

Logix 764

Operation Manual

**Models: 293/298 Magnum IT
Twin Alternating
Twin Parallel
Single with Remote Regeneration Start
Multi-Single Tank with Lockout**

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Safety Information

This water conditioner's control valve conforms to UL/CE Standards. Generic valves were tested and certified for compliance as verified by the agency listing.

- Please review the entire Installation and Operation Manual before installing the water conditioning system.
- As with all plumbing projects, it is recommended that a trained professional water treatment dealer install the water conditioning system. Please follow all local plumbing codes for installing this water conditioning system.
- This system will not make microbiologically unsafe water safe. Water that is unsafe must be treated separately from this conditioner.
- This water conditioning system is to be used only for potable water.
- Inspect the water conditioning system for carrier shortage or shipping damage before beginning installation.
- Use only lead-free solder and flux, as required by federal and state plumbing codes, when installing soldered copper plumbing.
- Use caution when installing soldered metal piping near the water conditioning system. Heat can adversely affect the plastic control valve and bypass valve.
- All plastic connections should be hand tightened. Teflon¹ tape may be used on connections that do not use an O-ring seal. Do not use pipe dope type sealants on the valve body. **Do not use pliers or pipe wrenches.**
- Do not use petroleum-based lubricants such as Vaseline, oils or hydrocarbon-based lubricants. Use only 100% silicone lubricants.
- Use only the AC adapter supplied with this water conditioning system.
- All electrical connections must be completed according to local codes.
- The power outlet must be grounded
- Install an appropriate grounding strap across the inlet and outlet piping of the water conditioning system to ensure that a proper ground is maintained.
- To disconnect power, unplug the AC adapter from its power source.
- Observe drain line requirements.
- Do not support the weight of the system on the control valve fittings, plumbing, or the bypass.
- Do not allow this water conditioning system to freeze. Damage from freezing will void this water conditioning system's warranty.
- Operating ambient temperature: 34° to 120°F (1° to 49°C).
- Operating water temperature: 34° to 100°F (1° to 38°C).
- Operating water pressure range : 25 to 100 psi (1.72 to 6.89 bar). In Canada the acceptable operating water pressure range is 25 to 100 psi (1.72 to 6.89 bar).
- 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 or laying the tank on its side can cause media to enter the valve.
- Use only regenerants designed for water conditioning. Do not use ice melting salt, block salt or rock salt.

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

Installation Profile Summary

Installation Date: _____

Installation Location: _____

Installer(s): _____

Phone Number: _____

Valve Number: _____

Application Type: (Softener) (Filter) (Dealkalizer)

Water Source:

(Public Well) (Private Well)

(Surface Supply)

(Other)

Water Test Results:

Hardness: _____ Iron: _____

Other: _____

Misc:

Capacity: _____ Flow Rates: ____ min. _____ max.

Tank Size: Diameter _____ Height: _____

Resin or Media Volume: _____

Resin or Media Type: _____

Brine Tank Volume: _____

Salt Setting per Regeneration: _____

Control Valve Configuration:

Valve Type: _____

(Hard Water Bypass) (No Hard Water Bypass)

Refill Control: _____ gpm

Injector Control: _____ gpm

Backwash Control: _____ gpm

Electronic Demand Settings

P1 Time of day _____

P2 Day of week _____

P3 Time of regeneration _____

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

P6 Amount of regenerant used or filter backwash time (salt setting) _____

P7 System capacity _____

P8 Hardness (not used on Filters) _____

P9 Units of measure _____

P10 Clock mode _____

P11 Service interval _____

P12 Remote regeneration switch delay _____

P14 Refill rate (conditioner only) _____

P15 Draw rate (conditioner only) _____

P16 Reserve type (not used for alternating mode) _____

P17 Initial average or fixed reserve (not used for alternating mode) _____

P18 Flow sensor select _____

P19 K-factor or pulse equivalent _____

Pr Refill First Option (not used for alternating mode) _____

Pd Remote Switch Operation _____

How To Use This Manual

This installation manual is designed to guide the installer through the process of installing and starting water conditioning systems featuring the Logix 764 controller.

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

- Training in the 764 series control and the 298/293 valve.
- Knowledge of water conditioning and how to determine proper control settings.
- Adequate plumbing skills.

Icons That Appear In This Manual



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

Note: Helpful hint to simplify procedure.

The Logix 764 control can be installed on several type valves that can have twin alternating, parallel or single tank configuration. The section on Logix 764 start-up provides a simple explanation of the valve types that are pre-programmed in the 764 control.

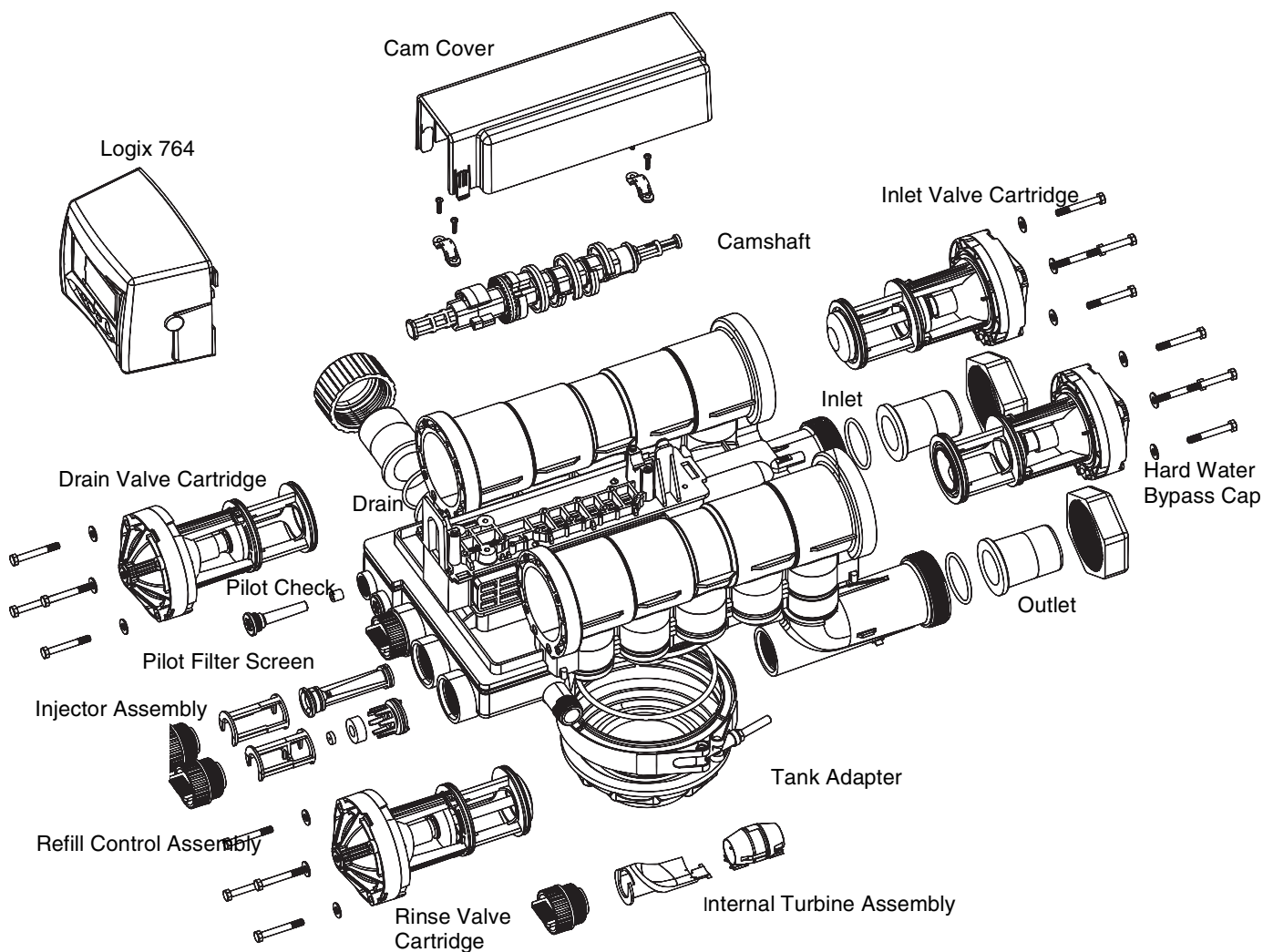


Figure 1 293/298 Valve Layout

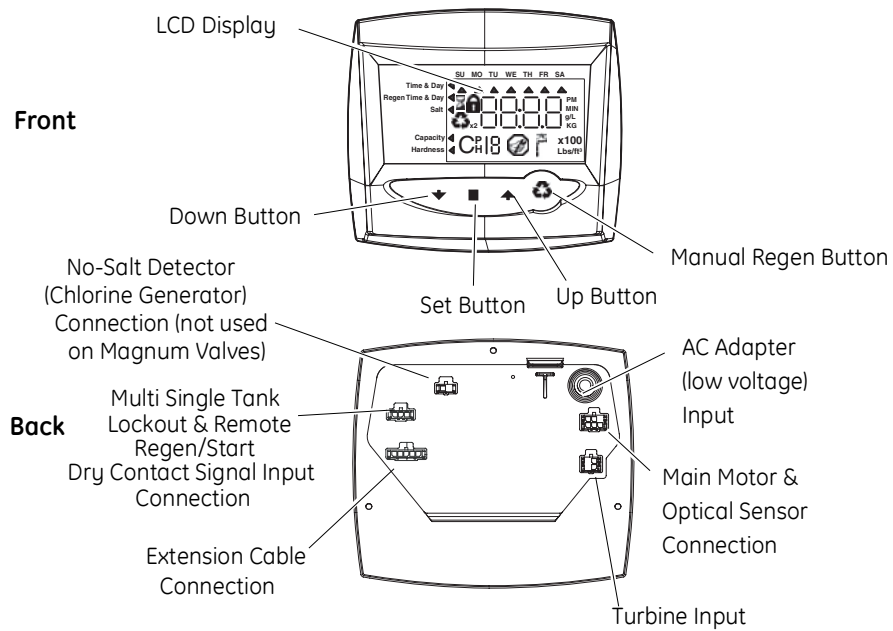


Figure 2 764 Controller Identification

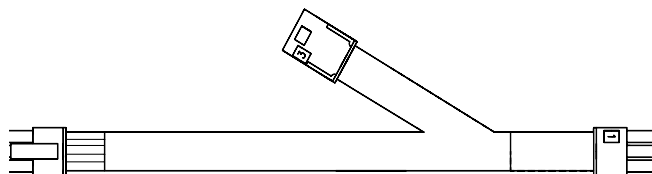


Figure 3 Remote Start/Multi-Tank Lockout Cable

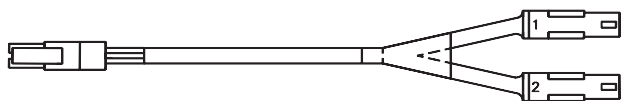


Figure 4 Twin Sensor Cable

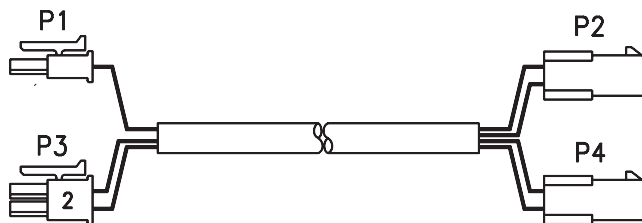


Figure 5 Twin Cable Extension

Location Selection

Location of a water conditioning 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 100 psi (6.89 bar) and above 25 psi (1.7 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 control are designed for use in 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, or upwards spray from sprinkler.

Caution: This unit is for dry location use only unless used with a listed Class 2 power supply suitable for outdoor use.

- **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.
- **Temperature** – Extreme hot or cold temperatures will cause damage to the valve or control. Freezing temperatures will freeze the water in the valve. This will cause physical damage to the internal parts as well as the plumbing and conditioning resin. High temperatures will affect the control. The display may become unreadable but the control should continue to function. When the temperature returns to normal operating limits the display will re-appear. A protective cover should assist with high temperature applications.
- **Insects** – The control 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 duct tape. The top cover should be installed securely in place.

Assembling the Logix 764 Control to the Magnum Valve

The control and the Magnum valve work together as an integral system to ensure synchronization. Follow the steps outlined below to install the control on the Magnum valve.

Remove Cam Cover

Remove the cam cover by pressing in on the cover release tabs (Figure 6). Note the cover locking tab and the slot in the top plate. When you reassemble the cover, the locking tab is placed in the slot first and the cover lowered into position.

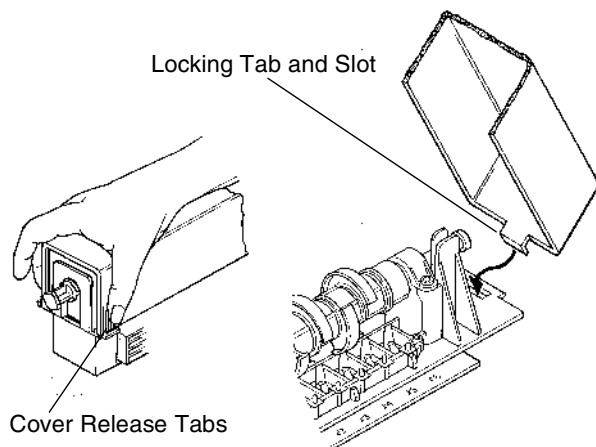


Figure 6

Align Camshaft

The camshaft is keyed and should only be engaged or disengaged when in the position illustrated (Figure 7). If the camshaft is not in the proper position, rotate the cam assembly counterclockwise until the camshaft arrow aligns with pillow block arrow.

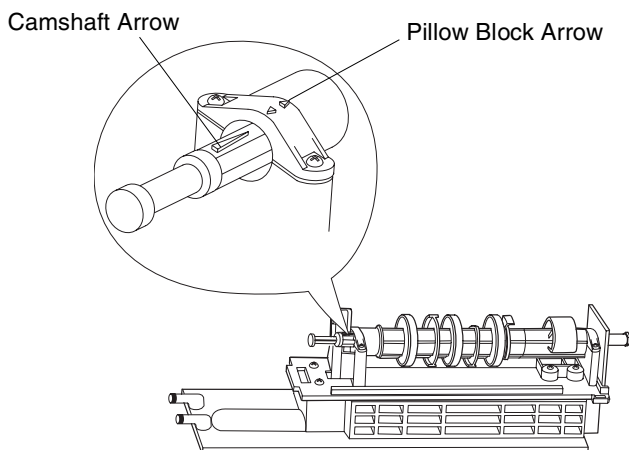


Figure 7

Slide Camshaft

Slide the camshaft toward the back of the valve by pressing on the release tab and pulling on the back end of the camshaft (Figure 8). The front end of the camshaft will be flush with the mounting plate.

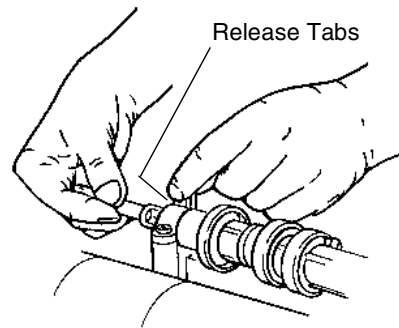


Figure 8

Removing the Control Faceplate

1. Press downward on top tab with fingers (Figure 9) while pushing up on bottom of control's face plate. **DO NOT push on top of control faceplate.**
2. When the lower mount bushings release, swing the lower end of the face plate outward to release.



Figure 9

Routing the Cables

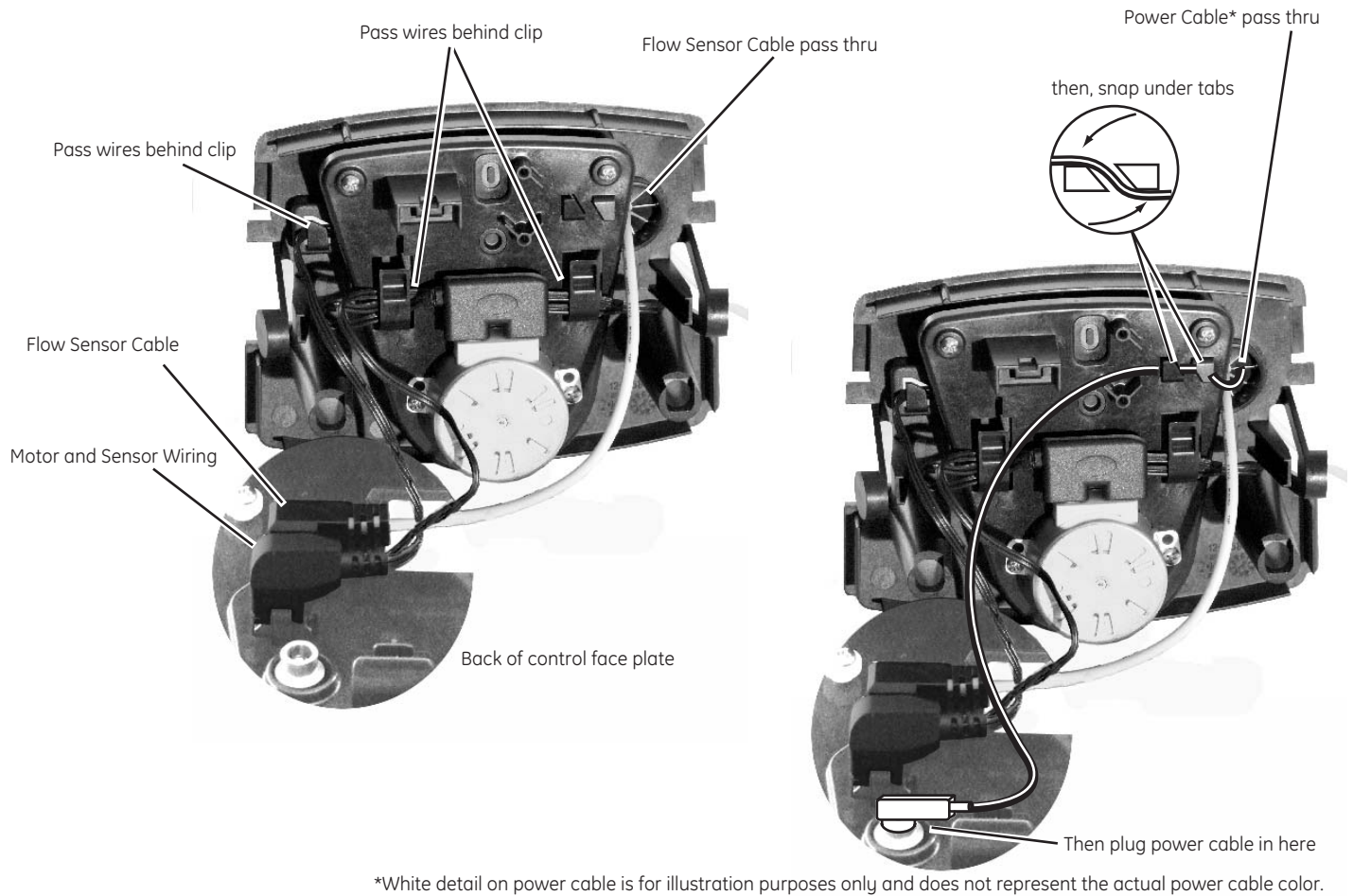


Figure 10

Replacing the Control Face Plate

1. Set the lower mount bushings into the backplate arms.
2. Then, swing top end of control face plate into position until it snaps into place.

