformer	
	1000810	Japanese	
	1000811	North American	
	1000812	Australian	
	1000813	British	
	1000814	European	
	1030234	Transformer Extension Cord 15 foot (4.5m)	
	1235448	North American Outdoor	

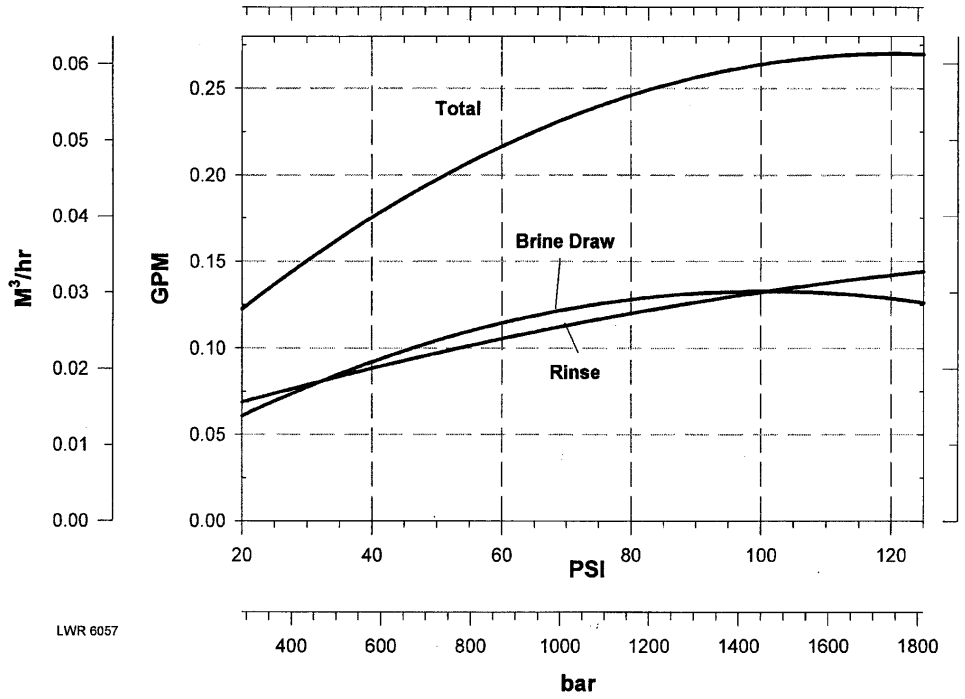
Code	Part No.	Description	Qty.
		Overlays	
	1235378	Overlay, Keypad, 700-860 Series Controller	
	1238472	Overlay, 740 Controller, English	
	1238473	Overlay, 740C Controller, English	
	1238474	Overlay, 740F Controller, English	
	1238475	Overlay, 742 Controller, English	
	1238476	Overlay, 742C Controller, English	
	1238478	Overlay, 742F Controller, English	

ACCESSORIES

INJECTOR PERFORMANCE CURVES

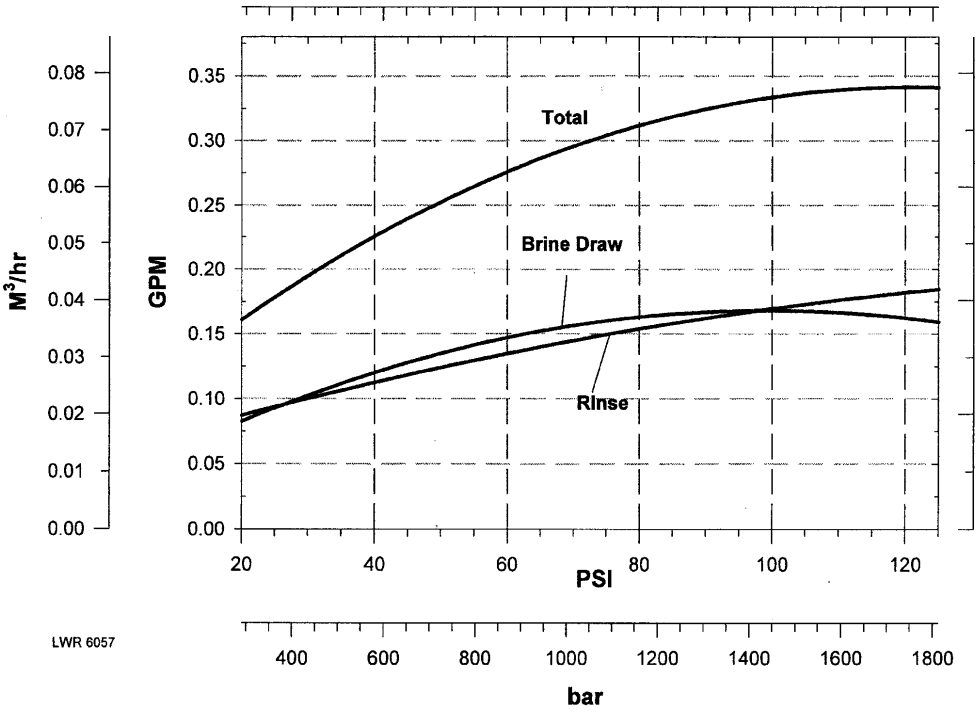
Injector #1035730

"E" 6-inch Tanks
Color: Yellow



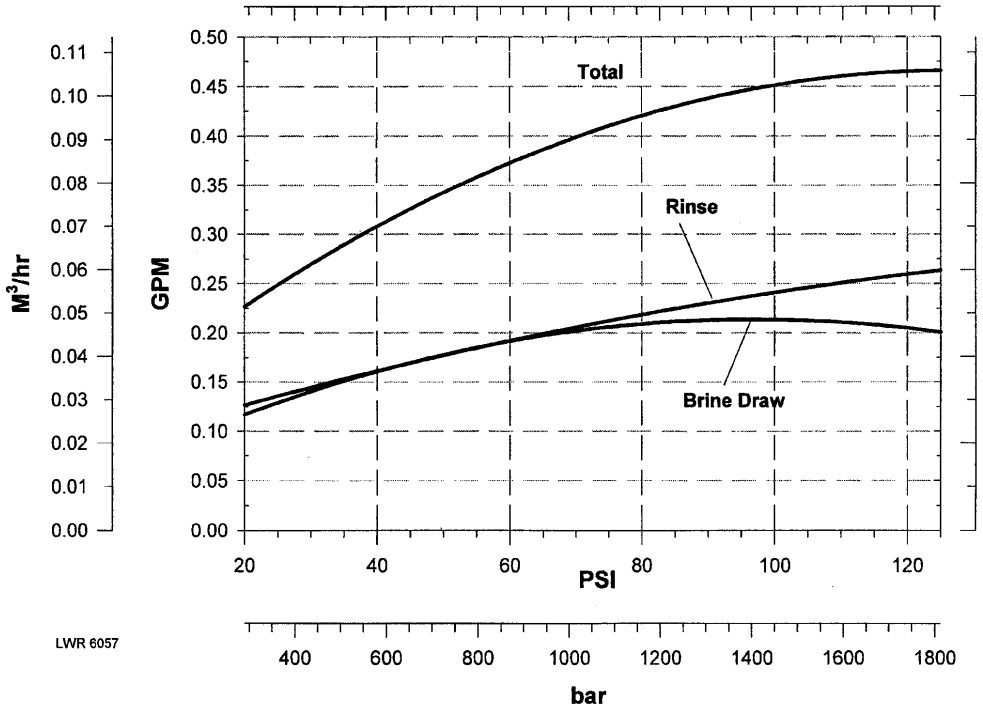
Injector #1035731

"F" 7-inch Tanks
Color: Peach



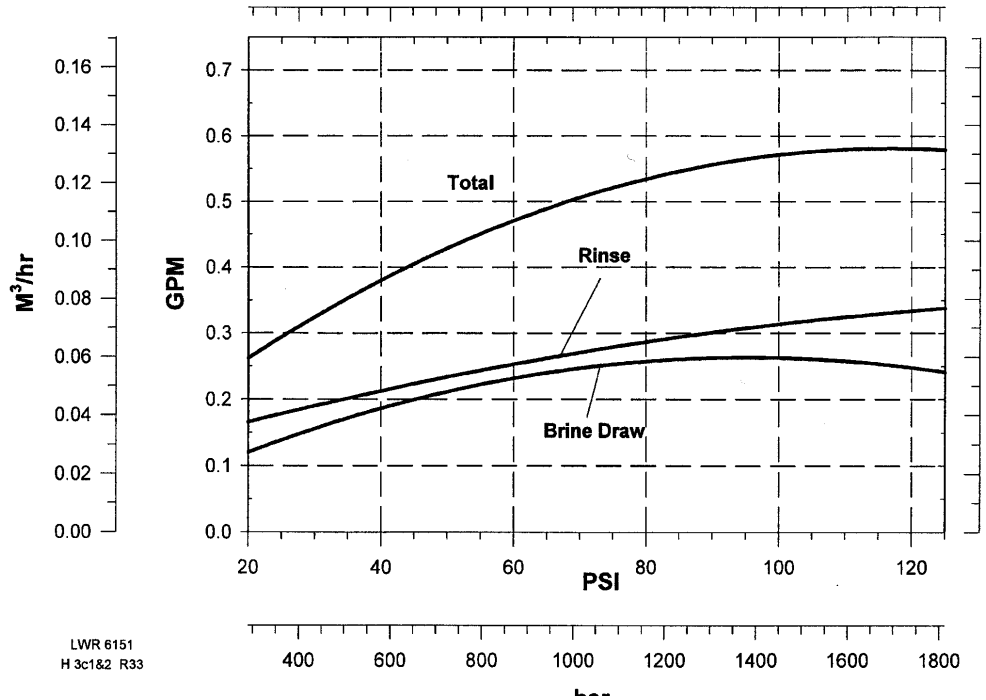
Injector #1035732

"G" 8-inch Tanks
Color: Tan



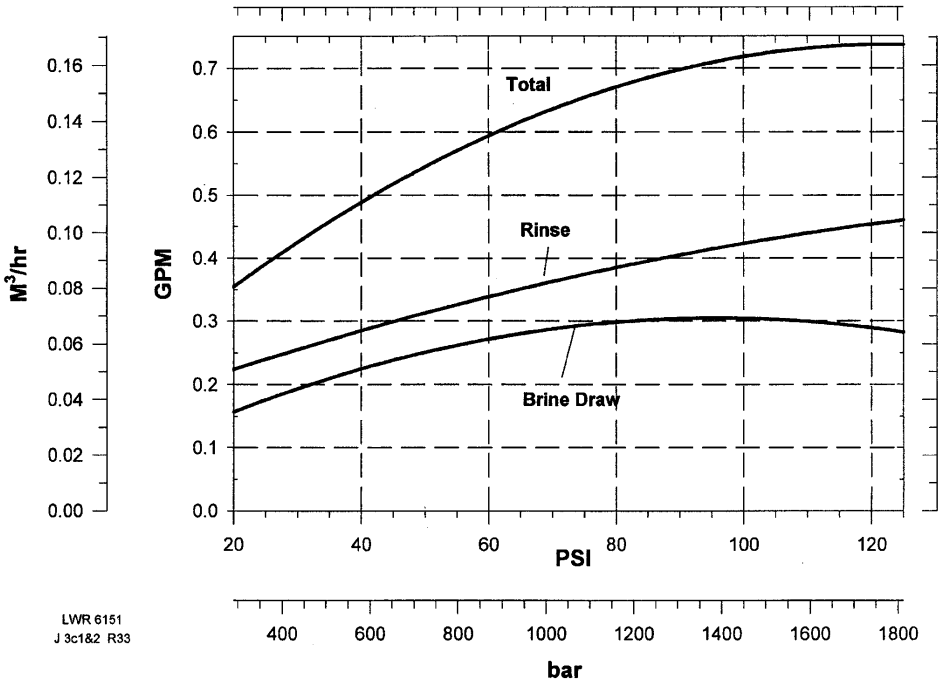
Injector #1035733

"H" 9-inch Tanks
Color: Light Purple