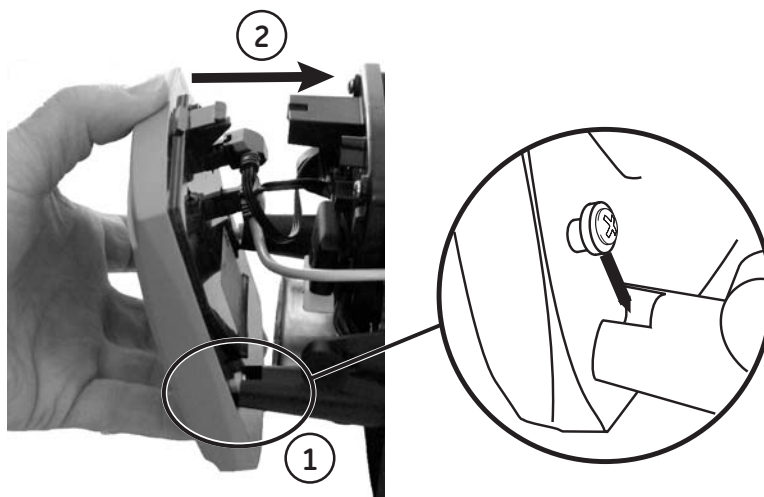


Figure 11

Mount Control

Mount the control onto the valve by sliding the mounting tabs over the mounting plate. Note that all models of Magnum controls mount to the valve in the same manner (Figure 12).

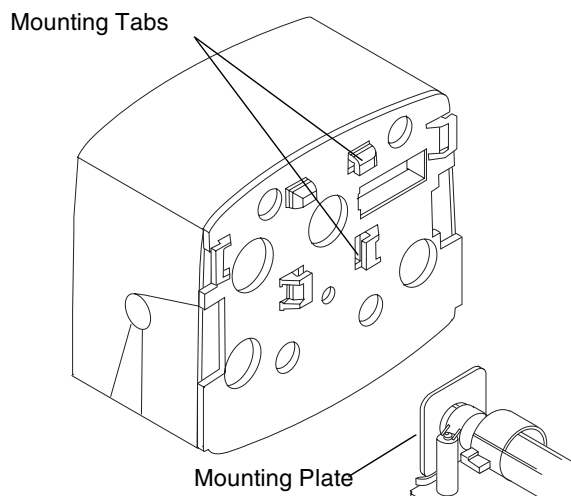


Figure 12

Engage Assembly

The camshaft will not rotate by hand when engaged with the controller. The Logix Magnum controller contains a motor with gears that drive a socket. The camshaft is keyed to only properly engage the socket when the Logix controller is in the treated water (Home) position.

If the camshaft is pulled back and not engaged it can be rotated counterclockwise. Rotate the camshaft to align the arrows (Figure 7). If the Logix Magnum controller is not in the treated water position, cycling the power will cause the socket to rotate to that position.

Engage the control by pressing on the release tab and pushing the camshaft into the control (Figure 13). Do not force the camshaft. If the camshaft does not slide freely into the control, check the alignment of the camshaft to the controller. Ensure it is in the proper position (Figure 7).

The Logix controller moves to the treated water (home) position when first power is applied.

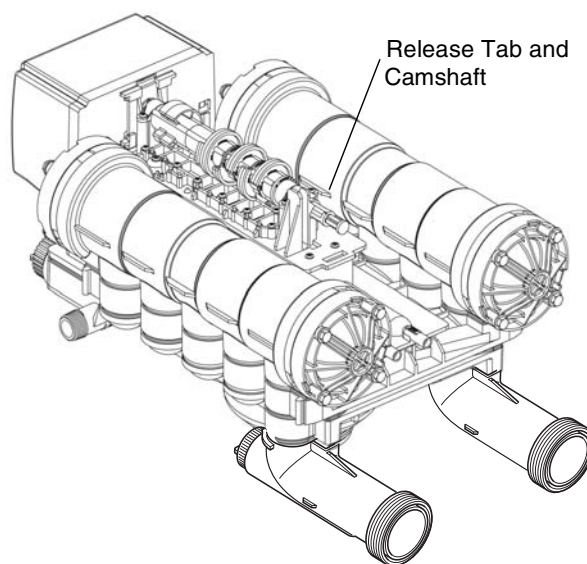


Figure 13

To disassemble the control from the valve, reverse the assembling procedure.

Inlet, Outlet and Drain Connections

The inlet, outlet, and drain connections are designed to accept a Pentair Water supplied CPVC or stainless steel adapter (Figure 14). The adapters provide a convenient union for the three connection ports on the valve. In addition, they incorporate a positive O-ring face seal for ease of installation and leak free operation. **DO NOT OVERTIGHTEN THE ADAPTERS.** As a general guideline, hand tightening the nut onto the valve is adequate. If additional tightening is required, never exceed a quarter turn beyond the hand tight position.

The outlet of the 2-inch Magnum IT has an integrated turbine. The turbine measures the flow of water through the outlet. This information is used by the controller to determine the best time to regenerate.

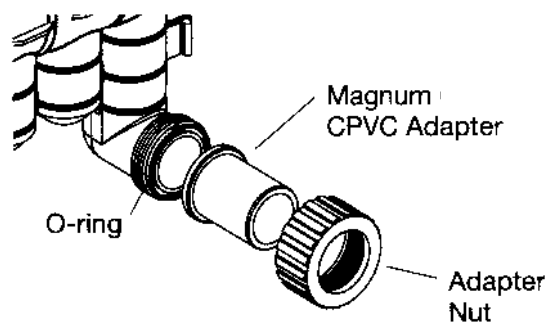


Figure 14

No Hardwater Bypass Feature

The Magnum control valve may be configured for “Hard Water Bypass” or “No Hard Water Bypass”. With Hard Water Bypass, unsoftened or unfiltered water is allowed to bypass the Magnum control valve during regeneration or backwash. With No Hard Water Bypass, a valve cartridge ensures that no unsoftened or unfiltered water bypasses the valve during regeneration or backwash.

It is easy to observe which option is installed in the valve. Note that the Hard Water Bypass End Cap has much longer standoffs than the No Hard Water Bypass cartridge. The No Hard Water Bypass assembly looks identical to the other three valve cartridges on the valve and has a label identifying the cartridge assembly (Figure 15).

*No Hard Water Bypass
No Unfiltered Water Bypass*

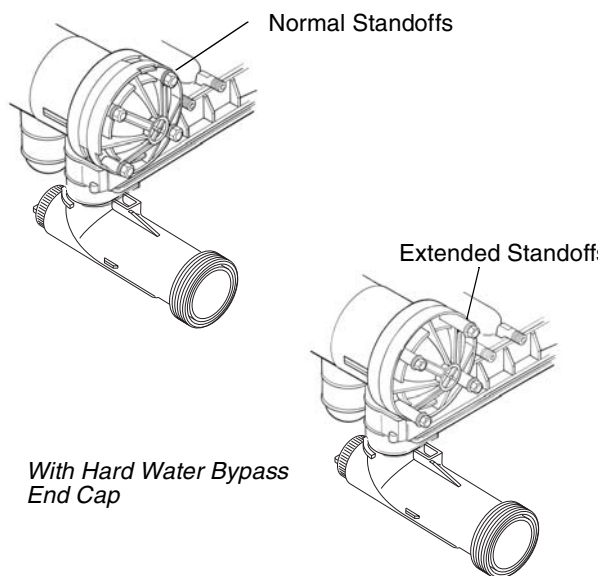


Figure 15

Hydraulic Output Signal

An optional hydraulic output signal is available on the valve. An optional cam lobe on pilot valve #6 is used on the camshaft assembly to initiate the hydraulic output signal during regeneration or backwash (Figure 16). The hydraulic line pressure signal is available through the 1/4-inch connection on the back of the valve marked “AUX”. See Figure 17. Remove the tube cap installed for shipping.

Optional cam lobes available are:

P/N 1000554 Provides a hydraulic signal from the beginning of BACKWASH through the start of REFILL.

P/N 1000553 Provides a hydraulic signal from the beginning of BACKWASH through the end of REFILL.

P/N 1041064 Breakaway cam. Can be programmed to send a hydraulic signal at any time during the REGENERATION or BACKWASH cycle. Note: The camshaft must be turning for the signal to change states, i.e. switch from OFF to ON, or from ON to OFF.

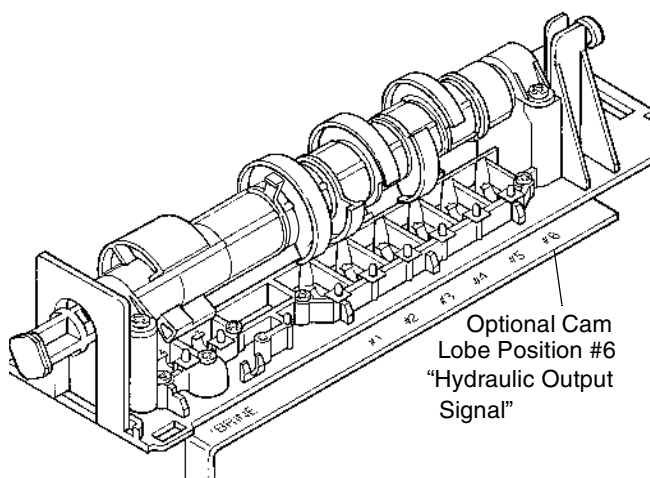


Figure 16

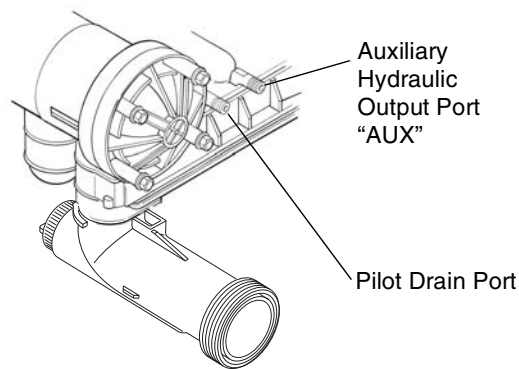


Figure 17

Magnum Tank Adapter and Riser

The Magnum now uses a stainless steel tank adapter that clamps onto the valve body.

The tank adapter on the control valve is designed to be compatible with a 4 inch-8UN (8 threads per inch) tank opening.

The valve is designed to accept a full 1-1/2-inch (3.81-cm) riser pipe with outside diameter of 1.90 to 1.91 inches (48.26 to 48.51 mm) (Figure 18). The riser pipe is sealed by an O-ring on the inside of the valve body (Figure 18). It is recommended that the riser pipe extend beyond the top of the tank by 1/4 inch $\pm$ 3/8 inch (6 mm $\pm$ 9 mm).

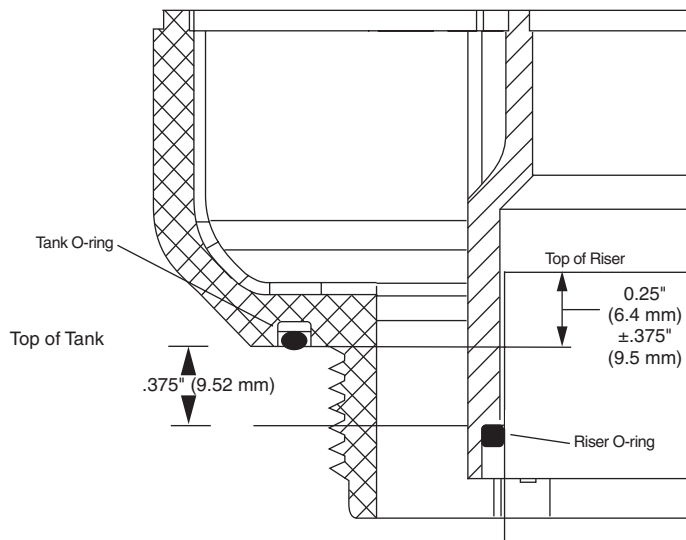


Figure 18

Optional Switch Assembly

A single optional feedback switch kit is available to provide an electrical signal during the entire regeneration or backwash cycle (Figure 19). The switch may be wired in the "Normally Open" or "Normally Closed" position and is rated for 0.1 amp at 125 volts AC. An optional 5.0 amp switch at 1/10 HP 125/250 volts AC is available upon request.

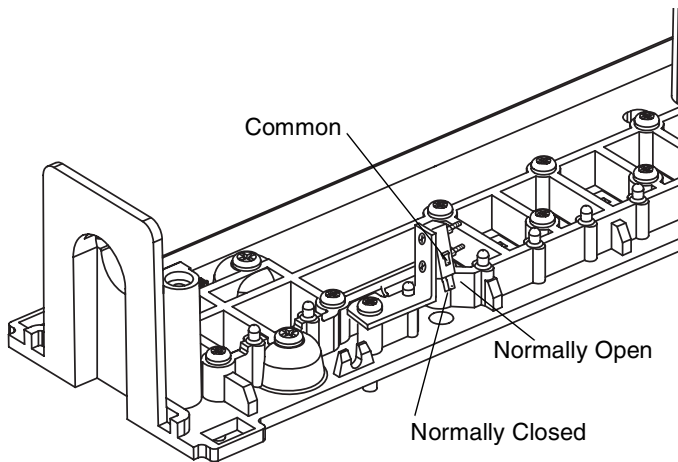


Figure 19

Optional multi-switch kits are available to provide additional electrical or switch closure signals during the regeneration or backwash cycles. Coupled with the optional breakaway cams, signals can be sent to external system equipment at virtually any time while the control/camshaft motor is running. Consult the instruction sheet covering the multi-switch option for additional application and programming information. The instruction sheet is sent with the switch kit.

Magnum General Specifications

Operating and Environmental

Dynamic Pressure	25 to 100 psig (172 to 688 kPa)
	100 psig (688kPa) maximum in Canada
Operating Water Temperature Range.....	34 to 100°F (1 to 36°C)
Ambient Temperature Range.....	34 to 120°F (1 to 50°C)
Cap Bolt Torque.....	35 to 40 inch lbs. (3.95 to 4.51 N _m)

Connections

Inlet and Outlet	2-inch Magnum IT
Tank	4-inch 8UN
Brine	3/4-inch NPT
Pilot Drain and Auxiliary Hydraulic Out.....	1/4-inch tube fitting
Riser Pipe Fitting	1-1/2 inch (3.81-cm)
Drain	1-1/2 inch (3.81-cm)

Physical

Dimensions.....	26-11/16" L, 16-1/4" W, 10-11/16" H
Approximate Weight (Valve and Control).....	27.3 lbs. (10.6 kg.)

Electrical*

Voltage - Logix 764 Series Control	12 VAC wall mount transformer only
Power Consumption	4 watts

*See section on Electronic Controls for alternative electrical configurations.

General Installation Information

Please review the following items thoroughly to ensure an efficient and safe installation of the water treatment system. The typical installation line drawings for the Magnum valves are shown in Figure 22.



WARNING: Filter media may need to be properly conditioned before the filter is placed into full operation. Consult the original equipment manufacturer for proper procedure.

Operating Conditions - A minimum dynamic operating water pressure of 25 psig (172 kPa) is required for the Magnum control valve to operate properly. Water pressure is not to exceed 100 psig (688 kPa). In Canada, water pressure is not to exceed 100 psig (688 kPa). Water temperature is not to exceed 100°F (36°C). Do not subject the valve to freezing conditions.

Space Requirements - Allow adequate space for the water treatment system and associated piping. A minimum of 4 1/2 inches (11.5 cm) front and rear clearance is required for cartridge assembly and removal.

Plumbing - Always follow good plumbing practices and conform to local codes. Check existing pipes for lime and/or iron buildup. Replace piping if heavy buildup exists and initiate the proper treatment to prevent additional occurrences. Locate the equipment close to a drain that is capable of handling the maximum drain flow rate during backwash.

Flexible Connectors - Some tanks expand and contract over the acceptable range of operating water pressures of the Magnum control valve. The use of flexible connectors is recommended on polywound or fiberglass tank installations of 24-inch (60.96-cm) diameter and larger. Follow the tank manufacturer's instructions for more information.

Inlet and Outlet Piping - Inlet and outlet plumbing should be adequately supported to avoid excessive loads on the valve. Install a manual bypass system to provide for occasions when the water conditioner must be bypassed for servicing.

Drain Line Piping - To prevent mineral loss during backwash, and to ensure proper operation of the control valve, **A DRAIN LINE FLOW CONTROL** must be plumbed into the drain line prior to placing the valve in the service mode. Flow controls from 5 to 40 gpm (18.92 to 151.4 Lpm) are available that can be easily installed in the drain line. Flow controls greater than 40 gpm (151.4 Lpm) must be plumbed externally. Selection

of the proper drain line flow control depends on the tank size and media used for the installation.

The following general drain line piping guidelines should be observed:

- 1-1/2 inch (3.81 cm) or larger piping
- Should not exceed 20 feet (6.1 m)
- Should not be elevated higher than five feet above the control valve
- No shut-off valves should be installed in drain line
- Minimal number of elbows and fittings should be installed in drain line
- Piping must be self-supporting
- Flow control should be installed as close to the Magnum Series control valve as possible if an external flow control is used.

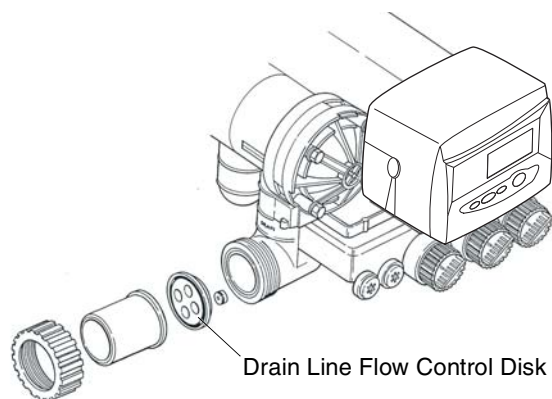


Figure 20

Brining System - The Magnum control valve utilizes timed water refill to add water to the salt tank. A refill tube with check ball is required in the brine tank that does not restrict the refill or brine draw flow rate capabilities of the valve. Although not required, a separate brine valve (safety float) system is recommended for use with Magnum installations. Select a "High-Flow" brine valve that does not restrict the refill or brine draw flow rate capabilities of the valve. The "Performance Injectors and Magnum Flow Controls" section of this manual contains flow rate information for various size injectors and refill controllers.

Pilot Drain - During regeneration, a small amount of water (200 ml or 1 cup) is discharged from the 1/4-inch (6.3-mm) tube fitting on the back of the valve marked DRAIN (Figure 21). To prevent this water from being discharged to the floor, plumb this connection to a non-pressurized drain or to the brine tank. **Do not plug or apply back pressure to the pilot drain at any time.**

Crimping the pilot drain line or installing the line to go up, which causes backpressure, prevents the diaphragm cartridges from shifting properly through the cycles of regeneration or backwash.

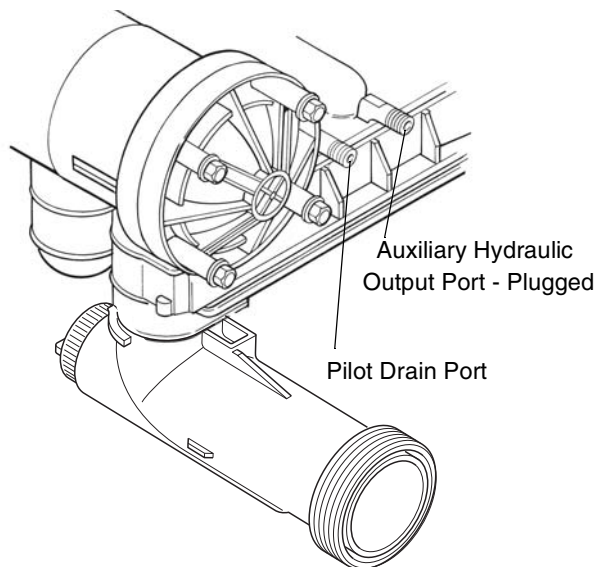


Figure 21

Magnum Valve Installation Guide (Top Mount)

Before the installation of the internal distribution system and loading of the media into the tank, the Magnum valve must be temporarily installed onto the tank. This will ensure that correct alignment of the inlet and outlet piping once the internals are installed and the media is loaded onto the tank.