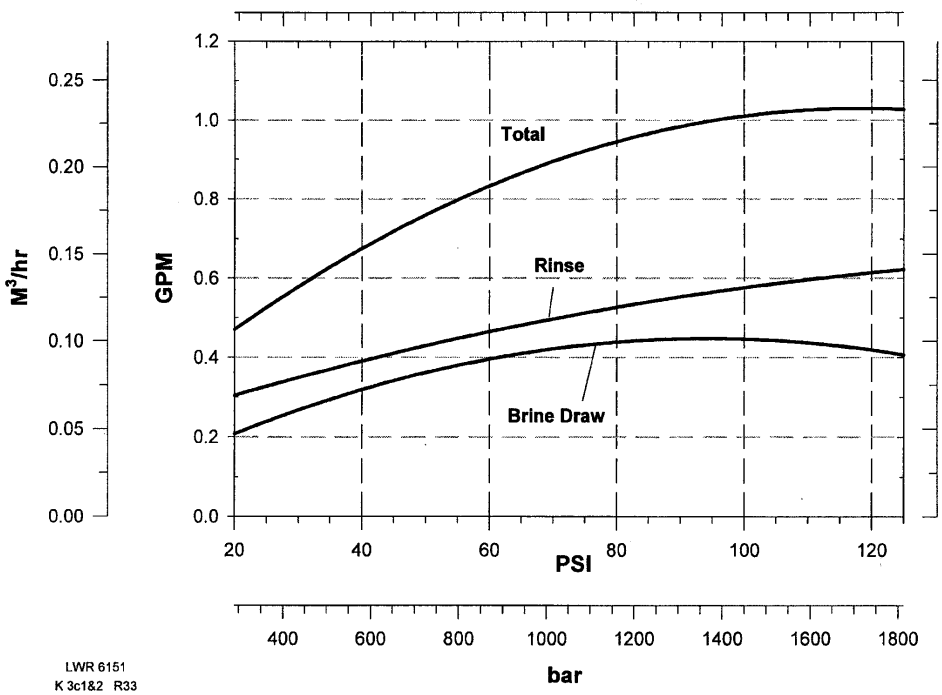
Injector #1035734

"J" 10-inch Tanks
Color: Lt Blue



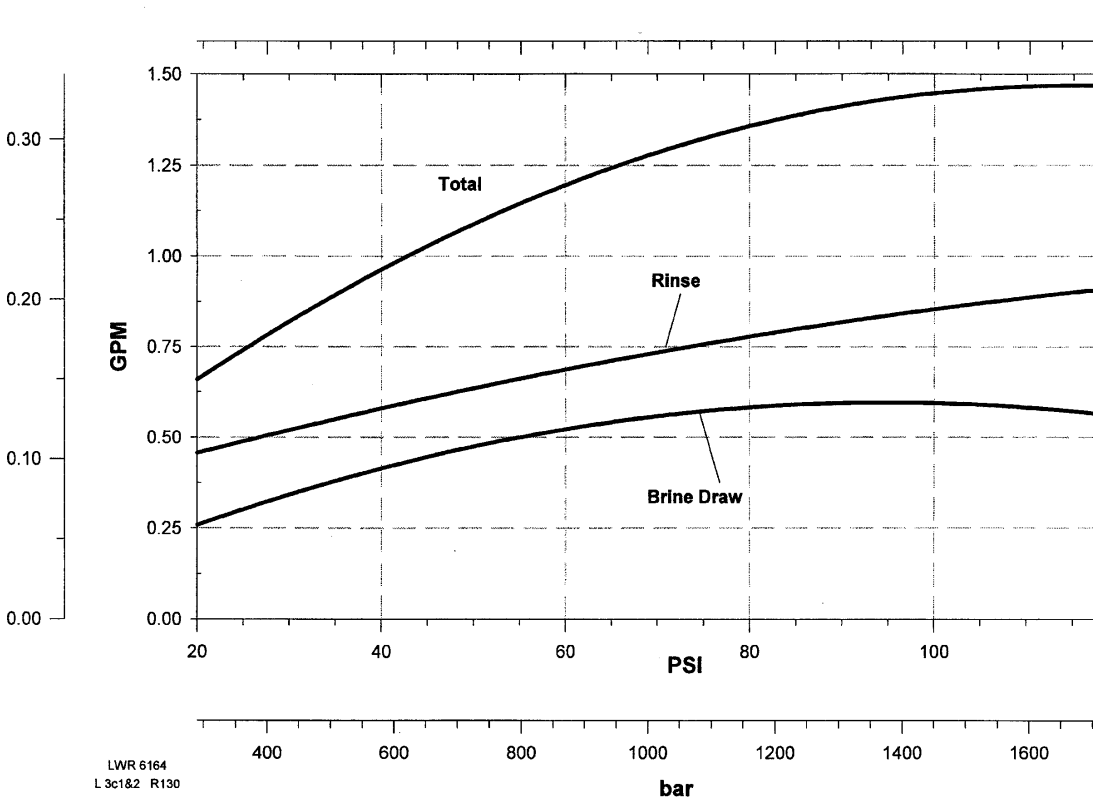
Injector #1035735

"K" 12-inch Tanks
Color: Pink



Injector #1035736

"L" 13 & 14-inch Tanks
Color: Orange



Logix 740 and 760 World Controllers Default Settings

Table 1 - Parameters Set with System Setup Calculated at 4.14 bar to cover from 2.07 to 6.21bar System Settings 1 thru 5

	System Setting (1)			System Setting (2)			System Setting (3)			System Setting (4)			System Setting (5)		
Tank Diameter (cm)	15.2			15.2			17.8			20.3			22.8		
Tank Height (cm)	45.7			89			111.8			111.8			123		
Injector	E			E			F			G			H		
Valve Model	255/268														
Slow Rinse @ 4.14 bar (Lpm)	0.41			0.41			0.49			0.72			0.91		
Media/resin Volume (L)*	5			10			15			20			30		
Refill Rate (Lpm)	1.25			1.25			1.25			1.25			1.25		
Regenerant Draw Rate (Lpm)	0.30			0.30			0.42			0.57			0.68		
First Backwash (minutes)*	8			8			8			14			14		
Pause-Re-pressurize (minutes)*	1			1			1			1			1		
First Fast Rinse (minutes)*	3			3			3			6			6		
2nd Backwash (minutes)*	1			1			1			1			1		
2nd Fast Rinse (minutes)*	1			1			1			1			1		
Total Water Used															
Salt Setting	L	S	H	L	S	H	L	S	H	L	S	H	L	S	H
Salt Amount (Kg)	0.2	0.37	0.75	0.37	0.75	1.5	0.6	1.7	2.8	0.9	2.6	4.1	1.3	3.4	5.6
Capacity (Kgrams)	0.1	0.2	0.3	0.3	0.4	0.5	0.4	0.8	1.0	0.7	1.2	1.5	1.0	1.6	2.0
Regenerant Draw (minutes)	2.4	4.7	9.4	4.7	9.4	18.9	5.2	15.5	25.8	6.3	17.6	27.7	7.3	18.9	31.5
Slow Rinse (minutes)	7.0	20.3	20.3	11.7	33.9	33.9	17	49.3	49.3	18.7	54.2	54.2	17.8	51.7	51.7
Draw + Rinse (minutes)*	9.5	25	30	16.5	43.5	53	22	65	75	25	72	82	25	70.5	83
Refill Time (minutes)*	0.5	1	2	1	2	4	1.5	4.5	7.5	2.5	7	11	3.5	9	15

*stored in memory.

Logix 740 and 760 World Controllers (cont.)

Table 2 - Parameters Set with System Setup Calculated at 4.14 bar to cover from 2.07 to 6.21 bar System Settings 6 thru 10

	System Setting (6)			System Setting (7)			System Setting (8)			System Setting (9)			System Setting (10) Filter		
Tank Diameter (cm)	22.8			25.4 or 30.5			33			35.6			N/A		
Tank Height (cm)	123			137.2 or 121.9			137.2			165			N/A		
Injector	H (22.8 cm)			J (25.4 cm) or K (30.5 cm)			L (33 cm)			L (35.6 cm)			N/A		
Valve Model	255/268												263		
Slow Rinse @ 4.14 bar (Lpm)	0.91			1.25			1.67			2.42			N/A		
Media/resin Volume (L)*	35			40			50			80			N/A		
Refill Rate (Lpm)	1.25			1.25			1.25			1.25			N/A		
Regenerant Draw Rate (Lpm)	0.68			0.79			1.14			1.44			N/A		
First Backwash (minutes)*	14			14			14			14			14		
Pause-Re-pressurize (minutes)*	1			1			1			1			0		
First Fast Rinse (minutes)*	6			6			6			6			10		
2nd Backwash (minutes)*	1			1			1			1			1		
2nd Fast Rinse (minutes)*	1			1			1			1			1		
Total Water Used															
Salt Setting	L	S	H	L	S	H	L	S	H	L	S	H	L	S	H
Salt Amount (Kg)	1.4	4.2	7	1.8	5	8.4	2.4	6.7	11.2	3.7	10.1	16.8	N/A	N/A	N/A
Capacity (Kgrams)	1.2	2.1	2.5	1.5	2.5	3.0	2.0	3.2	3.9	3.0	4.9	5.8	5 cubic meters		
Regenerant Draw (minutes)	8.4	23.1	39.9	9	24.3	40.5	8.2	22.7	37.8	9.9	26.8	44.7	N/A	N/A	N/A
Slow Rinse (minutes)	22.3	64.6	64.6	23.4	67.8	67.8	19.7	57.1	57.1	20.0	58.1	58.1	N/A	N/A	N/A
Draw + Rinse (minutes)*	30.5	87.5	104.5	32.5	92	108.5	28	80	95	30	85	103	N/A	N/A	N/A
Refill Time (minutes)*	4	11	19	5	13.5	22.5	6.5	18	30	10	27	45	N/A	N/A	N/A

*stored in memory.

Logix 740 and 760 North American Controllers Default Settings

Table 3 - Parameters Set with System Setup Calculated at 60 psi to cover from 30 to 90 psi System Settings 1 thru 5

	System Setting (1)			System Setting (2)			System Setting (3)			System Setting (4)			System Setting (5)		
Tank Diameter (in)	6			6			7			8			9		
Tank Height (in)	18			35			44			44			48		
Injector	E			E			F			G			H		
Valve Model	255/268														
Slow Rinse @ 60 psi (gpm)	0.08			0.08			0.11			0.15			0.21		
Media/resin Volume (ft^3)	0.15			0.25			0.5			0.75			1		
Refill Rate (gpm)	.33			.33			.33			.33			.33		
Brine Draw Rate (gpm)	0.08			0.08			0.11			0.15			0.18		
First Backwash (minutes)*	8			8			8			14			14		
Pause-Re-pressurize (minutes)*	1			1			1			1			1		
First Fast Rinse (minutes)	3			3			3			6			6		
2nd Backwash (minutes)*	1			1			1			1			1		
2nd Fast Rinse (minutes)*	1			1			1			1			1		
Total Water Used															
Salt Setting	L	S	H	L	S	H	L	S	H	L	S	H	L	S	H
Salt Amount (lbs)	0.5	1	2	1	2	4	1.5	4.5	7.5	2.5	7	11	3.5	9	15
Capacity (lbs)*	2	3	4	4	6	8	6	13	15	11	19	23	15	25	30
Regenerant Draw (minutes)	2.4	4.7	9.4	4.7	9.4	18.9	5.2	15.5	25.8	6.3	17.6	27.7	7.3	18.9	31.5
Slow Rinse (minutes)	7.0	20.3	20.3	11.7	33.9	33.9	17	49.3	49.3	18.7	54.2	54.2	17.8	51.7	51.7
Draw + Rinse (minutes)*	9.5	25	30	16.5	43.5	53	22	65	75	25	72	82	25	70.5	83
Refill Time (minutes)*	0.5	1	2	1	2	4	1.5	4.5	7.5	2.5	7	11	3.5	9	15

*stored in memory.