1. Cut riser 1/4-inch above the top of the tank, plus or minus 3/8 inch. Place riser inside the tank.
2. Install tank O-ring into the tank adapter. **Be sure to lightly lubricate the O-ring with the 100% silicone lubricant provided with the valve.**
3. Screw the stainless steel tank adapter onto the empty tank until O-ring touches the top of the tank.
4. Turn (tighten) the tank adapter an additional 45° to 90° (max).
5. Slide clamp ring over tank adapter.
6. Mount valve on tank adapter until the valve uniformly contacts the tank adapter.
7. Align valve with plumbing connections to minimize unnecessary stress.
8. Remove the Magnum valve in preparation for installation of the internals and media loading.
9. Load media following your supplier's recommendations.
10. Re-mount valve on tank adapter.

11. Slide clamp ring over valve and tank adapter interface.
12. Tighten nut on clamp ring until valve cannot be turned in relation to tank adapter. The nut should be torqued to 20 to 25 ft-lbs.
13. Follow piping recommendations to provide support and flexibility. Layout piping to accommodate for tank and piping dimensional changes and potential water hammering. Flexible connectors may be needed.

Flex connectors are recommended when installing valves on FRP tanks that are 24 inches or larger in diameter.

Electrical

1. Electrical requirements for the installation depends on the configuration of the control.
2. The standard North American Series Logix electronic control is supplied with a 12 volt AC adapter. Optional AC adapters must be ordered separately for all international 12 VAC configurations.

Caution: The Logix Control and supplied AC adapter are for dry location use only, unless used with a Listed Class 2 power supply suitable for outdoor use.

Lubricants

It is very important that 100% silicone lubricant is the only lubricant used for installing the Magnum control valve. Any other lubricant may cause material degradation and potential failure of the valve components.

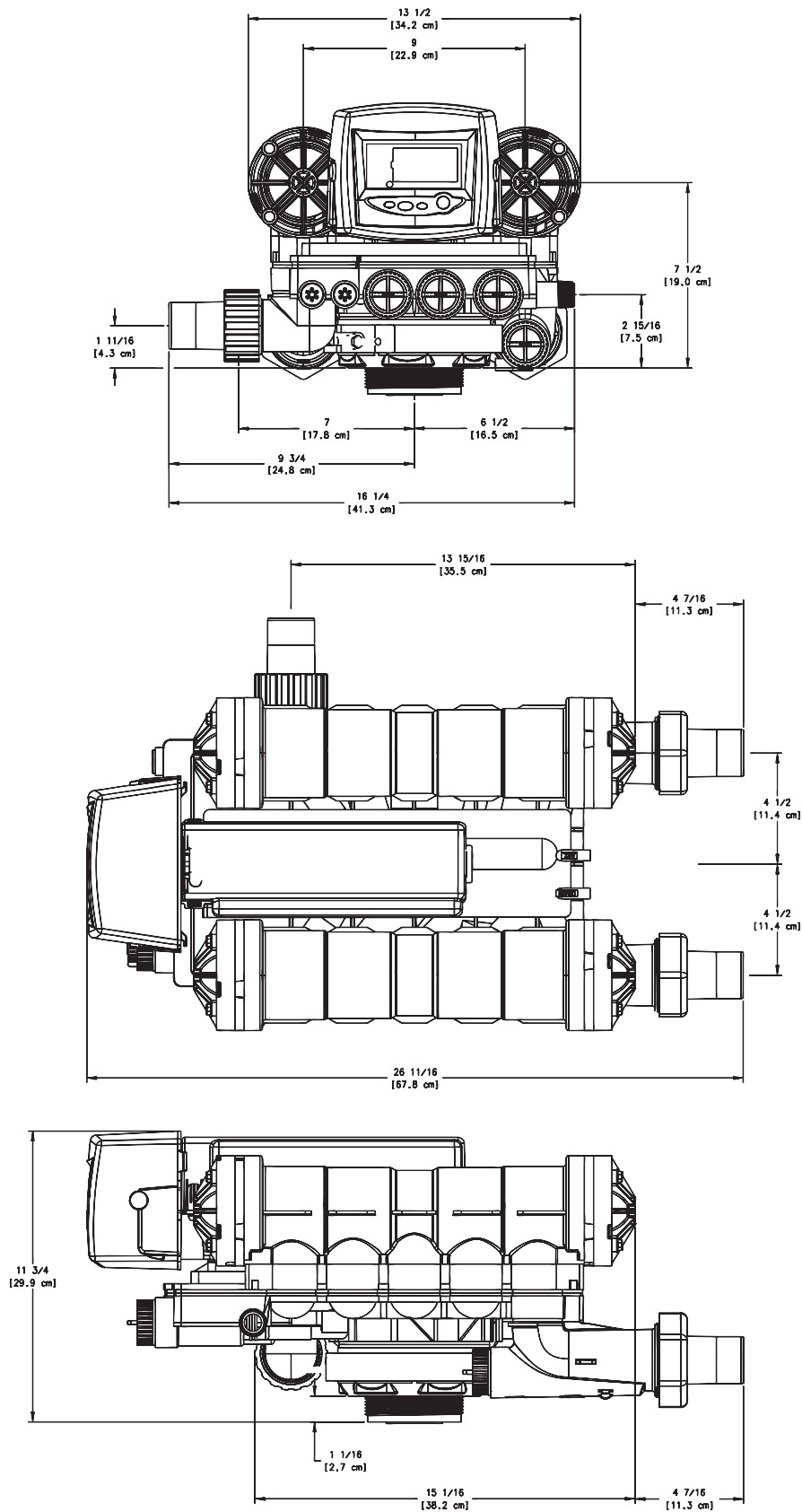
NOTE: Some silicone based lubricants contain petroleum-based ingredients. If there is a question about the lubrication that you are using contact the lubricant manufacturer to be sure the product is 100% silicone.

Caution: Plumbing cannot be used for electrical grounding when metal inlet and outlet piping is connected to a non-metal valve.

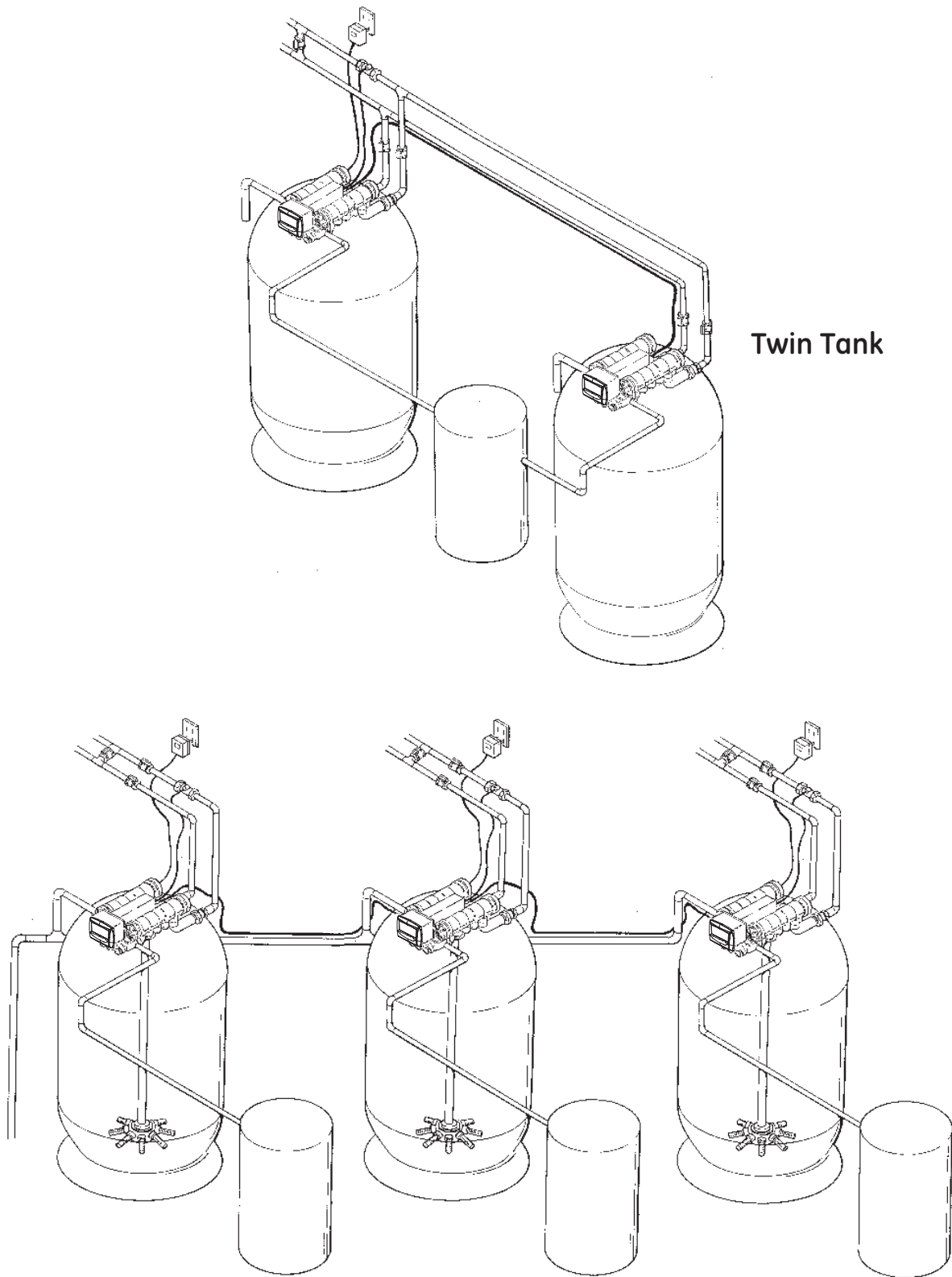
Connect the inlet and outlet piping together using a grounding strap or clamp to establish continuity.

Magnum IT Dimensional Specifications

2-Inch Inlet and Outlet, 1 1/2-Inch Drain



Typical Installation Drawings



Multiple Tank

Figure 22

Camshaft Cycle Positions

The front end of the camshaft has an indicator cup. The cup has slots in the outer edge and cycle numbers on the inside face.

Remove the cover and look over the top of the 764 control to view the cycle numbers. The number in the opening, (Figure 23) indicates the current cycle position of the control valve. The corresponding slot for the number is positioned at the optical sensor, which is rotated approximately 90 degrees out of phase.

Cycle Indicators:

- 0 = Treated Water
- 1 = Backwash Cycle
- 2 = Regenerant Draw Cycle
- 3 = Slow Rinse Cycle
- 5 = Fast Rinse Cycle
- 8 = Regenerant Refill Cycle

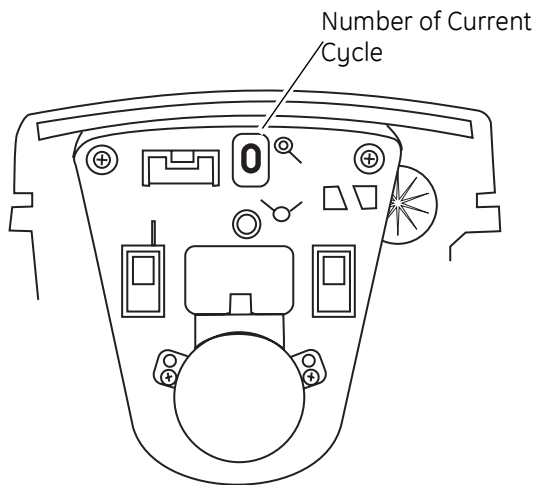


Figure 23 View with Cover and Logix Control Removed

764 Control Operation

Power Loss Memory Retention

The 764 control features battery-free Time of Day and Day of Week retention during loss of power. A super capacitor is designed to keep time for 8 to 24 hours depending on the installation. If the super capacitor is exhausted the Logix control will display four dashes (- - :- -) immediately upon power up. The Time of Day and Day of Week must be reset.

All other programmed parameters are stored in the static memory and are retained.

Flow Diagrams

The Magnum control valve utilizes a series of pilot valves to properly position the diaphragm valve cartridges (Figure 24). The pilot valves are activated by the camshaft (Figure 25). The flow diagrams that follow represent the **Service Cycle** for a 5-cycle conditioner and

3-cycle filter configuration. Both the Hardwater Bypass and No Hardwater Bypass service flow diagrams are presented.