Logix 740 and 760 North American Controllers (cont.)

Table 4 - Parameters Set with System Setup Calculated at 60 psi to cover from 30 to 90 psi System Settings 6 thru 10

	System Setting (6)	System Setting (7)	System Setting (8)	System Setting (9)	System Setting (10) Filter
Tank Diameter (in)	9	10 or 12	13	14	N/A
Tank Height (in)	48	54 or 48	54	65	N/A
Injector	H (9")	J (10") or K (12")	L (13")	L (14")	N/A
Valve Model	255/268				263
Slow Rinse @ 60 psi (gpm)	0.18	0.24	0.38	0.56	N/A
Media/resin Volume (ft^3)*	1.25	1.5	2	3	N/A
Refill Rate (gpm)	.33	.33	.33	.33	N/A
Brine Draw Rate (gpm)	0.18	0.21	0.30	0.38	N/A
First Backwash (minutes)*	14	14	14	14	14
Pause-Re-pressurize (minutes)*	1	1	1	1	0
First Fast Rinse (minutes)*	6	6	6	6	10
2nd Backwash (minutes)*	1	1	1	1	1
2nd Fast Rinse (minutes)*	1	1	1	1	1
Total Water Used					

Salt Setting	L	S	H	L	S	H	L	S	H	L	S	H	L	S	H
Salt Amount (lbs)	4	11	19	5	13.5	22.5	6.5	18	30	10	27	45	N/A	N/A	N/A
Capacity (lbs)*	17	34	38	22	38	45	28	50	60	44	75	90	1,000		
Regenerant Draw (minutes)	8.4	23.1	39.9	9	24.3	40.5	8.2	22.7	37.8	9.9	26.8	44.7	N/A	N/A	N/A
Slow Rinse (minutes)	22.3	64.6	64.6	23.4	67.8	67.8	19.7	57.1	57.1	20	58.1	58.1	N/A	N/A	N/A
Draw + Rinse (minutes)*	30.5	87.5	104.5	32.5	92	108.5	28	80	95	30	85	103	N/A	N/A	N/A
Refill Time (minutes)*	4	11	19	5	13.5	22.5	6.5	18	30	10	27	45	N/A	N/A	N/A

*stored in memory

Logix 742 And 762 Controllers Default Settings

Table 5 - Logix 742 and 762 Controller Default Settings

255/268 Valves (0.25 ft^3/5 Liter steps)				278 Valve (0.50 ft^3/10 Liter steps)				298 Valve (1.00 ft^3/25 Liter steps)			
	Resin Volume				Resin Volume				Resin Volume		
Tank	Metric	US	Injector	Tank	Metric	US	Injector	Tank	Metric	US	Injector
6	5	0.25	E	9	30	1.00	H	14	75	3.00	14
6	10		E	10	40	1.5	J	16	100	4.00	16
7	15	0.50	F	12	50		K	16	125		16
8	20	0.75	G	12	60	2.00	K	18	150	5.00	18
9	25		H	14	70	2.50	L	21	175	6.00	21
9	30	1.00	H	14	80	3.00	L	21	200	7.00	21
10	35	1.25	J	14	90		L	21	225	8.00	21
10	40	1.50	J	16	100	3.50	M	24	250	9.00	24
12	45		K	16	110	4.00	M	24	275	10.00	24
12	50	1.75	K	16	120		M	24	300		24
12	55	2.00	K	18	130	4.50	N	24	325	11.00	24
13	60		L	18	140	5.00	N	30	350	12.00	30
13	65	2.25	L	18	150	5.50	N	30	400	14.00	30
14	70	2.50	L	18	160		N	30	400	14.00	30
14	75		L	21	170	6.00	R	30	425	15.00	30
14	80	2.75	L	21	180	6.50	R	30	450	16.00	30
14	85	3.00	L	21	190		R	30	475	17.00	30
				21	200	7.00	R	36	500	18.00	36
								36	525	19.00	36
								36	550		36
								36	575	20.00	36
								36	600		36

SECTION J—GLOSSARY

This section provides definitions for industry terminology.

GLOSSARY

acid	When dissolved in water, this substance increases the concentration of hydrogen ions. Most acids will dissolve the common metals and will react with a base to form a neutral salt in water.
acre-foot	Equal to 43,560 cubic feet (1,233 cubic meters) or 325,851 gallons (1,233,L), it is the amount of water which would cover one acre area to a depth of one foot.
activated carbon	A very porous structure used in water conditioning as an absorbent for organic matter and certain dissolved gases. It is produced by roasting grades of coal in the absence of air. Also known as “activated charcoal”.
air check	The device used to stop regenerant draw from the regenerant tank when the regenerant tank is out of fluid.
air gap	A vertical space between a water or drain line and the flood level of a receptacle. This gap prevents back-flow or siphoning from the receptacle in the event of a negative pressure or vacuum. Plumbing codes usually require the air gap to be at a minimum of 1-1/2 inches (3.8 cm).
alkali	Water soluble mineral compounds, considered to have moderate strengths as bases (as opposed to the caustic or strongly basic hydroxides). The term is applied to bicarbonate and carbonate compounds when they are present in the water or solution.
alkalinity	The quantitative capacity of a water or water solution to neutralize an acid. Usually measured by titration with a standard acid solution of sulfuric acid, it is expressed in terms of its calcium carbonate equivalent.
back-flow	Water flow in a pipe or line in the opposite direction of normal flow. May be associated with back siphonage or the flow of possible contaminants into a potable water system.
back-flow preventer	A system installed in a water line to stop back-flow.
backwash	A process in which beds of filter or ion exchange media are subjected to flow directly opposite the service flow direction to loosen the bed and flush suspended matter which collects during the service run.
backwash control	A flow control device that regulates or restricts the flow of backwash fluids.
bacteria	Micro-organisms typically reproduced by cell division.
base	When dissolved in water, this is a substance which releases hydroxyl ions. Bases react with acids to form a neutral salt in water.
brine	A concentrated solution made up of salt(s) used in the regeneration of ion exchange water softeners. Also applies to the mixed sodium, calcium and magnesium chloride waste solution from regeneration.
brine tank	In a water conditioning system it is a vessel (tank) that holds the regenerant (salt) material. The regenerant is emersed in water that is used to recondition the systems’ resin bed.
BSPT	British Standard Pipe Taper. A 1:16 tapered thread.
buffer	A chemical which causes a solution to shift the pH to a specific value or causes it to resist changes in pH.