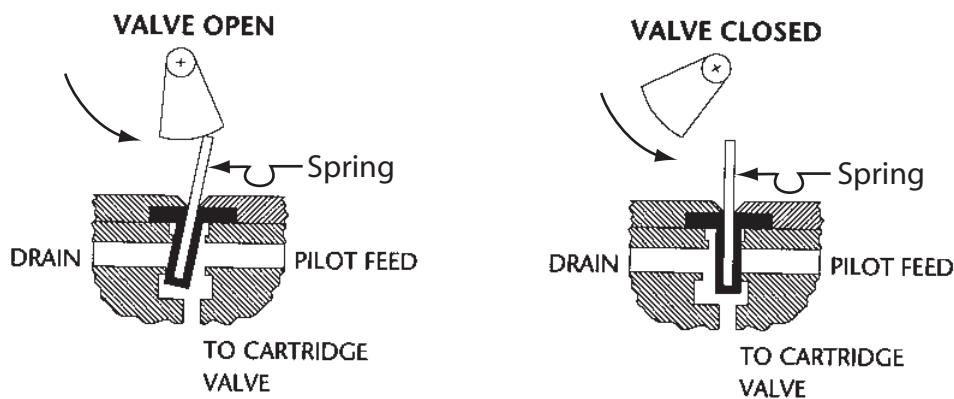


Figure 24 Pilot Valve Principle of Operation, Front View

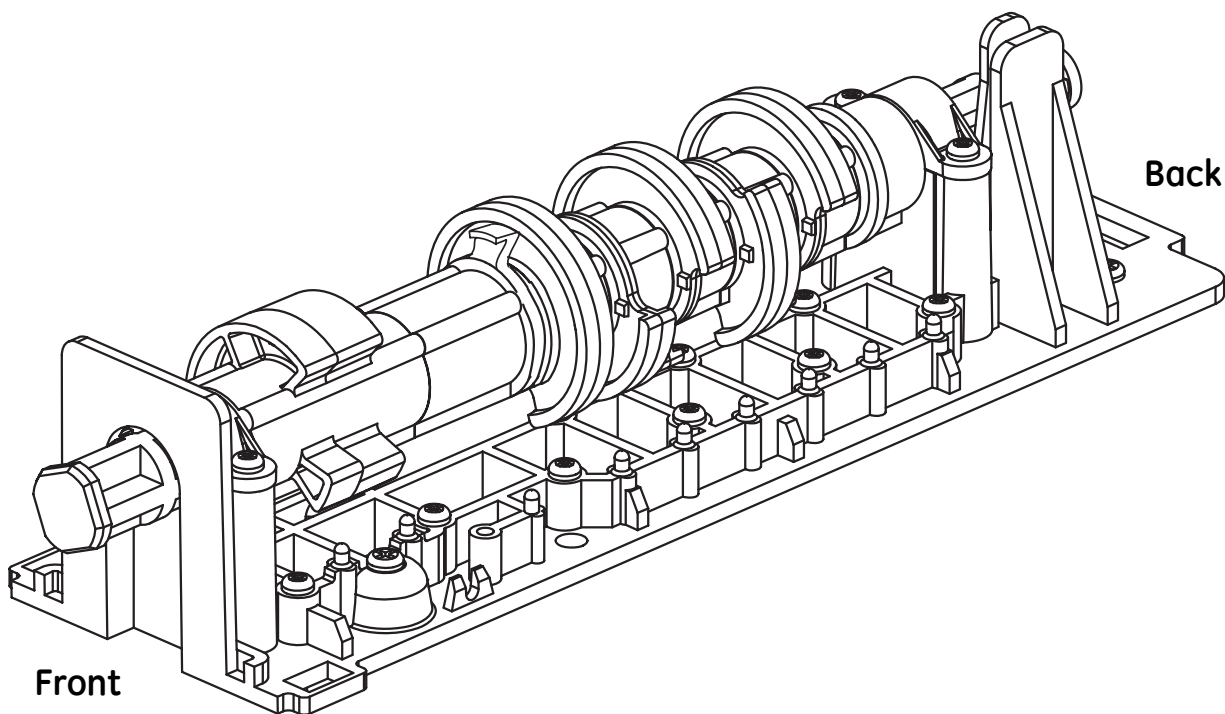


Figure 25 Cam Assembly

Magnum 5-Cycle Conditioner Hard Water Bypass Service Cycle

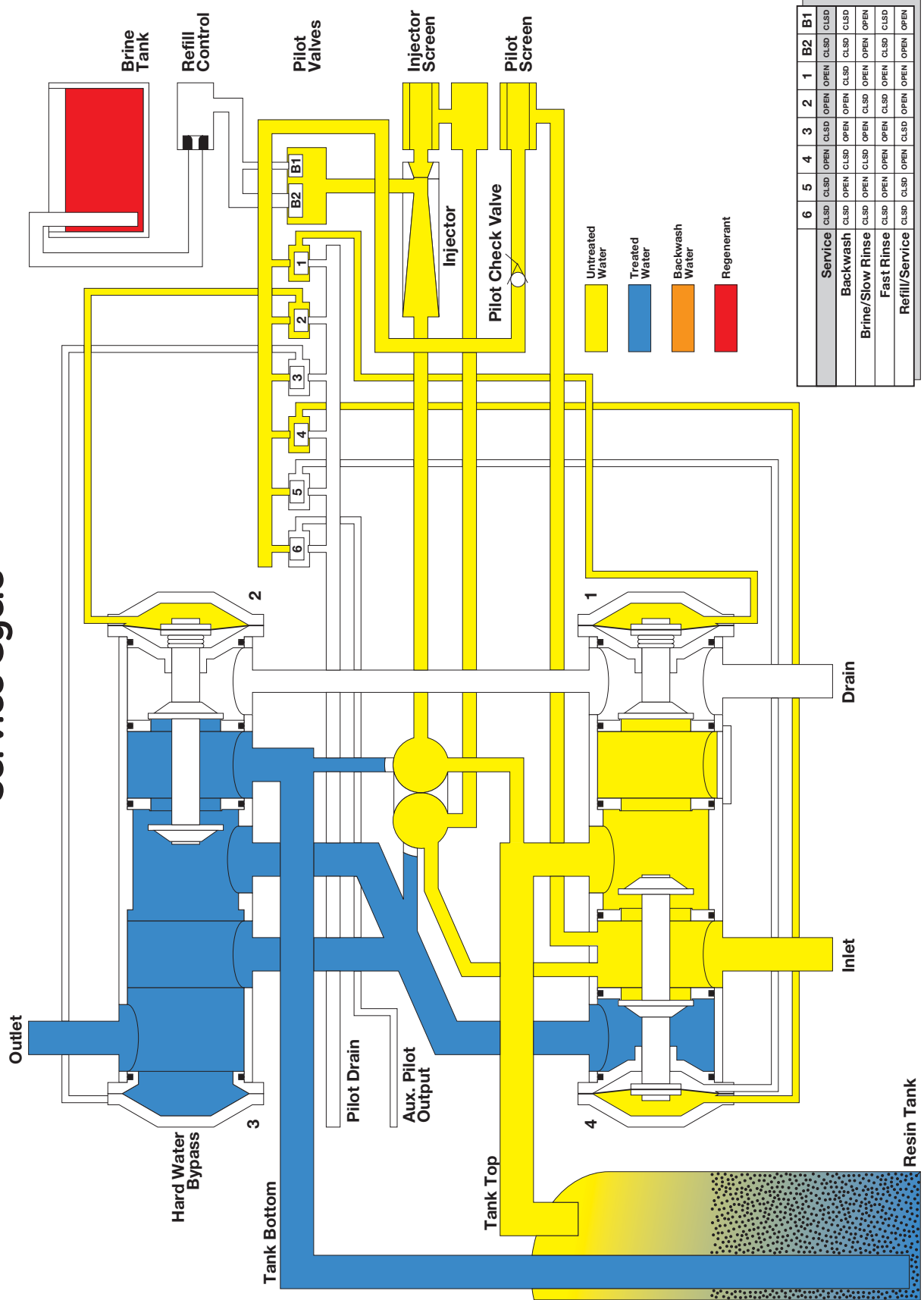


Figure 26

Magnum 5-Cycle Conditioner No Hard Water Bypass Service Cycle

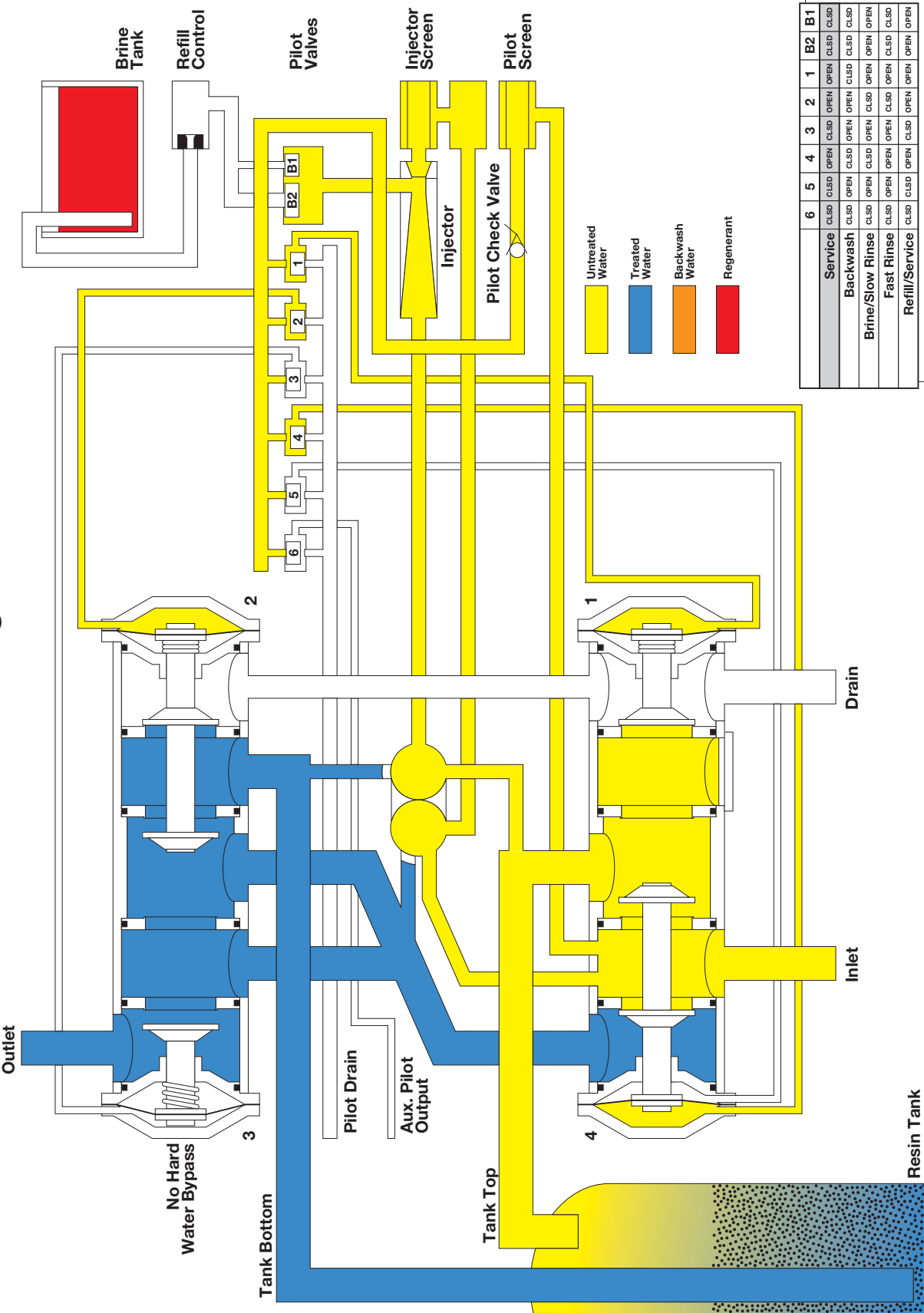


Figure 27

Magnum 3-Cycle Filter: Unfiltered Water Bypass Service Cycle

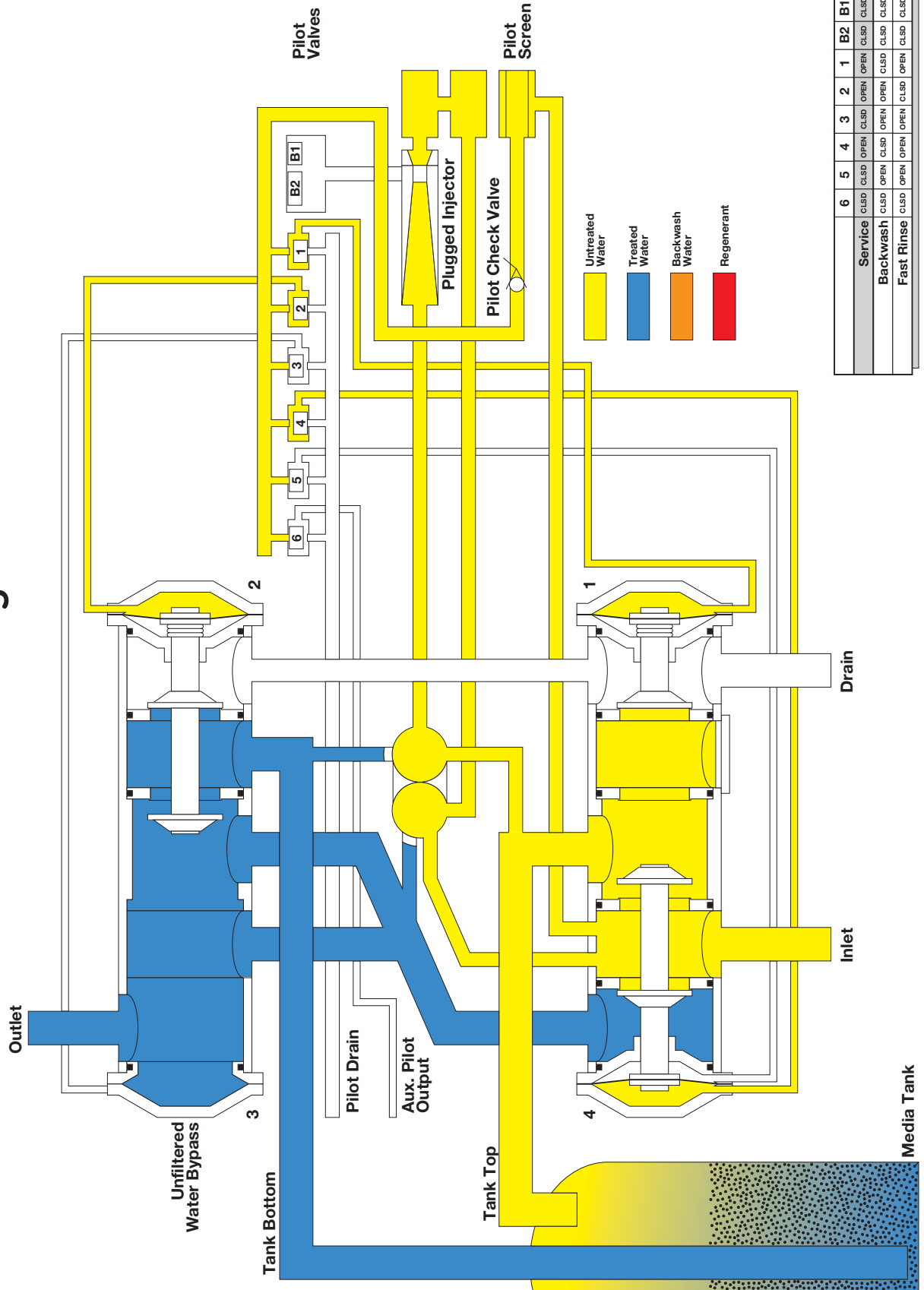


Figure 28

Magnum 3-Cycle Filter: No Unfiltered Water Bypass Service Cycle

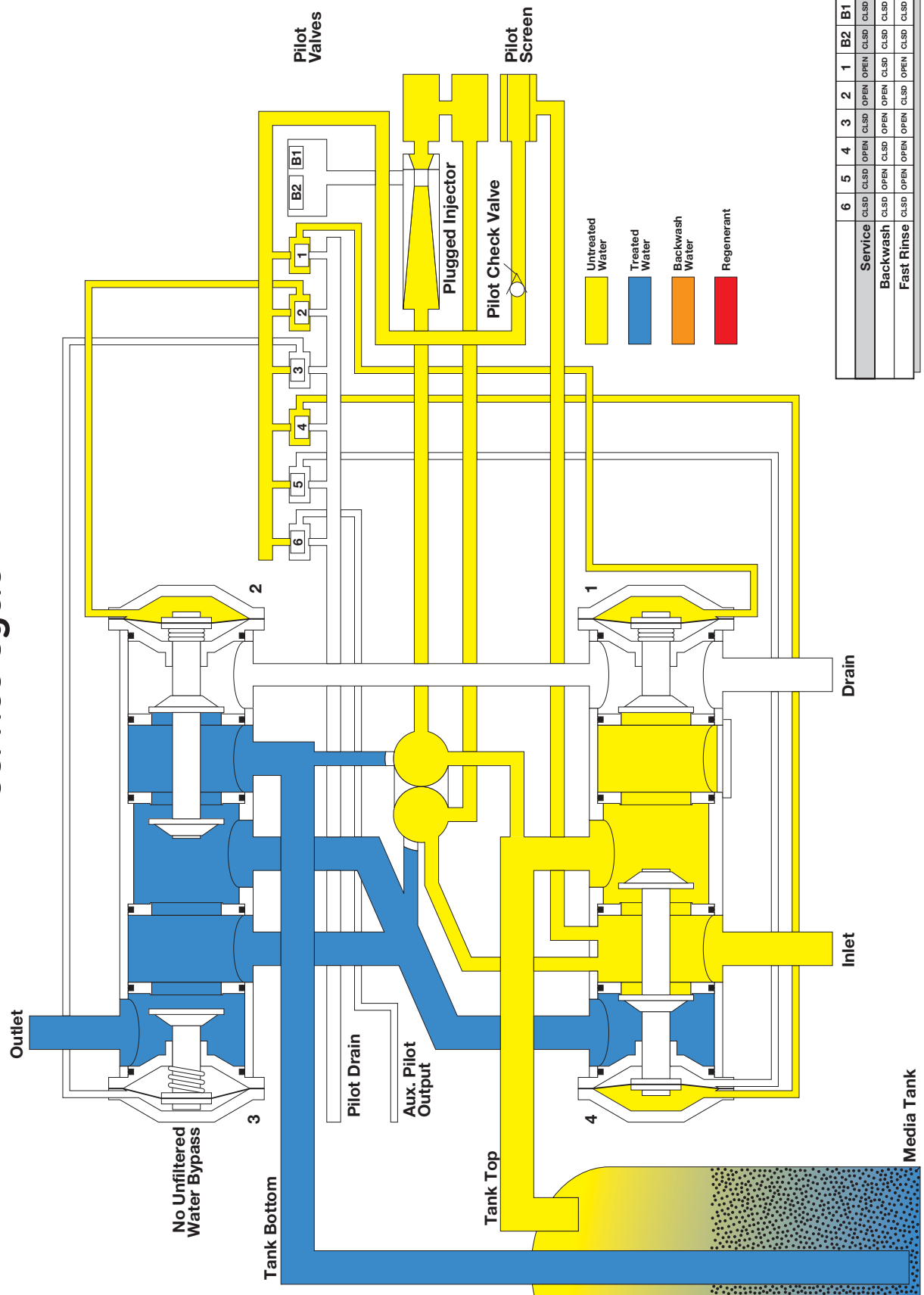


Figure 29

Identifying the Logix Control

If you are unsure of your control model, simply remove the cover and disconnect the controller module from the control valve. On the back of the control valve is a silver label that shows your model number and version revision.

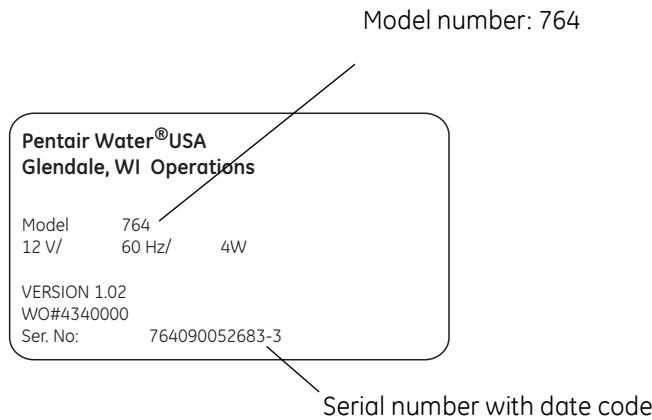


Figure 30

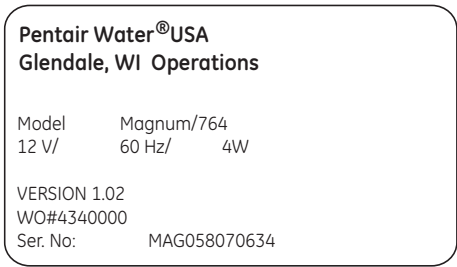


Figure 31

How To Read the Serial Number

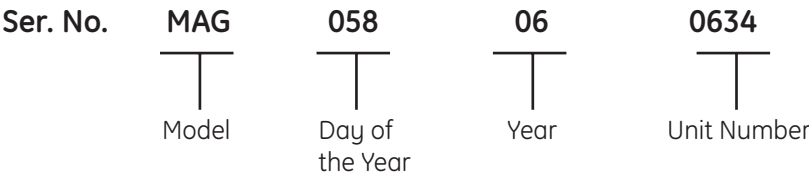
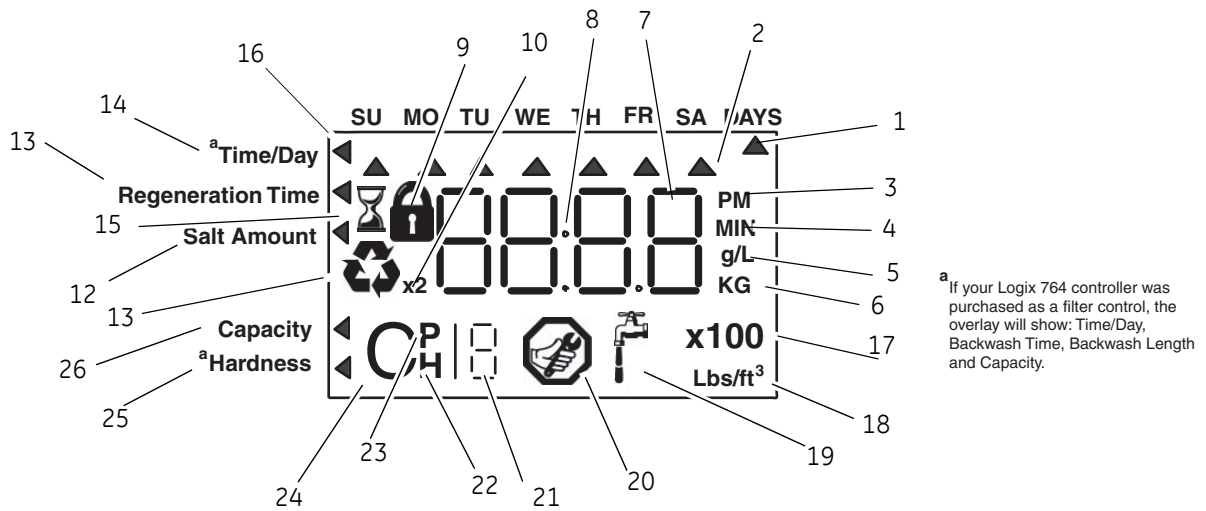


Figure 32

Display Icons & Cursors



^a If your Logix 764 controller was purchased as a filter control, the overlay will show: Time/Day, Backwash Time, Backwash Length and Capacity.

Note: In normal operation and during programming, only a few of the icons are actually displayed.

1. This cursor is displayed when the days between regeneration are being programmed (used with .5 to 99 day regeneration programming).
2. One of these cursors is displayed to indicate which day will be programmed into the controller.
3. "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.
4. When "MIN" is displayed, the value entered is in minute increments.
5. When g/L is displayed, the value for regenerant amount entered is in grams/Liter.
6. When "Kg" is displayed, the value entered is in kilograms or kilograins.
7. Four digits used to display the time or program value. Also used for error codes.
8. Colon flashes as part of the time display. Indicates normal operation (742 only).
9. 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 is locked (icon flashes) when controller is in Level I.
10. When "x2" is displayed, a second regeneration has been called for.
11. 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.
12. The display cursor is next to "SALT AMOUNT" when programming the amount of regenerant. If the controller is on a 3-cycle filter then backwash time is programmed.
13. The display cursor is next to "REGENERATION TIME" when programming the time of regeneration and the days of regeneration.
14. The display cursor is next to "TIME/DAY" when programming the current time and day.
15. The hourglass is displayed when the motor is running. The camshaft should be turning.
16. These cursors appear next to the item that is currently displayed.
17. X100 multiplier for large values.
18. When Lbs/ft³ is displayed the value for regenerant amount entered is in pounds/cubic foot.
19. Faucet is displayed when the current flow rate is displayed. Control may show the faucet and "0", indicating no flow.
20. Maintenance interval display turns on if the months in service exceed the value programmed in P11.

21. Used with #24, #25, and #26. Displays valve in service, a sequence number or a value.
22. History Values (H). The number displayed by #23 identifies which history value is currently displayed.
23. Parameter (P). Displayed only in Level II Programming. The number displayed by #23 identifies which parameter is currently displayed.
24. Cycle (C). The number displayed by #23 is the current cycle in the regeneration sequence.
25. Hardness setting—only used with 298 conditioners.
26. Capacity display—shows estimated system capacity.

Keypad — Buttons

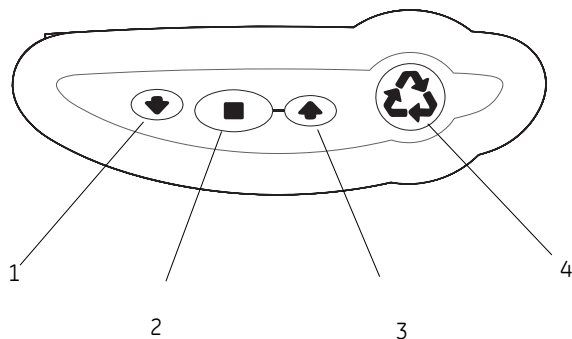


Figure 33

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.

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.

Programming Conventions

The 700 series controller is programmed using the buttons on the keypad. The programming instructions are 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.

Placing Water Conditioning System Into Operation

After you have performed the installation steps, the conditioner will need to be placed into operation.

Follow these steps carefully, (pages 28 to 33) as they differ from previous instructions.

Note: All Logix 764 controls will be shipped in the service (treated water) position. **Check to see that the camshaft is aligned to service position. See Figure 7 on page 9 for proper control/camshaft alignment.**

The incoming supply water should be turned off.

Remove air from tank(s).

1. Position the bypass valve(s) to the in service (not in bypass) position.
2. Open the nearest water faucet completely.
3. Open the incoming water supply valve slowly to the quarter open position.

Note: Do not plug in the power supply until step 5. The tank(s) will fill with water. The air will exit through the faucet. When water flows steady from the faucet, the tank(s) are purged.

4. Turn off the faucet then turn off the incoming water supply.

Power-up the Control

5. Plug the AC adapter into a non-switched outlet. The display will show the valve type that was loaded from memory.

If this is the first time the control is powered up the display will show 255A.

6. Use the  or  buttons to increment through the available selections, Table 1.

Table 1 Preprogrammed Valves

Type	Valve			Connection - inches
255 A	255	Twin Alternating	8-cycle conditioner	3/4
273 A	273		3-cycle filter	1
278 A	278		5-cycle conditioner	1
293 A	293		3-cycle filter	2
298 A	298		5-cycle conditioner	2
255 P	255	Twin Parallel	8-cycle conditioner	3/4
273 P	273		3-cycle filter	1
278 P	278		5-cycle conditioner	1
293 P	293		3-cycle filter	2
298 P	298		5-cycle conditioner	2
255 L	255	Single Tank Remote Regeneration or Multi-Single Tank Lockout	8-cycle conditioner	3/4
263L	263		8-cycle conditioner	1
268L	268		3-cycle filter	1
273 L	273		3-cycle filter	1
278 L	278		5-cycle conditioner	1
293 L	293		3-cycle filter	2
298 L	298		5-cycle conditioner	2

For the next steps you may want to remove the cover to watch the camshaft movement.

7. Press  to enter the valve type and the proper preprogrammed valves for your application:

293A for Twin Alternating Filter

298A for Twin Alternating Conditioner

293P for Twin Parallel Filter

298P for Twin Parallel Conditioner

293L for single or multiple tank filters with regeneration lockout or remote regeneration start

298L for single or multiple tank conditioners with regeneration lockout or remote regeneration start

Note: The control overlay changes depending on whether a filter or conditioner Logix control was purchased. If a filter control is programmed to be a conditioner then the overlay will not be correct. However, the Logix control will function properly. See previous page for overlay text.

8. The display will show - - - . Select media volume or “F” for filter set-up. If a number or an “F” is displayed then the resin volume or filter type has been preprogrammed.

Finish programming the Logix 764 control using the Level I programming guide.

For a 293/298A system: the control will automatically synchronize the cam positions.

Tank 1 will move to standby

Tank 2 will move to service

Error 3 will be displayed when the Tank 1 cam is moving. *Error 4* will be displayed when Tank 2 cam is moving.

For a 293/298P system:

Tanks 1 and 2 will move to service if not already in service.

For a 293/298L system:

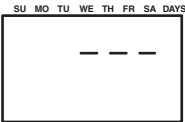
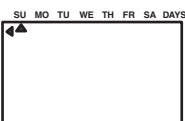
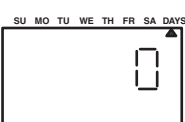
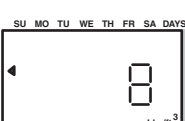
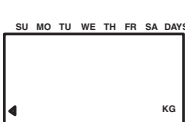
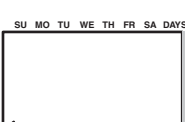
The tank(s) will move to service if not already in service.

These cam movements may take up to 5 minutes.

Table 2

Resin Volume - 1.0 ft ³ and 25 Liter Steps			
	Resin Volume		
Tank Dia (inches)	Injector	US	Metric
14	14	3.00	75
14	14		100
16	16	4.00	125
18	18	5.00	150
21	21	6.00	175
21	21	7.00	200
21	21	8.00	225
24	24	9.00	250
24	24	10.00	275
24	24		300
24	24	11.00	325
30	30	12.00	350
30	30	13.00	375
30	30	14.00	400
30	30	15.00	425
30	30	16.00	450
30	30	17.00	475
30	30		500
36	36	18.00	525
36	36	19.00	550
36	36	20.00	575
36	36		600
36	36		625
36	36		650
36	36		675
36	36		700

Level I Programming - 764 Control with 298 Valve, 5 Cycle Conditioner

Screen	Buttons to Press	Description	Range
	then ↓ or ↑ press ■	1. Resin Volume Select correct resin volume	Cubic feet: 3.00 to 20.00
	press ■ then ↓ or ↑ press ■	2. Time of Day (12 hr.) Set to time of day Note: Setting includes PM indicator.	
	press ■ then ↓ or ↑ press ■	3. Day of Week Set to actual day of the week	
	press ■ then ↓ or ↑ press ■	4. Time of Regeneration Set to desired time of regeneration	
	press ■ then ↓ or ↑ press ■	5. Days Override Leave at 0 to disable or Set to desired days between regeneration	Days: 0 to 99
	press ■ then ↓ or ↑ press ■	6. Salt Dosage Set to desired dosage lbs per cubic feet of resin	Lbs/ft³: 3 to 18
	press ↓ to override press ■ then ↓ or ↑ press ■	7. Capacity Capacity calculated by Logix Control Use to OVERRIDE calculated capacity	Kilograins: 1 to 900
	press ■ then ↓ or ↑ press ■	8. Hardness Set to actual water hardness in grains per gallon	Grains/gal: 3 to 200

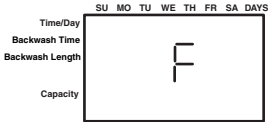
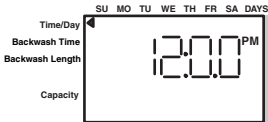
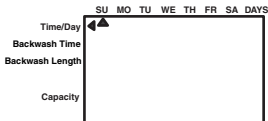
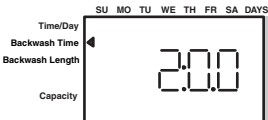
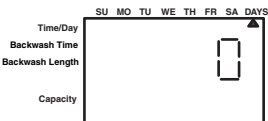
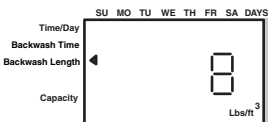
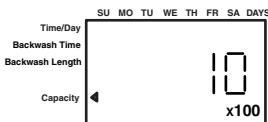
Control programming is complete

Note: If one of the following conditions occur:

- control displays Err3 and goes to home position or
- power outage discharges the supercapacitor and when power is restored the time of day is reset;

the Regen Icon will begin flashing. This indicates that a delayed regeneration will occur at the next programmed time of regeneration. If a delayed regeneration is not desired, press the REGEN Button to disable the delayed regeneration and the system will regenerate by water usage.

Level I Programming - 764 Control with 293 Valve, 3 Cycle Filter

Screen	Buttons to Press	Description	Range
	then ↓ or ↑ press ■	1. Program Type Select "F"	
	press ■ then ↓ or ↑ press ■	2. Time of Day (12 hr.) Set to time of day Note: Setting includes PM indicator.	
	press ■ then ↓ or ↑ press ■	3. Day of Week Set to actual day of the week	
	press ■ then ↓ or ↑ press ■	4. Time of Backwash Set to desired time of Backwash Note: Time of Backwash is not used for Alternating mode.	
	press ■ then ↓ or ↑ press ■	5. Days Override Leave at 0 to disable or Set to desired days between regeneration	Days: 0 to 99
	press ■ then ↓ or ↑ press ■	6. Backwash Length (minutes) Set to desired Backwash length	Minutes: 0 to 200
	press ↓ to override press ■ then ↓ or ↑ press ■	7. Capacity (gallons) Set to desired Capacity in multiples of 100 gallons	Gallons: 1 to 900

Control programming is complete

Note: If one of the following conditions occur:

- control displays Err3 and goes to home position or
- power outage discharges the supercapacitor and when power is restored the time of day is reset;

the Regen Icon will begin flashing. This indicates that a delayed regeneration will occur at the next programmed time of regeneration. If a delayed regeneration is not desired, press the REGEN Button to disable the delayed regeneration and the system will regenerate by water usage.

Placing Water Conditioning System Into Operation (cont.)

Note: 293/298 Alternating and parallel tank systems have one Logix 764 control that is mounted on tank 1. Tank 2 has a blank faceplate and the valve is controlled by the Logix 764 control on tank 1.

Quick Cycling the Control 293/298A, 293 298P and 293/298L

It is required that the control be quick cycled to specific regeneration cycles when placing the conditioner into operation. This will ensure that all of the air in the tank and valve is purged. The process also provides a check for leaks and functioning of the brine system. Please perform the following steps for quick cycling the control, before proceeding to start-up.

1. With the control in the treated water position, Press and hold the REGEN button on the controller for 5 seconds. This will initiate a manual regeneration. The control will display a solid hourglass indicating that the motor and camshaft are turning to the backwash cycle (C1). When the control reaches the backwash cycle, the total regeneration time remaining will be displayed. Pressing the SET button will display the specific cycle time remaining.
2. Press and release the UP and SET buttons to move the control to the Regenerant Draw cycle (C2).
3. Repeat Step 2 to advance to each cycle.

Before the final filling of the media tank with water check that:

- the nearest water faucet is completely closed.
- the valve drain line is properly routed to a drain
- the regenerant tank is empty and the regenerant hose is connected to the valve
- the water supply valve is off.

Note: The control can be sent directly back to the treated water position from any regeneration cycle. Press the UP and SET buttons (about 5 seconds) until the hourglass icon begins flashing. The control will now skip all remaining regeneration cycles.

4. Add water to the regenerant tank.
 - A. With a bucket or hose add approx. 4 gallons (15 liters) of water to the regenerant tank.
 - B. 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: It's recommended 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.

5. Press and hold the  button on the controller for 5 seconds. This will initiate a manual regeneration. The control will display a solid hourglass indicating that the motor and camshaft are turning to the backwash cycle (C1). When the control reaches the backwash cycle, the total regeneration time remaining will be displayed. Pressing SET will display the specific cycle time remaining.
6. While the controller is in cycle C1 (Backwash), open the water supply valve very slowly to approximately the ¼ open position. Water will begin to enter the media tank. Any air remaining will begin to be purged to drain as the media tank fills with water.



WARNING: If opened too rapidly or too far, media may be lost out of the tank into the valve or the plumbing. In the ¼ open position, you should hear air slowly escaping from the valve drain line.

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

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

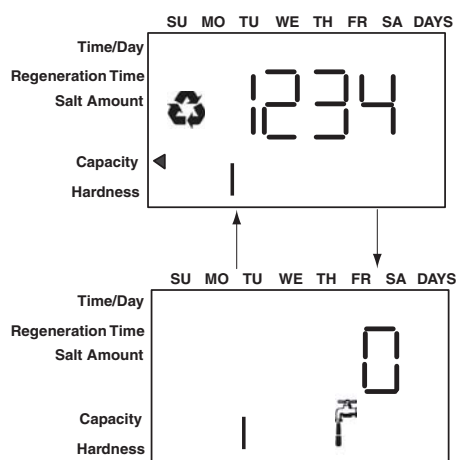
7. Check Regenerant Draw.
 - A. Quick cycle the control to the C2 regenerant draw/slow rinse position .
 - B. C2 will be displayed. With the control in this position, check to see that the water is being drawn out of the regenerant tank. The water level in the regenerant tank should recede very slowly.
 - C. Observe that water is being drawn from the regenerant tank for at least three minutes. If the water level does not recede, check all regenerant line connections for air leaks.

8. If the water level is receding from the regenerant tank you can quick cycle the control to the C8 Regenerant tank refill position.
 - A. The control will cycle to the regenerant tank refill cycle, and water will be directed down through the regenerant line to the regenerant tank. Let the water flow through the line until all air bubbles have been purged from the line. Note: Do not let the water flow down the line to the tank for more than one to two minutes, or the tank may overflow.
9. Repeat steps 4 and 8 for each additional tank.
10. Finally, turn on a faucet plumbed after the water conditioner. Run the faucet until the water runs clear.
11. Add the appropriate amount of regenerant to regenerant tank.

The Water Conditioning System is Now Fully Operational

Note: After any control reset (valve type or system change, etc.) it is necessary to initiate a manual regeneration and quick cycle through it. This will ensure the control and cam are synchronized. If not synchronized *E r r 3* will display and the control will drive cams to the correct position for valve and system type programmed.

In Service Display



Logix 764 Electronic Multi-Tank - "A" Alternating Control:

Service display — The number of the Tank in Service (small digit next to CPH position) and Alternating Capacity Remaining and Flow Rate with Faucet icon of Tank in Service.

Logix 764 Electronic Multi Tank - "P" Parallel Control:

Service Display — alternating three items

Capacity remaining for Tank 1 with digit "1" displayed

Capacity remaining for Tank 2 with digit "2" displayed

System Flow Rate (Tank 1 + Tank 2 added) with Faucet icon

Logix 764 Electronic Multi Tank — "L" Lock Out Control

Service Display — Alternating Capacity Remaining and Flow Rate with Faucet icon "L" displayed indicating lockout signal is active. Blinking "L" and Lock icon if lockout signal is active and control is ready to perform regeneration.

Note: The faucet icon is displayed on all the Logix 764 controls when there is flow. The 764 will show the faucet icon when the flow rate is displayed, even if the flow rate is zero. If the flow rate is zero, the faucet will turn off when the capacity is displayed.

Note: In service flow rate display can be replaced with a clock display. Using Level II (P10) programming if desired.

Programming Overview

The 764 control includes multiple program levels that allow the Water Treatment Professional to customize the system for many water conditions. Additionally, historical data can be viewed allowing quick and easy troubleshooting. In most cases Level I programming is all that is required to set up the water conditioning system for proper operation. A brief description of each program level is listed below.

Level I Used to program control for normal applications.

Level II (P-Values) Allows the installer to customize programming for non-standard applications.

Level III (C-Values) Allows the installer to adjust the length of select cycles for non-standard applications.

Level IV History (H-Values) Allows access to historical information for troubleshooting the system.

Note: If a button is not pushed for thirty seconds, the control returns to normal operation mode.

Level I Programming

The 764 control can be quickly programmed by following the sequential procedure in the section “Placing Water Conditioning System Into Operation”. Level I program parameters are those that can be accessed by pressing the UP or DOWN buttons.

- Resin Volume Setting: Set to match the volume (cubic feet) of resin in the mineral tank.
- Time of Day: Includes PM indicator. Can be set to display as a 24-hour clock. See Level II programming
- Day of Week: Set to actual day of the week.
- Time of Regeneration: Fully adjustable. Default is 2:00 AM.
- Days Override: Range 0.5 to 99 days. Leave at 0 to disable.
- Salt Dosage: Set at pounds of salt per cubic foot of resin in the conditioner tank (298 conditioner only).

For the 293 filter valve the salt dosage is replaced with backwash length. The display arrow will point to backwash length and the setting is minutes of backwash.

Note: When the control is set up for a twelve-hour clock a PM indicator will illuminate when the displayed time is in the PM hours. There is no AM indicator.

Level II Programming – P Values

Level II program parameters can be adjusted to fine-tune the conditioner's operation. The parameters are accessible by pressing and holding the UP and DOWN buttons until the control displays a "P" value. Note: The control must be in the home position to change settings. See Table below for Level II parameters. Typically the Level II parameters will not need to be adjusted as the

default settings accommodate most applications. Contact your Water Treatment Professional before attempting any programming.

	Description	Range	Minimum Increments	Default	Units	Notes
P9	Units of Measure	0-1	1	(2)		0 = US 1 = Metric
P10	Clock Mode	0-1	1	(2)		0 = 12 hour clock; flow rate service display 1 = 24 hour clock; flow rate service display 2 = 12 hour clock; Time of Day service display 3 = 24 hour clock; Time of Day service display
P11	Service Interval	0-250	1	0	months	Uses 30 days for each month; 0 = off
P12	Remote regeneration switch delay	3-250	1	60	seconds	Time remote switch must be active to start regeneration.
P13 *	(not used on Magnum systems)					
P14	Refill Rate	1-700	1	(1)	gpm x 100	
P15	Draw Rate	1-700	1	(1)	gpm x 100	
P16	Reserve Type (not used for alternating mode)	0-3	1	0		0 = variable reserve delayed regeneration 1 = fixed reserve delayed regeneration 2 = variable reserve immediate regeneration 3 = fixed reserve immediate regeneration
P17	Initial average or fixed reserve (not used for alternating mode)	0-70	1	30	% of Capacity	Depends on value entered in P16
P18	Flow sensor select	0-7	1	(1)		0 = internal magnum NHWB, 1, 6 = 1" Autotrol turbine 2, 7 = 2" Autotrol turbine 3 = User defined K-factor 4 = User defined Pulse Equivalent 5 = Internal Magnum HWB Values 6 & 7 are for single turbine configurations on twin alternating systems.
P19	K-factor or Pulse equivalent	1.00-99.99 0-9999	0.01 1	0.01 1		K-factor P18=3; Pulse Equivalent P18 = 4
Pr	Refill First (not used for alternating mode)	0-1	1	0		0 = Refill first off 1 = Refill first on
Pd	Remote switch operation	0-1	1	0		0 = Immediate Regeneration after P12 time 1 = Delayed Regeneration after P12 time
Notes: (1) Default selected with valve type and resin volume. (2) Factory Default is "0" for North America units and "1" for World units.						

*Not used for Magnum valves.

Programming the Lockout Feature

All Level I parameters can be locked out when the control is in Level II programming. Simply press the REGEN button during Level II programming and a Lock Icon will appear indicating that the specific setting has been locked out. When locked out, the setting cannot be adjusted. To disable the Lock Out Feature, press the REGEN button when in Level II. The lock icon will not be displayed.

Salt Setting (298 Conditioner)

The default P6 salt setting is set at 9 lbs/cu ft. Under normal circumstances this setting will provide the correct system capacity. This setting may be adjusted to change the exchange capacity.

Table 3 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

Level III Cycle Programming – C Values

Several Level III program parameters can be adjusted to fine-tune valve operation for non-standard applications. Typically these parameters will not need to be adjusted as the default settings accommodate most applications. Contact your Water Treatment Professional before attempting any programming. The parameters are accessible by pressing and holding the UP and SET buttons until the display shows a “C” value.

Note: The control must be in the treated water position to change settings.

C#	Description	Range	Minimum Increments	Default Setting	Notes
C1	Backwash	0 – 200	1 Min	14	Flow rate dictated by size of drain line flow controller
C2	Regenerant Draw	0 – 200 ^a	1 Min	See Notes	Automatically calculated from resin volume and salt dosage settings
C3	Slow Rinse	0 – 200	1 Min	See Notes	Automatically calculated from resin volume and salt dosage settings
C5	Fast Rinse	0 – 200	1 Min	6	Rinses residual regenerant from tank
C8	Regenerant Refill	0 – 200 ^a	1 Min	See Notes	Automatically calculated from resin volume and salt dosage settings

a. Only adjustable when the 293 filter valve has been selected.