bypass or bypass valve	A valve system that allows untreated water to flow past a unit that is regenerating or otherwise being serviced. May be plumbed or integrated into the valve body.
calcium	When dissolved in water, calcium is a factor contributing to the formation of scale and insoluble soap curds which can help identify untreated (hard) water.
calcium carbonate equivalent	This signifies that the concentration of a dissolved mineral is chemically equivalent to the stated concentration of calcium carbonate. It a common basis for expressing the concentration of hardness and other salts in chemically equivalent terms to simplify certain calculations.
calendar override	The ability of the controller to be programmed for specific days of the week. This would disable the calendar (number of days) settings.
camshaft	A shaft having one or more eccentric lobes. The rotation of the camshaft will provide linear force away from the axis of rotation. Typically used to open spring loaded valves.
cation	An ion with a positive electrical charge such as calcium, magnesium and sodium.
cation exchange	A process in which cations in solution are exchanged for other cations from an ion exchanger.
chelate	The forming of a complex chemical compound in which a usually metallic ion is bound into a stable ring structure.
chelating agent	A chemical fed to water to neutralize undesirable metal ions, keep them in solution, and eliminate or reduce the normal effects of the ion.
chloramine	A combination of chlorine and ammonia for disinfecting drinking water.
chlorides	Generally soluble, high concentrations of chloride salts can contribute to corrosion problems.
coagulant	A material which causes the agglomeration of finely divided particles into larger particles for later removal by settling and/or filtration.
coagulation	The process of agglomerating very small, finely divided solid particles into larger particles.
Coliform bacteria	A group of microorganisms used as indicators of the possible presence of pathogenic bacteria or water contamination.
collector	A device designed to be used as an upper distributor to spread the flow of water in downflow column operation or to collect backwash water from a filter or ion exchange bed.
colloid	Very finely divided solid particles which do not settle out of a solution. Colloidal particle removal usually requires coagulation.
controller	A device used to accept inputs, make programmed decisions, and provide outputs that will determine the behavior of a system.
Cv (flow coefficient)	The flow of water in gallons per minute at 60^{o}F, that causes a pressure drop of one psi across a fully open valve.
deionization	A two-phase ion exchange process for the removal of all ionized minerals and salts from a solution. Phase-1, positively charged ions are removed by a cation exchange resin in exchange for a chemically equivalent amount of

	hydrogen ions. Phase-2, negatively charged ions are removed by an anion exchange resin for a chemically equivalent amount of hydroxide ions. Water molecules are formed when the hydrogen and hydroxide ions introduced in this process unite. The term, commonly abbreviated as DI, is often used in place of demineralization.
demand control	Regeneration of the conditioner is based on usage. Programmed in media/resin volume will determine the amount of usage allowed before regeneration.
demineralization	Similar to deionization, it is the removal of ionized minerals and salts from a solution by a two-phase ion exchange procedure. The term demineralization is used interchangeably with deionization.
density	The mass of a substance per specified unit of volume. An example would be pounds per cubic foot. Apparent density is the mass per unit volume including pores; true density is the mass per unit volume excluding pores.
disinfection	A process which may involve disinfecting agents such as chlorine, or physical processes such as heating to kill vegetative bacteria.
dissolved solids	The weight of matter in true solution in a stated volume of water which includes both organic and inorganic matter and is usually determined by weighing the residue after evaporation of the water at 105 or 180^{o}C.
downflow	It is a term which designates the downward direction flow of water or a regenerant through an ion exchanger or filter.
drain	The pipe or conduit in a plumbing system which carries liquids to waste by gravity.
drain line	A pipe or tube from a water conditioning unit that carries regeneration wastes, backwash water and/or rinse water to a drain or waste system.
durez nut	A nut made from a phenolic plastic that has impact strength and resistance to flex.
EEPROM	Electrically Erasable Programmable Read Only Memory. Device used to store application parameters that must be retained indefinitely when power is lost (non-volatile memory).
effluent	Similar to the softened water from an ion exchange softener, it is the stream emerging from a unit, system or process.
electrolyte	A substance which, when dissolved in water, separates into ions which may carry an electric current, or a nonmetallic substance that carries an electric current.
exhaustion	After the depletion of the initial supply of exchangeable ions, it is the state of an ion exchange material that is no longer capable of effective function.
fast rinse	During the regeneration cycle clear water is directed through the media/resin bed. Any regenerant residual is rinsed out.
filter	A system or device used for the removal of suspended solids (solid particles).
filter area	A filter media's usable area. May be expressed in square feet (square meters).