Level IV Viewing History - H Values

Historical information can be viewed by pressing the SET and DOWN buttons simultaneously, with the 764 control in the home position. Release both buttons when the control displays an “H” value. Press the UP or DOWN buttons to navigate to each setting.

Table 4 History Data

H#	Description	Range	Notes
H0 ^a	Initial Setting Value	Cubic Feet or Liters	Resin Volume
H1	Days since last regeneration	0 - 255	
H2	Current Flow Rate	Depends on turbine used	
H3	Water used today in gallons or/m ³ since Time of Regeneration	0-131,070 or 0-1,310.70 m ³	
H4	Water used since last regeneration in gallons or/m ³	0-131,070 or 0-1,310.70 m ³	
H5 ^a	Total water used since reset in 100s	0-999900 gallons or 0-9999 m ³	
H6 ^a	Total water used since reset in 1,000,000	4,294 x 10 ⁶ gal or 4264 x 10 ⁴ m ³	
H7	Average usage for Sunday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H8	Average usage for Monday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H9	Average usage for Tuesday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H10	Average usage for Wednesday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H11	Average usage for Thursday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H12	Average usage for Friday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H13	Average usage for Saturday in gallons or m ³	0-131,070 gallons or 0-1,310.70 m ³	
H14	Average service cycle	0-255 days	
H15 ^a	Peak Flow Rate	0-200 gpm or 1000 Lpm	
H16	Day and Time of Peak Flow Rate	Time and day that peak flow occurred	
H17 ^a	Months since service	0-2184 months	
H18	Water used since last regeneration - Tank 1	0-131,070 gallons or 0-1,310.70 m ³	
H19 ^a	Water used since last regeneration - Tank 2	0-131,070 gallons or 0-1,310.70 m ³	
Hr	Number of regenerations since last serviced	0-65536	

- a. H0, H5, H6, H15, H17, H19 values can be reset by pressing and holding  for 3 seconds while the value is being displayed.

Program Reset

The 764 control can be reset to original factory parameters when viewing the H0 parameter. Press and hold the SET button for three seconds while H0 is displayed. Release the button. All settings except for Time of Day and Day of Week will be reset. The 764 Logix control will now display the valve and system type. Refer to Level I Programming.

Note: After any control reset (valve type or system change, etc.) it is necessary to initiate a manual regeneration and quick cycle through it. This will ensure the control and cam are synchronized. If not synchronized *Error* will display and the control will drive cams to the correct position for valve and system type programmed.

Manual Regeneration Options

Refill First Option

Refill First is only available for single tank “L” and twin parallel “P” models.

The 764 control allows users to select when the refill cycle occurs. When $Pr = 0$ (default) refill occurs immediately after fast rinse. When $Pr = 1$ refill will not occur until just before a regeneration. This allows for a “dry” brine tank.

If refill first is selected, the valve will move to refill two hours before the start of backwash. After refill is complete, the valve moves back to service for a two-hour brine make-up time. Regeneration then follows as normal, skipping refill.

By default, time of regeneration is set to midnight after refill first is selected.

Note: The tank in service (on-line) cannot be regenerated while the other tanks are isolated. Water for backwash would not be available.

The 764 control features several options that offer additional flexibility for manually regenerating the conditioner. On alternating systems the tank in standby will move through regeneration to service. The tank in service will move through regeneration to standby. On parallel systems, the tank with the lowest remaining capacity will regenerate.

Delayed Manual Regeneration

Press and release the REGEN button to start a delayed manual regeneration. The Regeneration icon on the display will flash indicating a regeneration will start when the time of day reaches the programmed time of regeneration. Pressing the REGEN button again will turn off the regeneration icon and cancel the delayed regeneration.

Immediate Manual Regeneration

Pressing and holding the REGEN button for three seconds starts an immediate manual regeneration. A solid regeneration icon will be displayed. The control will immediately begin a regeneration on the tank in service.

Delayed Second Regeneration

Pressing and releasing the REGEN button while the control is in regeneration will program the control for a delayed second regeneration. A flashing x2 icon next to the regeneration icon will appear indicating a second regeneration will start when the time of day reaches the programmed time of regeneration. The delayed second regeneration will be performed on the new tank in service. For alternating and parallel systems, each tank will regenerate once.

Double Immediate Manual Regeneration

Back-to-Back manual regenerations are initiated by pressing and holding the REGEN button for three seconds while the control is in the regenerating mode. A solid x2 icon next to the regeneration icon will appear indicating a second manual regeneration will start immediately after current regeneration is complete. For alternating and parallel systems each tank will regenerate once. Single tank systems will regenerate twice back-to-back.

Regeneration Modes for Parallel Systems

Parameter P16 is used to determine the method for demand initiated regeneration. Four regeneration modes are possible.

- P16 = 0, Delayed Regeneration with a Smart Reserve Regenerations will start only at the Time of Regeneration entered in P2. A tank is regenerated if the capacity remaining in that tank is below the minimum required capacity needed to meet the next days calculated water usage requirement. The next days water usage number is based on the daily average water usage held in memory plus a 20% reserve. If necessary both tanks will be regenerated sequentially beginning with the most exhausted tank.

This option allows the control to vary the reserve, and therefore the decision to regenerate, based on the actual daily water usage pattern for the location at which it is installed. See Table 5.
- P16 = 1, Delayed Regeneration with a Fixed Reserve Regenerations will start only at the Time of Regeneration entered in P2. A tank is regenerated if the capacity remaining in that tank is below the percentage entered in P17.

If either tank's capacity is overrun by 50% a regeneration will take place. The control will also cause both tanks to be regenerated sequentially the next Time of Regeneration regardless of how much water is used during that 24 hour period.

This feature is to help recover a severely exhausted bed. See Table 6.
- P16 = 2, Immediate Regeneration - Fixed Reserve/DelayedRegeneration-Smart Reserve

This option uses the features of both option 0 and option 3. This is the most versatile of regeneration options. Option number 2 provides all the advantages of variable reserve based on the actual amount of water that is used each day plus the capability to react to the excessive water usage days that occur occasionally. See Table 7.
- P16 = 3, Immediate Regeneration - Fixed Reserve

Regenerations are started immediately when a tank reaches zero or when the system capacity remaining (capacity remaining in both tanks) drops below the reserve capacity programmed in P17. To prevent hard water this reserve should be set large enough to provide conditioned water during the regeneration of the most exhausted tank. See Table 8.

Table 5 P16 = 0

Priority	Flow Rate	Continuous Soft Water	Efficiency
High	•		
Ave		•	•
Low			

Table 6 P16 = 1

Priority	Flow Rate	Continuous Soft Water	Efficiency
High	•		
Ave		•	
Low			•

Table 7 P16 = 2

Priority	Flow Rate	Continuous Soft Water	Efficiency
High		•	
Ave	•		•
Low			

Table 8 P16 = 3

Priority	Flow Rate	Continuous Soft Water	Efficiency
High		•	•
Ave			
Low	•		

Wiring Diagrams

Connecting the Logix 764 Twin Alternating or Parallel Controls

The twin sensor and extension cables are used for twin unit parallel and alternating applications. Four standard connections are required for operation; the power AC adapter, the flow sensor, motor/optical sensor, and the connection between tank 1 and tank 2 controls.

Figure 34 outlines these standard features.

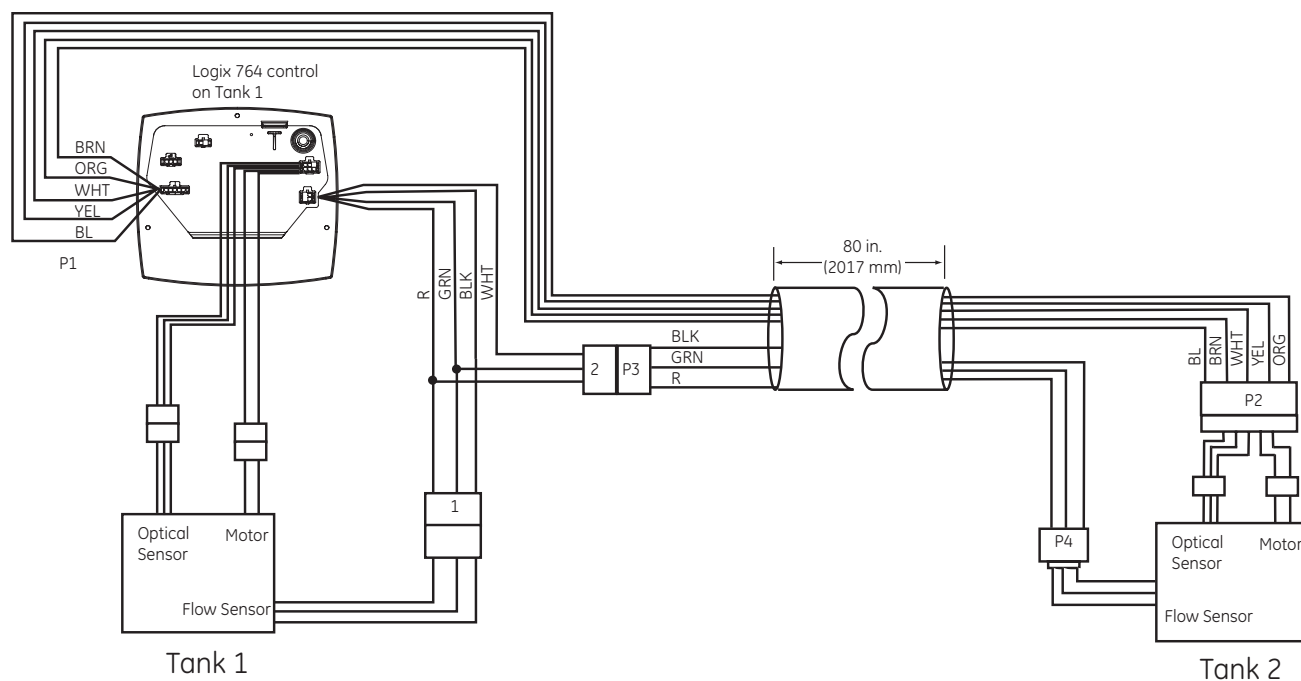
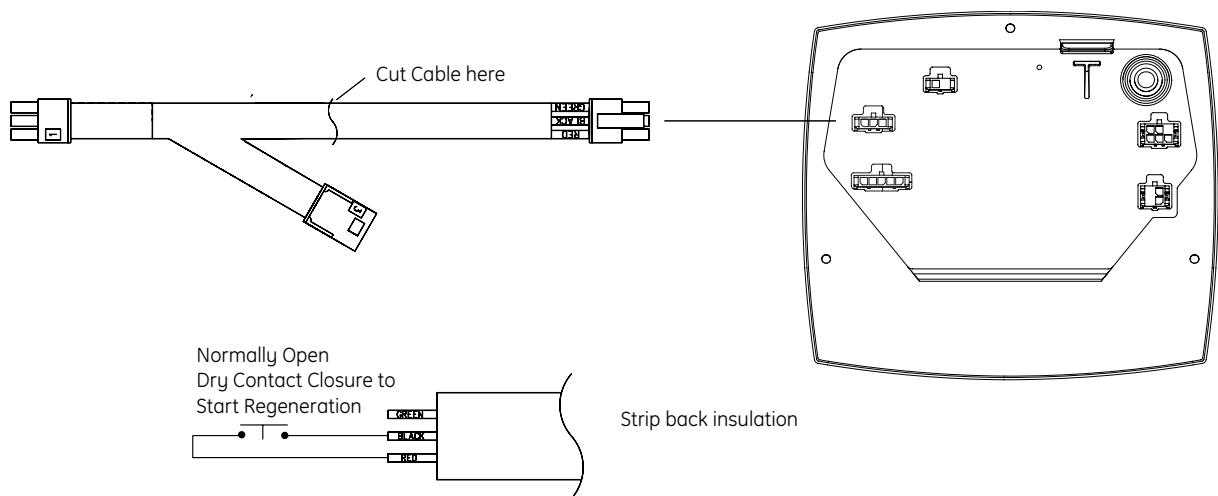


Figure 34

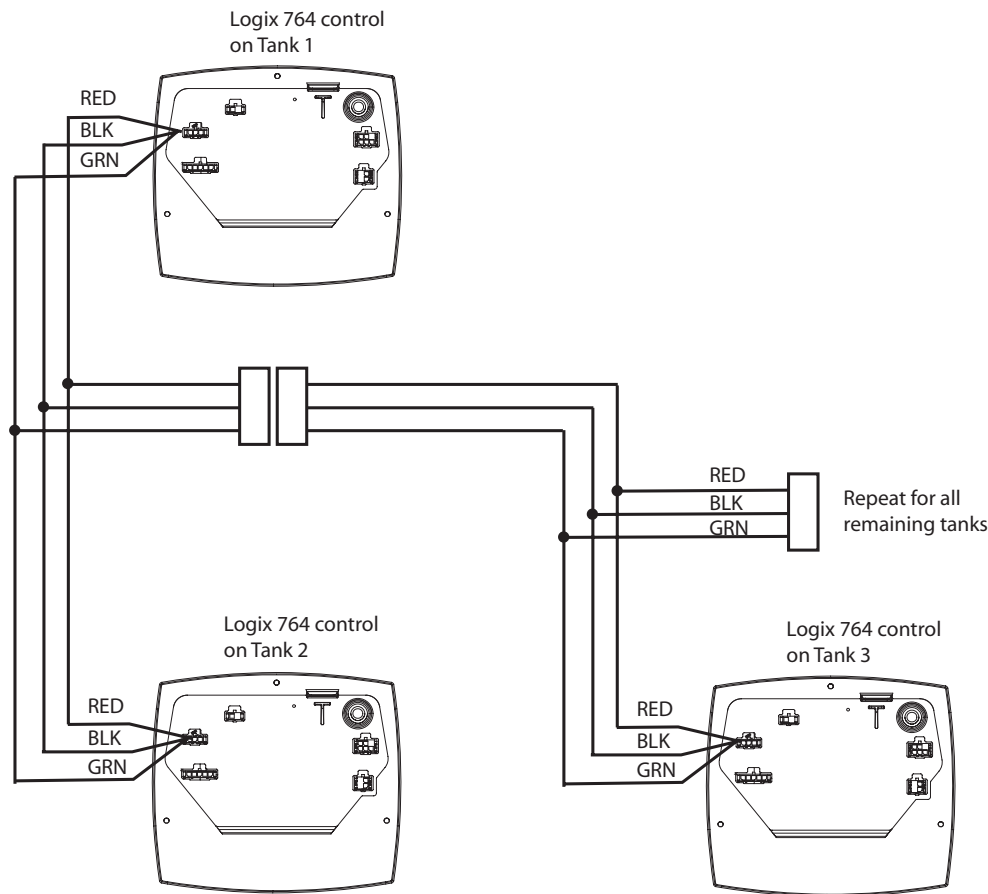
Remote Regeneration Start



Note: Cable PN 3020228 sold separately.

Figure 35

Connecting the Logix 764 Multi Single Tank Control



Note: Cable PN 3020228 sold separately.

Figure 36

Troubleshooting

764 Controller – Error Codes

Problem	Possible Cause	Solution
ERR 1 is displayed.	Program settings have been corrupted.	Press any key and reprogram Level I settings.
ERR 3 is displayed.	Controller on tank 1 does not know the position of the camshaft. Camshaft should be rotating to find Home position.	Wait for two minutes for the controller to return to Home position. The hourglass should be flashing on the display indicating the motor is running.
	Camshaft on tank 1 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: 1. Wire Harness, Motor, Optical Sensor Assy 2. Controller
	Camshaft on tank 1 is turning more than five 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: 1. Wire Harness, Motor, Optical Sensor Assy 2. Controller
	Regeneration starts but control shows Err3 before completing regeneration.	Verify that the correct valve is selected in the Logix controller.

ERR 4 is displayed.	If single tank system..	Verify system setting is programmed to 293/298“L”.
	Controller on tank 2 does not know the position of the camshaft. Camshaft should be rotating to find Home position.	Wait for two minutes for the controller to return to Home position. The hourglass should be flashing on the display indicating the motor is running.
	Camshaft on tank 2 is not turning during ERR 4 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: 1. Wire Harness, Motor, Optical Sensor Assy 2. Controller
	Camshaft on tank 2 is turning more than five 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: 1. Wire Harness, Motor, Optical Sensor Assy 2. Controller

System Troubleshooting

Problem	Possible Cause	Solution
Regenerant tank overflow.	a. Uncontrolled refill flow rate. b. Air Leak in regenerant line to air check. c. Drain control clogged with resin or other debris.	a. Remove refill flow control to clean ball and seat. b. Check all connections in regenerant line for leaks. c. Clean drain control.
Flowing or dripping water at drain or regenerant line after regeneration.	a. Valve stem return spring weak. b. Debris is preventing valve disc from closing.	a. Replace spring. (Contact dealer). b. Remove debris.
Hard water leakage after regeneration.	a. Improper regeneration. b. Leaking of external bypass valve. c. O-Ring around riser pipe damaged. d. System capacity too low due to incorrect resin volume setting	a. Repeat regeneration after making certain correct regenerant dosage was set. b. Replace bypass valve. (Contact dealer). c. Replace O-ring d. Reset control and program resin volume to correct setting
Control will not draw regenerant, or intermittent or irregular draw.	a. Low water pressure. b. Restricted drain line. c. Injector plugged. d. Injector defective. e. Valve disc B1 and/or B2 not fully open.	a. Make correct setting according to instructions, 25 psi dynamic pressure minimum. b. Remove restriction. c. Clean injector and screen. d. Replace injector and cap. (Contact dealer). e. Remove foreign matter from disc and check disc for closing by pushing in on stem. Replace if needed. (Contact dealer).
Control will not regenerate automatically.	a. AC adapter or motor not connected. b. Defective motor. c. Fouled or defective turbine. d. Defective turbine cable.	a. Connect power. b. Replace motor. (Contact dealer). c. Clean or replace turbine assembly. d. Replace turbine cable.
Control regenerates at wrong time of day.	a. Controller set incorrectly.	a. Correct the time setting according to instructions.
No conditioned water after regeneration.	a. No regenerant in regenerant tank. b. Injector plugged.	a. Add regenerant to regenerant tank. b. Clean injector and screen.
Backwashes or purges at excessively low or high rate.	a. Incorrect drain controller used. b. Foreign matter affecting valve operation.	a. Replace with correct size controller (Contact dealer). b. Remove drain controller and clean.
Run out of conditioned water between regenerations.	a. Improper regeneration. b. Incorrect resin volume setting	a. Repeat regeneration, b. Reset control and program resin volume to correct setting
Control displays 1 - x (1 thru 4)	a. Control is in test mode	a. Press control keys in order from left to right.

Magnum Valve Cartridge Troubleshooting

This procedure provides sequential troubleshooting steps to isolate a suspect cartridge. Figure 37 displays the locations of all cartridges.

Note: The Dynamic Pressure applied to the valve must be greater than 25 psi at all times when performing the following tests. If a cartridge needs to be removed, follow the cartridge removal procedure in the next section.

There are four symptoms that may require a cartridge to be removed and inspected or replaced.

1. A constant leak from the pilot drain in any cycle position. A small discharge of water from the pilot drain while transitioning from one cycle to the next is normal. A leak from the pilot drain could be caused by the following:
 - a. Diaphragm failure in one of the valve cartridges. See Table 9 for troubleshooting faulty cartridges.
 - b. Debris may prevent the flappers from closing.

Inspect discs and seats.

Table 9 Troubleshooting Faulty Cartridges

Quick cycle the Logix Magnum to each cycle indicated below. If the pilot drain leak stops in a particular cycle, remove the cartridge listed in the right column. Inspect for wear or damage.	
No Leak During	Cartridge
Service Cycle	#3 Outlet
Backwash	#1 Drain
Brine/Slow Rinse	#2 Rinse
Fast Rinse	#2 Rinse or #4 Inlet

2. A leak to the main 1.5-inch drain valve port.
 - a. If the system is newly installed, ensure that the start-up procedure has been properly followed. Refer to the Service Manual or the start up sheet packed in the shipping carton of the Magnum valve.
 - b. If the system has been operating correctly for a period of time and is now leaking, see Table 10.

Table 10 Magnum Valve Leak to Main Drain Troubleshooting

Regenerate the unit if the media bed is exhausted, then proceed to the following steps:
1. Test the water leaking from the 1.5-inch drain port of the Magnum valve. If it is treated, remove and inspect the #2 Rinse cartridge.
2. If the water leaking to the 1.5-inch drain port is untreated, remove and inspect the #1 Drain cartridge.
3. Leakage of untreated water to service. a. Leak at riser pipe seal or any other cause mentioned in Service Manual. b. Bypassing of untreated water by #4 Inlet cartridge, remove and inspect.
4. Leak between the main valve body and the cartridge assembly. a. Remove and replace the two small O-rings at the 5:30 and 6:30 positions of the cartridge. The part number for the O-ring set is P/N 1010116.

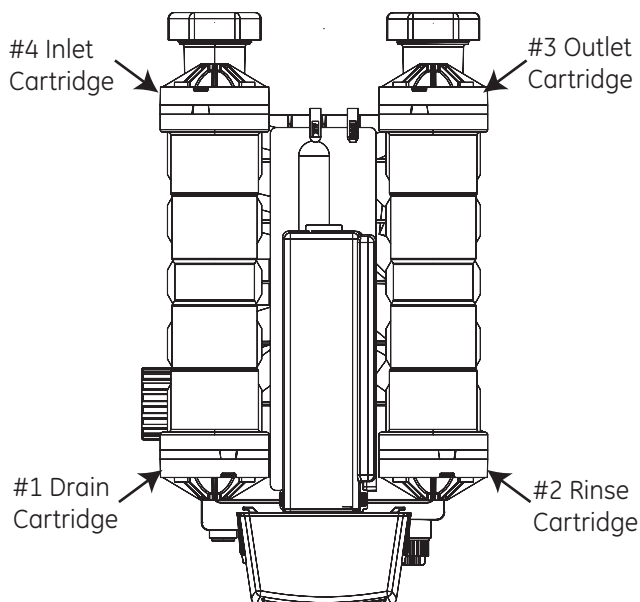


Figure 37 Logix Magnum Control

Note: Replacement cartridges are only available as complete assemblies:

Cartridge #1	Drain	P/N 1000366
Cartridge #2	Fast Rinse	P/N 1000365
Cartridge #3	Service	P/N 1000366 (No bypass)
Cartridge #3	Service	P/N 1000336 (Cap only for bypass)
Cartridge #4	Inlet	P/N 1000317

Magnum Valve Cartridge Removal Procedure

Removal of cartridges should be done only after reviewing all other possible causes of the problem(s) being addressed. There may be some difficulty removing cartridges in valves that have been in service for a period of time. Scale or iron build up around the O-ring seals may cause breakage in the cage assembly of the cartridge. If this occurs the cartridge must be replaced.

To remove the number 1 or number 2 cartridges the control must be removed first.

What follows is a step-by-step procedure for cartridge removal:

1. Remove the four bolts securing the cartridge.
2. There are two parts or sections in the “cap” of the cartridge assembly. The first part is the cover for the diaphragm. The second part is attached to the main cartridge assembly. This part is in contact with the body of the Magnum valve. When referring to inserting screwdrivers for cartridge removal it is the area between the Magnum valve body and the second part of the cartridge that is being referred to. See Figure 38.

3. A small flat blade screwdriver should be inserted as indicated in drawing. Pry a small opening between the Magnum valve body and the second part of the cartridge. This allows the insertion of two larger flat blade screwdrivers that are used to remove the cartridge.
4. Insert the two larger flat blade screwdrivers at the 10 o'clock and 2 o'clock positions on the cartridge. These should be inserted approximately 1/2 inch into the opening created by the small blade screwdriver. Use the two screwdrivers to slowly move the cartridge out of the valve body.
5. The cartridge should be removed for inspection. Look for damaged O-ring or debris on sealing surface ring of poppet.

There are two nipples, one on either side of the bottom center on the inside of the cartridge cap. They transfer water to and from the diaphragm. There are two O-rings associated with the nipples. The O-rings must be in place when the cartridge is re-installed into the valve body.

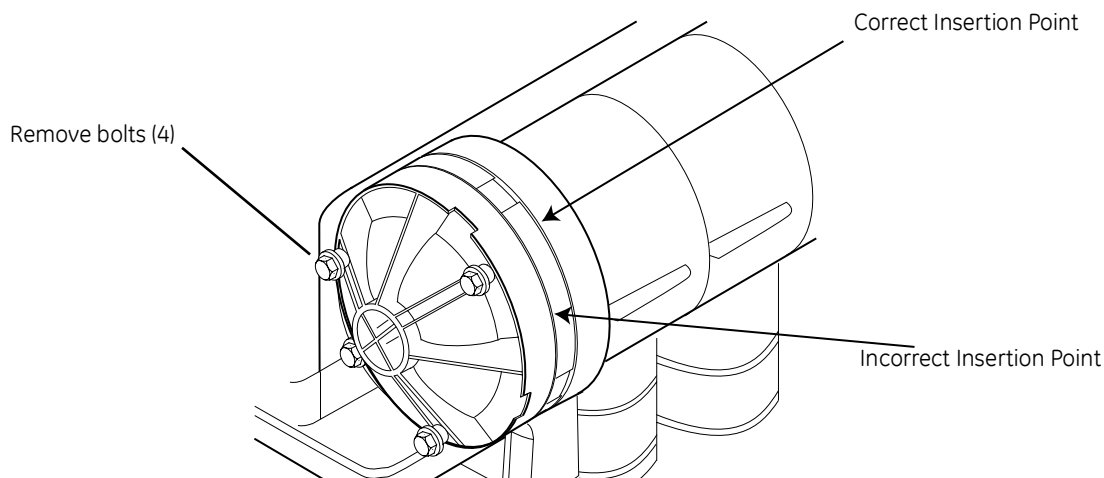
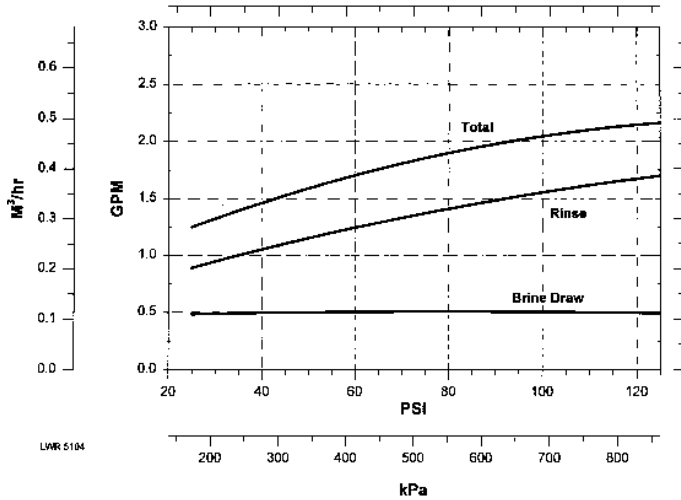


Figure 38

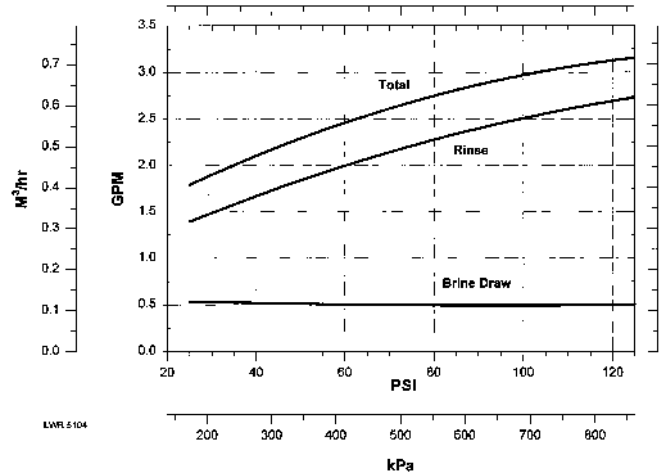
Performance Injectors

Injector Charts

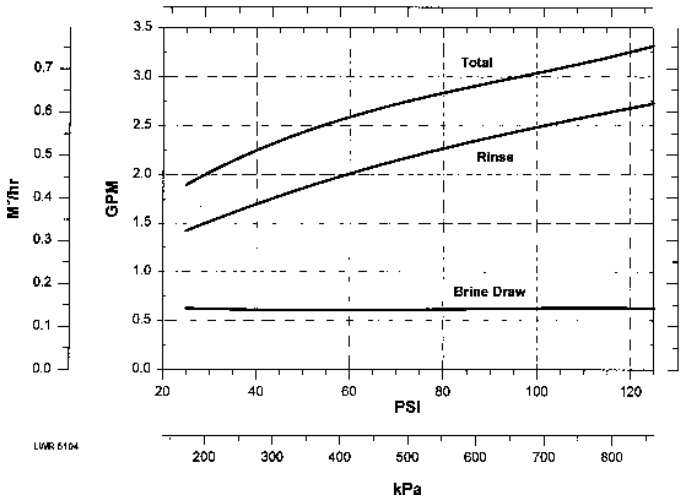
Injector # 1000441
Typical for 14-inch Tank*



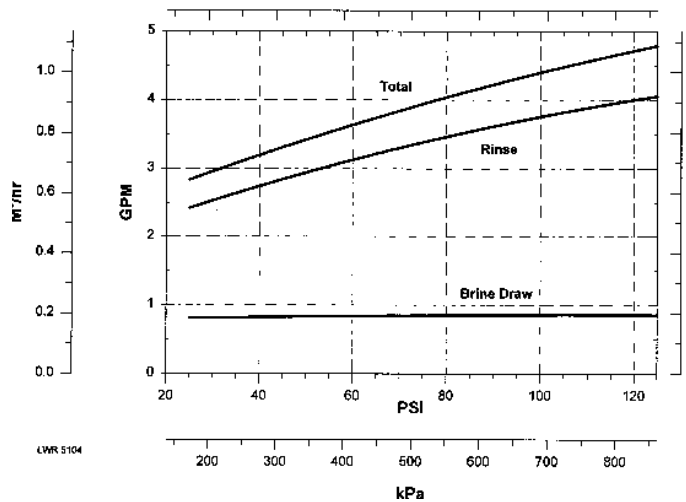
Injector # 1000442
Typical for 16-inch Tank*



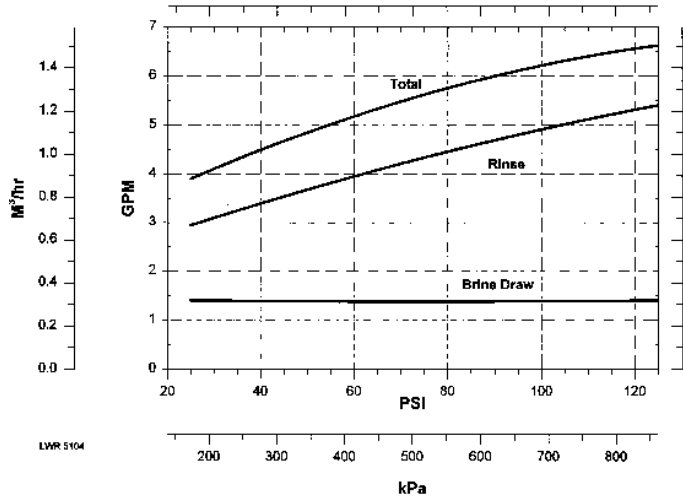
Injector # 1000443
Typical for 18-inch Tank*



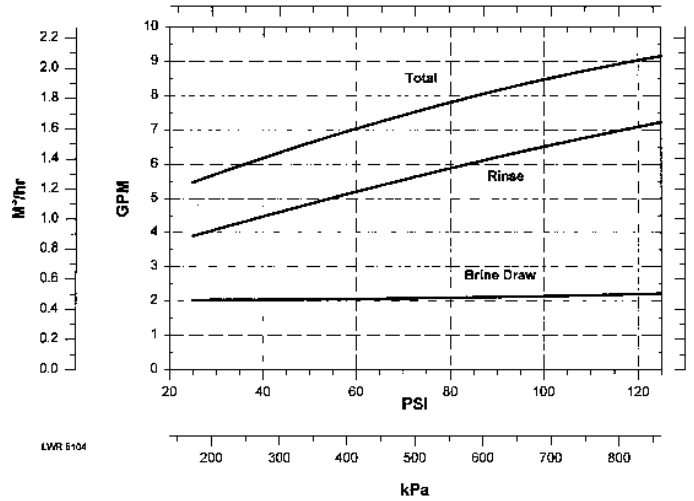
Injector # 1000444
Typical for 21-inch Tank*



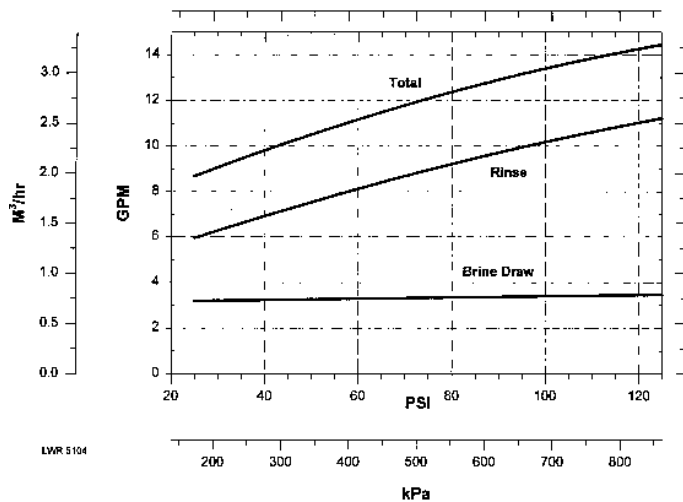
Injector # 1000445
Typical for 24-inch Tank*



Injector # 1000446
Typical for 30-inch Tank*



Injector # 1000447
Typical for 36-inch Tank*



*Brine draw and Rinse rates on empty tank.

Magnum Flow Controls

Refill Control Identification

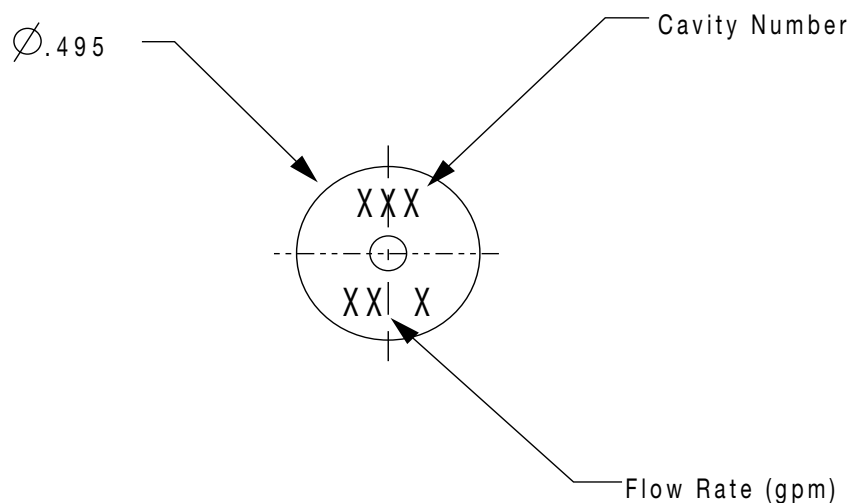


Table 11 Magnum Refill Control Chart
(P/N Indicates 3-Pack)

Part Number	Tank Diameter In. (cm)	Flow Rate GPM (LPM)
1040679	14 (35.6)	0.7 (2.65)
1040680	16 (40.6)	0.8 (3.03)
1040681	18 (45.7)	1.0 (3.79)
1040682	21 (53.3)	1.4 (5.30)
1040683	24 (61.0)	2.0 (7.57)
1040684	30 (76.2)	3.0 (11.36)
1040685	36 (91.4)	5.0 (18.93)

NOTE: All flow rates are based on an inlet pressure of 60 psig (413 kPa). Actual rates vary with pressure, temperatures and other system variables.

Drain Line Flow Control

Table 12 Drain Line Flow Controls (5 gpm - 40 gpm)

Part Number	Flow Control Disk		Insert 1	Insert 2	Insert 3	Insert 4
	gpm	m ³ /h				
1040720	5	1.135	Blue	Black	Black	Black
1040721	6	1.362	Red	Black	Black	Black
1040722	7	1.589	Brown	Black	Black	Black
1040723	8	1.816	Green	Black	Black	Black
1040724	9	2.043	White	Black	Black	Black
1040725	10	2.27	Blue	Blue	Black	Black
1040726	11	2.497	Red	Blue	Black	Black
1040727	12	2.724	Red	Red	Black	Black
1040728	13	2.951	Brown	Red	Black	Black
1040729	14	3.178	Brown	Brown	Black	Black
1040740	15	3.405	Blue	Blue	Blue	Black
1040741	16	3.632	Green	Green	Black	Black
1040742	17	3.859	White	Green	Black	Black
1040743	18	4.086	White	White	Black	Black
1040744	19	4.313	White	Orange	Black	Black
1040745	20	4.54	Blue	Blue	Blue	Blue
1040746	21	4.767	Brown	Brown	Brown	Black
1040747	22	4.994	Green	Green	Red	Black
1040748	23	5.221	Green	Green	Brown	Black
1040749	24	5.448	Red	Red	Red	Red
1040730	25	5.675	Green	Green	White	Black
1040731	26	5.902	White	White	Green	Black
1040732	27	6.129	White	White	White	Black
1040733	28	6.356	Brown	Brown	Brown	Brown
1040734	29	6.583	Brown	Brown	Brown	Green
1040735	30	6.81	Orange	Orange	Orange	Black
1040736	31	7.037	Green	Green	Green	Brown
1040737	32	7.264	Green	Green	Green	Green
1040738	33	7.491	Green	Green	Green	White
1040739	34	7.718	Green	Green	Green	Orange
1040750	35	7.945	White	Green	Green	Green
1040751	36	8.172	White	White	White	White
1040752	37	8.399	White	White	White	Orange
1040753	38	8.626	Orange	Orange	Orange	Green
1040754	39	8.853	Orange	Orange	Orange	White
1040755	40	9.08	Orange	Orange	Orange	Orange

NOTE: Drain Line Flow Controls above 40 gpm
require external control installed in drain line.