filter medium	A material used in a filter bed which forms a barrier to the passage of some dissolved molecules or suspended solids.
floc	A collection of finely divided suspended particles in a larger, often gelatinous particle which would come as the result of physical attraction or adhesion to a coagulant compound.
flow control	A device designed to restrict the flow of liquid which may include a throttling valve, a pressure compensating orifice, or an orifice of fixed diameter.
flow rate	Often expressed in gallons per minute, it is the quantity of regenerant or water which passes a given point in a specified unit of time.
globe valve	A type of valve in which the closing element is a flat or rounded gasket or a sphere, which is moved into or onto a round port.
grain (gr.)	A weight unit which is equal to 1/7000 of a pound, or 0.0648 gram.
grain(s) per gallon (gpg)	A unit of measure for reporting water analyses in the United States and Canada; one grain per U.S. gallon is equal to 17.12 milligrams per liter (mg/l) or parts per million (ppm). One grain per British (Imperial) gallon is equal to 14.3 milligrams per liter or parts per million.
gram (g)	The basic metric unit of weight (mass), originally intended to be the weight of 1 cubic centimeter of water at 4^{o}C. One pound equals 454 grams.
gram-milliequivalent	1/1000 the equivalent weight of a substance in grams.
greensand	A mineral primarily composed of complex silicates which possess ion exchange properties.
hardness	A natural water characteristic which comes primarily from the presence of dissolved polyvalent cations, such as calcium and magnesium. Water hardness forms an insoluble "curd" when contacting soaps. Scale in water systems is a result of hard water. Hardness can be expressed in grains per gallon, parts per million, or milligrams per liter, all as calcium carbonate equivalent.
hydrogen sulfide	A poisonous gas with a foul smell that will cause headache and nausea. It can cause a black precipitate with many metals.
injector	A device that forces fluid into another fluid or substance.
injector screen	A fine mesh filter (screen) that traps foreign objects in the fluid flow.
inorganic matter	Matter not derived from living organisms. Types include rocks, minerals and metals.
intermittent flow	Interrupted patterns of water usage or the term used in reference to specific on-off flow patterns selected to test the performance of water conditioning equipment under standard conditions. May not be similar to actual patterns of use of installed equipment.
ion	An atom(s) that functions as a unit, which has a positive (cation) or negative (anion) electrical charge, resulting from the loss or gain of one or more electrons.
ion exchange	The process of releasing ions from an insoluble permanent material in exchange for ions in solution. The direction of the exchange depends upon

	the concentrations of the ions in the solution and on the affinities of the ion exchanger for the ions present.
iron	Often found in ground water supplies, iron is an undesirable element in water supplies because of: staining caused after oxidation and precipitation, tastes, and discoloration.
iron bacteria	A type of microorganism which is capable of utilizing ferrous iron, either from the water or from steel pipe, in their metabolism. The result is precipitating ferric hydroxide in sheaths and gelatinous deposits. These organisms will collect in tanks and pipe lines during periods of low flow, and can break loose in slugs of turbid water to create staining, odor and taste problems.
kilograin (Kgr.)	One thousand grains.
kilogram (kg.)	One thousand grams.
magnesium	An element found in the earths crust, the compounds make water hard when dissolved. The presence of magnesium in water can contribute to the formation of scale and insoluble soap curds.
manganese	Found dissolved in ground water, usually with dissolved iron but in lower concentration; can cause black stains and other problems similar to iron. Can be removed by a water softener or it can be precipitated by chlorine at a pH of 9.5 or above.
manganese greensand	Greensand which has been processed to incorporate the higher oxides of manganese. This product has a mild oxidizing power, and is often used in the oxidation and precipitation of iron, manganese and/or hydrogen sulfide, and their removal from water.
manifold	A pipe with several lateral outlets. Connection between a regeneration system and the water system.
manual regeneration	A regeneration cycle that was initiated manually instead of by the controller.
mg/L	Milligrams per liter (abbreviation).
micrometer	A linear measure equal to one millionth of a meter (.00003937 inch). Also known as a micron. “um” is the symbol for micrometer.
micron	Refer to micrometer.
micron rating	A term used to describe a filter medium to indicate the particle size above which all suspended solids will be removed throughout the rated capacity. This is an “absolute” not “nominal” rating.
milligram per liter (mg/L)	A unit concentration of matter which is used to report the results of water and waste water analyses. It is equal to the part per million in dilute water solutions, but varies from the ppm in concentrated solutions such as brine. As most analyses are performed on measured volumes of water, the mg/L is a more accurate expression of the concentration, therefore, the preferred unit of measure.
non-volatile memory	Memory that retains contents without power.
NPT	American National Pipe Taper. A tapered thread typically for pipe connections.

organic matter	Characterized by its carbon-hydrogen structure, organic matter is a substance of or derived from plant or animal matter.
osmosis	The passage of a solvent through a semipermeable membrane which will transmit the solvent but block the passage of the solute. The normal flow of solvent is from the dilute solution to the concentrated solution tending to equalize the solutions on both sides of the membrane. (Refer to reverse osmosis.)
oxidation	A chemical process in which electrons are removed from an atom, ion, or compound; causing the substance's valence to increase. The process involves an oxidizing agent, which is reduced, and a reducing agent which is oxidized.
ozone	A strong oxidizing agent consisting of an unstable form of oxygen (O_3), which can be generated by an electrical discharge through air or regular oxygen. Ozone has been used in water conditioning as a disinfectant.
particle size	The size of a particle suspended in water as determined by its smallest dimension, usually expressed in micrometers.
parts per million (ppm)	ppm is a common basis for reporting the results of water and waste water analysis. ppm is the number of parts by weight of a constituent, per million parts by weight of water or other solvent. In a water solution, one part per million is equal to one milligram per liter. 17.12 ppm equals one grain per U.S. gallon.
potable water	Water which is pure enough for human consumption.
ppm	Parts per million (abbreviation).
pressure tank	The system's media/resin tank that functions at the same pressure as the water system.
R.O.	Reverse Osmosis.
rated pressure drop	As determined under standard test conditions, it is the pressure drop of a water conditioner or filter at the rated service flow, with clean water at a temperature of 60^{o}F, and a freshly regenerated and/or backwashed conditioner or filter.
rated service flow	The maximum flow rate specified by the manufacturer at which a water conditioner will deliver treated water, or the flow at which a filter will deliver quality water as specified for its type.
rated softener capacity	Determined under standard test conditions, this is a water conditioner capacity rating. It is based on grains of hardness removed while producing treated water between successive regenerations, and relative to the amount of regenerant required for each regeneration.
recovery	This indicates the amount of product water taken from the feed water stream in reverse osmosis processes. It is expressed as a percentage of product water flow rate to feed water flow rate.
regenerant	The solution used to restore the capacity of an ion exchange system. Examples would be sodium chloride brine (used as a regenerant for ion exchange water softeners) or acids and bases (used as regenerants for the cation and anion resins used in demineralization).

regeneration	A process of restoring an ion exchange medium to a usable state after exhaustion. This would include the backwash, regenerant introduction and fresh water rinse steps necessary to prepare a water conditioner exchange bed for service. The term regeneration may also be applied to the step in which the regenerant solution is passed through the exchanger bed.
regeneration cycles	The separate parts of the regeneration process: backwash, brining/slow rinse, purge/fast rinse, refill, service.
reserve	The remaining capacity of the conditioner's media/resin bed to condition water. When the reserve drops to zero, the media/resin bed is regenerated to provide full reserve.
reverse osmosis (RO)	By the application of pressure, this process reverses the natural process of osmosis so that water is passed from the more concentrated solution to the more dilute solution through a semipermeable membrane.
semipermeable membrane	Usually thin, this organic film allows the passage of some ions or materials while preventing the passage of others. In electrodialysis, semipermeable membranes will only allow the passage of cations. In reverse osmosis, the membranes reject most dissolved substances, but allow the passage of water.
slow rinse	During the regeneration cycle regenerant is drawn from the regenerant tank and directed through the media/resin tank.
soft water	Water that contains less than 1.0 gpg (17.1 mg/L) of hardness minerals, expressed as calcium carbonate.
softened water	Water which is treated to reduce hardness minerals to 1.0 gpg (17.1 mg/L) or less, expressed as a calcium carbonate equivalent.
solvent	Water or other liquid in which other materials are dissolved.
specific conductance	The measure of the electrical conductance of water or a water solution at typically 25^{o}C.
specific gravity	Exact ratio of the weight of a specific volume of a substance in comparison to the weight of the same volume of pure water at 4^{o}C.
specific resistance	The measure of the electrical resistance of water or a water solution at typically 25^{o}C.
super capacitor	A large capacity capacitor that can be charged to store electrical power. This is used in the event of a power failure to provide electricity to memory functions such as a running clock.
tank jacket	A decorative sleeve that covers the media/resin tank. Also provides a barrier that prevents tank sweating.
TDS	Total dissolved solids (abbreviation).
time clock control	Regeneration of the conditioner is based on calendar settings; day of the week or days between regeneration. Programmed media/resin volume has no effect on when regeneration occurs.
top plate	As related to a water conditioning valve, this is the topmost part of the valve, usually the last body part assembled. Removal of the top plate will expose the inner workings of the valve.

torx wrench	A tool used to screw down and tighten screw type fasteners. Vertical engagement sides and six lobes reduce stripping.
total acidity	Total sum of all acid forms. Usually determined by titration with a standard base solution to the phenolphthalein endpoint (pH 8.3).
total alkalinity	Total alkalinity will include many components such as hydroxides, carbonates, and bicarbonates and is the alkalinity of a water sample as determined by titration with standard acid solution to the methyl orange endpoint (pH approximately 4.5). Alkalinity may be abbreviated as “M”.
total cations	The sum of positive ions Ca + Mg _ Na + K all reported in grains per gallon as $CaCO_3$. Total cations should always equal total anions.
total chlorine	The total chlorine concentration in water, includes free and combined chlorine.
total dissolved solids (TDS)	The weight of solids which are in true solution per unit volume of water. Can be determined by the evaporation of a measured volume of filtered water, and determination of the residue weight.
total hardness	Total sum of all hardness constituents in a water, conveyed as their equivalent concentration of calcium carbonate. The sum may include small amounts of metals such as iron, which can act like calcium and magnesium in certain reactions.
turbidity	Cloudiness in water, as the result of suspended, undissolved particulate matter, which gives color or cloudiness to the water. Turbidity can be removed by filtration.
turbine	A circular vaned device that is driven by air or fluid flow.
twin manifold	A connection between the water system and two water conditioning units.
valve disc (flapper)	The movable part of the valve that is in contact with the camshaft lobes. These flappers are pushed open by the camshaft to change the direction of flows inside the valve.
variable reserve	On a demand conditioning system it is a programmed percentage that is added to the average daily usage. This total is used as the actual demand.
water conditioning	The removal of the principle cause of hardness from water; calcium and magnesium ions. Any form of water treatment used to improve the aesthetic quality of water. (Not health related.)
water cycle	The cycle of water in the natural environment. Rain/snow, flow into or over the earth, evaporation into clouds.

SECTION K—WARRANTY

This section explains the product warranty.

GE OSMONICS RESIDENTIAL VALVES AND CONTROLLERS LIMITED WARRANTY

For a period of five years (60 months) from the date of the manufacture of residential valves and controllers (timers) produced by GE Osmonics (we), we warrant that the Goods shall conform to our published specifications and shall be free from defects in material and workmanship when used with applications within our published specifications. This warranty applies to all residential control valve bodies, 1265 or 256 bypass valves, 400, 900 or 700 Series valve controllers (electronic or mechanical), or 700 series residential valve controller systems manufactured directly by GE Osmonics. Excessive weathering or component fatigue that causes valve or controller failure due to outdoor or harsh environment applications without adequate protection is not covered by this GE Osmonics limited warranty.

Any claim for breach of these warranties must be in writing and received by us within 60 months of the delivery of the Goods at issue, or the claim will be void. Our sole responsibility and your exclusive remedy for any breach of these warranties is limited to: (a) replacement of non-conforming Goods; or (b) re-performance of the goods at issue. Should applicable law prohibit this limitation of your remedies, then we agree that the maximum amount you may claim from us is twice the applicable portion of the net purchase price you paid us for the non-conforming Goods and Services. You, as the original purchaser, are not entitled to extend or transfer this warranty to any other party. The foregoing warranties are in lieu of and exclude all other warranties, statutory, express or implied, including any warranty of merchantability or of fitness for a particular purpose.

SECTION L—APPENDIX

This section provides a form to give us your feedback.

If you have any comments, or suggestions regarding this manual, use this form. Please list the page number and a description of the change.

You may also copy the page, mark it up in black ink, avoiding the side margins, and fax it to us with our form as a cover page.

GE Water Technologies

DOCUMENT FEEDBACK FORM

Send us your comments on this manual.

TO: GE Osmonics Dealer Relations Desk

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Thanks for your input.