Recommended Backwash Flow Rates for Various Media

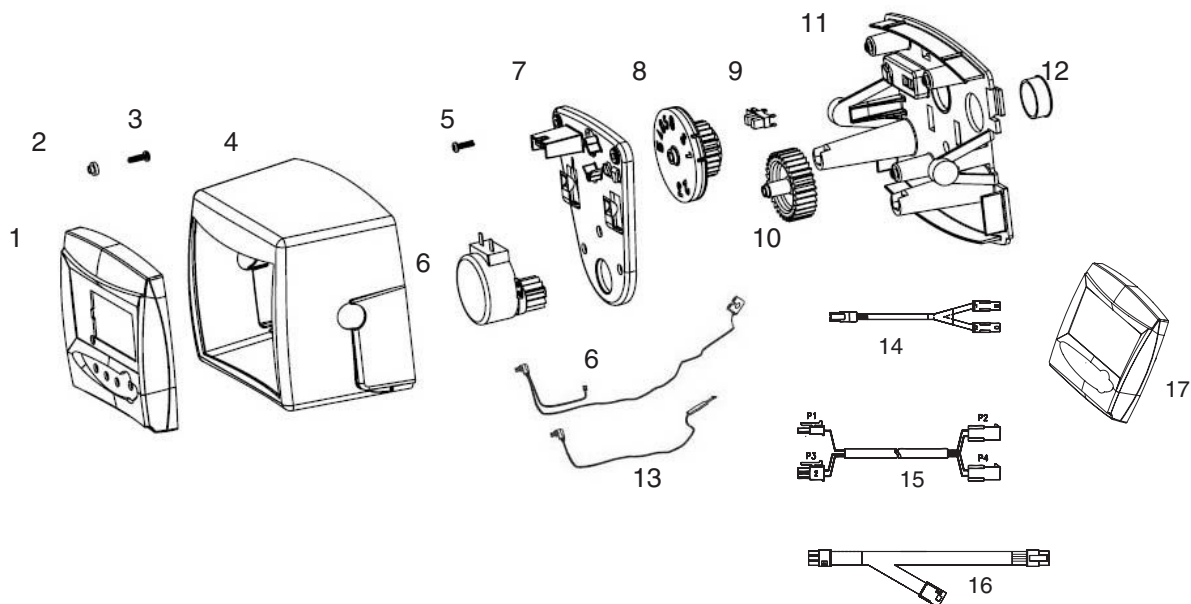
Table 13 Recommended Backwash Flow Rates for Various Media

Media	Tank Diameter						
	14 in (35.6 cm) Tank	16 in (40.6 cm) Tank	18 in (45.7 cm) Tank	21 in (53.3 cm) Tank	24 in (61.0 cm) Tank	30 in (76.2 cm) Tank	36 in (91.4 cm) Tank
	Drain Line Flow Control in GPM						
*Softening Resin (5.0 gpm/ft ²) (12.25 m/h/cm ²)	5	7	9	12	15	25	35
*Fine Mesh Softening Resin (2.8 gpm/ft ²) (6.86 m/h/cm ²)	3	4	5	7	9	14	20
Multi Layer (15 gpm/ft ²) (36.75 m/h/cm ²)	15	20	25	36	50	70	105
Birm, Greensand, Carbon (10 gpm/ft ²) (24.5 m/h/cm ²)	10	15	17	25	30	50	70

*50 °F (10°C) water temperature, 50% bed expansion

Parts Lists

764 Logix Magnum Exploded View



Item No.	Qty.	Part Number - Kits	Part Number	Description
1	1		3022006	764 Series Logix Control - North American
2	2		1266224	Bushing, Logix Mount
3	2		1005981	Screw
4	1		1262674	Cover, Logix Magnum
5	2	1233809	1005981	Screw
6	1		1238861	Motor, Logix Cable Assembly
7	1		1262673	Gear Plate, Logix
8	1		1262581	Drive Gear, Logix
9	1		1235373	Optic Sensor
10	1		1262672	Idler Gear, Logix
11	1		1262580	Back Plate, Logix Magnum
12	1		1239647	Bushing, Cable
13	1		1266722	Meter Cable, 32 inches
14	1		3016715	Assembly, Sensor Cable Logix Twin
15	1		3016775	Assembly, Cable Extension 3 m (9.8 ft) Logix Twin
16	1		3020228	Kit, Assembly Cable Remote Start/Multi-Tank Lockout 3 m (9.8 ft)
17	1		1254886	Secondary Faceplate with out items 2 & 3
*			1000827	Outdoor Cover

* Not shown.

Replacement Components: Logix Magnum Conditioner/ Filters

Camshaft and Pilot Valve Assembly

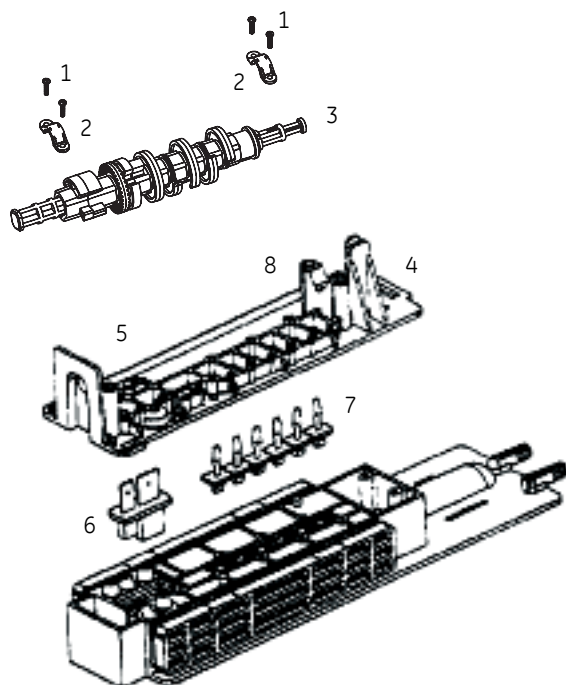
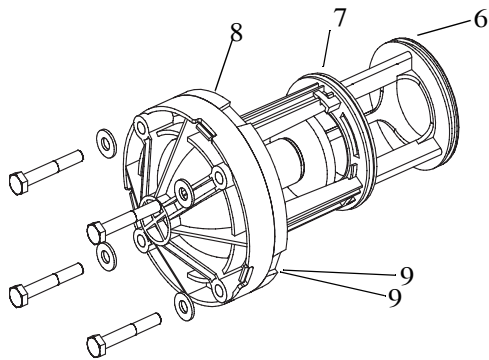


Table 14 Assembly Parts

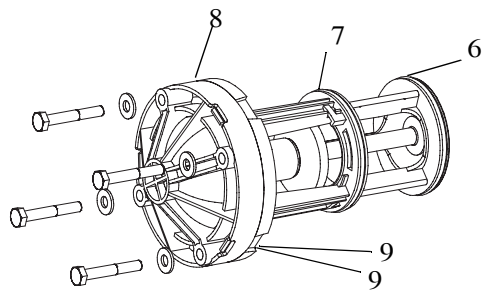
Item Number	Part Number	Description
1	1005953	Screw, Pillow Block
2	1000589	Pillow Block
3*	1001751 1267726	Logix Multi Tank Camshaft, "A", "P", or "L" Types Logix Single Tank Magnum Camshaft, "L" Types
4	1000339	Top Plate
5	1234170	Screw Short, Top Plate
6	1000391	Brine Valve Disc
7	1000328	Pilot Valve Disc
8	1005953	Screw Long, Top Plate

* Single tank camshaft allows the unit to go into Service during Refill.

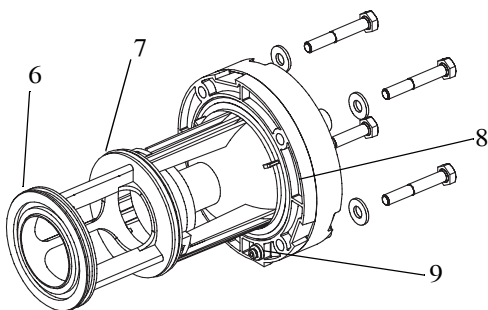
Magnum Valve Cartridges



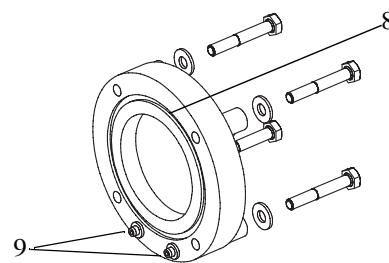
1 - Drain Valve Cartridge



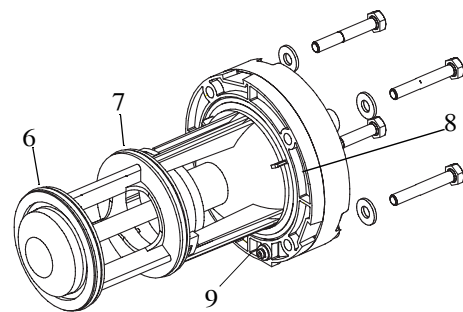
2 - Rinse Valve Cartridge



3 - No Hard Water Bypass Valve Cartridge



4 - Hard Water Bypass Cap

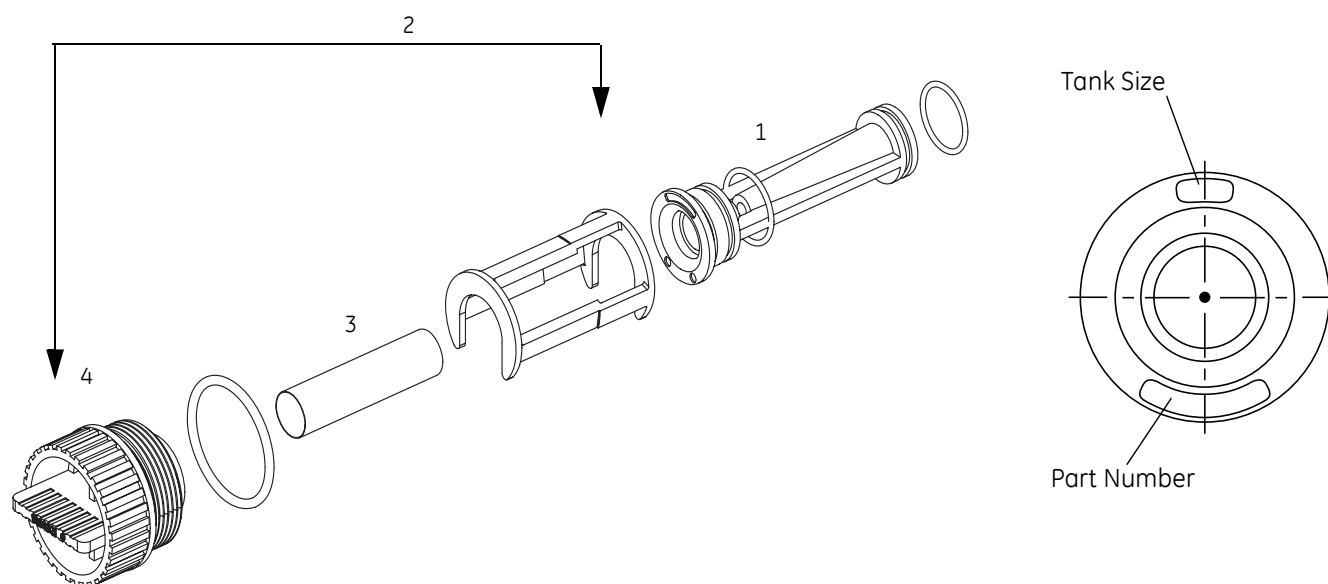


5 - Inlet Valve Cartridge

Item	Part Number	Description
1	1000366	Drain Valve Cartridge, Single Seat - Spring Assisted
2	1000365	Rinse Valve Cartridge, Double Seat - Spring Assisted
3	1000366	No Hardwater Bypass Valve Cartridge, Single Seat - Spring Assisted
4	1000336	Hardwater Bypass Cap
5	1000317	Inlet Valve Cartridge, Double Seat - No Spring Assist
6	1010157	O-Ring
7	1010158	O-Ring
8	1231646	O-Ring
9	1010116	O-Ring (qty. 2 per Cartridge)

NOTE: Items 1 and 3 are identical valve cartridges.

Injector Assembly

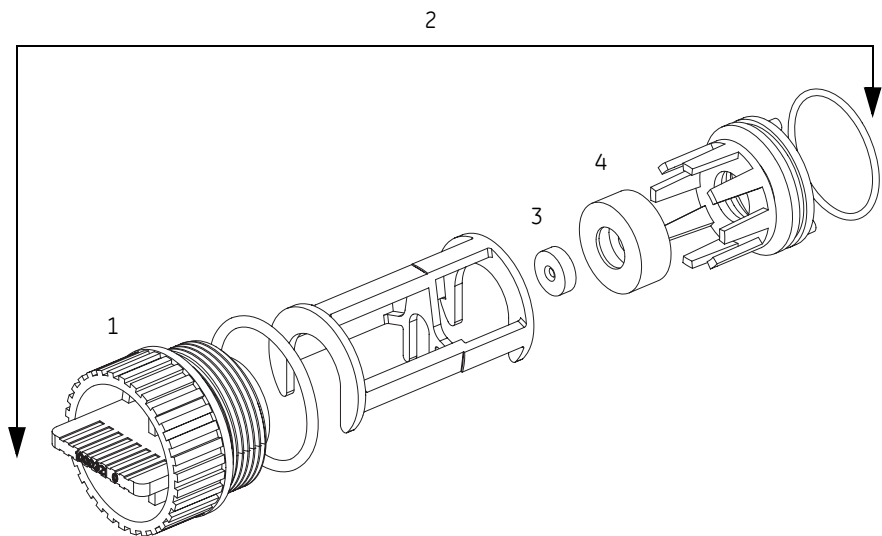


Item	Part Number	Description
1	1040670	Injector for 14-inch (35.6 cm) Tank - 0.5 GPM (1.9 LPM) (includes O-rings)
	1040671	Injector for 16-inch (40.6 cm) Tank - 0.5 GPM (1.9 LPM) (includes O-rings)
	1040672	Injector for 18-inch (45.7 cm) Tank - 0.6 GPM (2.27 LPM) (includes O-rings)
	1040673	Injector for 21-inch (53.3 cm) Tank - 0.9 GPM (3.41 LPM) (includes O-rings)
	1040674	Injector for 24-inch (61.0 cm) Tank - 1.4 GPM (5.3 LPM) (includes O-rings)
	1040675	Injector for 30-inch (76.2 cm) Tank - 2.0 GPM (7.57 LPM) (includes O-rings)
	1040676	Injector for 36-inch (91.4 cm) Tank - 3.3 GPM (12.5 LPM) (includes O-rings)
	1040669*	Injector, Blank (includes O-rings)
2	1040677	Injector Assembly (Less Injector)
3	1040678	Injector Screen (3 pack)
4	1040688	Cap (including O-rings)

NOTE: All flow rates are based on an inlet pressure of 60 psig (413 kPa). Actual rates vary with pressure, temperatures and other system variables.

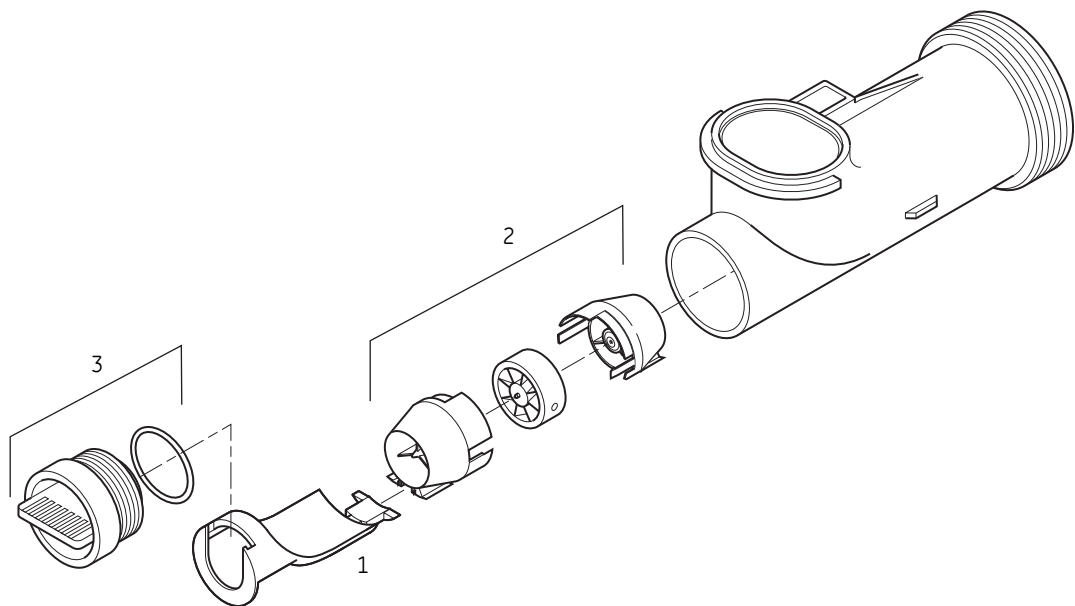
*Filter applications only.

Refill Flow Control Assembly



Item	Part Number	Description
1	1040688	Cap (includes O-ring)
2	1040687	Refill Assembly (Less Refill Flow Control)
3	1040679	Refill Flow Control for 14-inch (35.6 cm) Tank - 0.7 GPM (2.6 LPM) (3 pack)
	1040680	Refill Flow Control for 16-inch (40.6 cm) Tank - 0.8 GPM (3.0 LPM) (3 pack)
	1040681	Refill Flow Control for 18-inch (45.7 cm) Tank - 1.0 GPM (3.8 LPM) (3 pack)
	1040682	Refill Flow Control for 21-inch (53.3 cm) Tank - 1.4 GPM (5.3 LPM) (3 pack)
	1040683	Refill Flow Control for 24-inch (61.0 cm) Tank - 2.0 GPM (7.6 LPM) (3 pack)
	1040684	Refill Flow Control for 30-inch (76.2 cm) Tank - 3.0 GPM (11.4 LPM) (3 pack)
	1040685	Refill Flow Control for 36-inch (91.4 cm) Tank - 5.0 GPM (19.0 LPM) (3 pack)
4	1040686	Refill Flow Control Cage (3 pack)

Magnum IT Flow Sensor Assembly



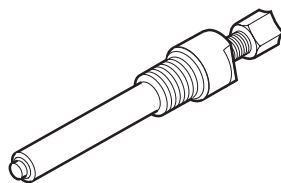
Item	Part Number	Description
1	1000074	Insert, Corner 2-inch
2	1232965	Assembly, Turbine 2-inch Elbow
3	1000318	Assembly, Cap

Installation Adapter Kits

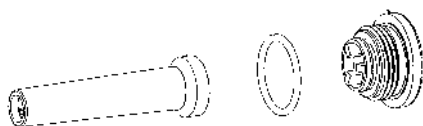
Adapters-Magnum IT

Item	Part Number	Description
Not Shown	3023849	Magnum IT Adapter Kit - Stainless Steel NPT for inlet, outlet, drain
Not Shown	3023674	Magnum IT Adapter Kit - Stainless Steel BSP for inlet, outlet, drain
Not Shown	1040784	Magnum IT Adapter Kit - CPVC for inlet, outlet, drain
Not Shown	3023860	2-inch NPT Stainless Steel Adapter with Zinc Diecast Nut (24 Pack)
Not Shown	3023829	2-inch BSP Stainless Steel Adapter with Zinc Diecast Nut (24 Pack)
Not Shown	1040788	2-inch CPVC Adapter with Zinc Diecast Nut (24 Pack)
Not Shown	1030664	2-inch Cast Zinc Diecast Nut
Not Shown	3014558	2-inch Stainless Steel NPT Adapter
Not Shown	3023879	2-inch Stainless Steel NPT Adapter with Drilled and Tapped 1/4-inch NPT Port
Not Shown	3014559	2-inch Stainless Steel BSP Adapter
Not Shown	3023848	2-inch Stainless Steel BSP Adapter with Drilled and Tapped 1/4-inch BSP Port
Not Shown	1030666	2-inch CPVC Adapter
Not Shown	1030667	63-mm Metric PVC Adapter
Not Shown	1010160	1.5-inch Adapter O-Ring
Not Shown	1010165	2.0-inch Adapter O-Ring
Not Shown	3024790	Stainless Steel Tank Adapter - 4-inch - 8UN Threads
Not Shown	3024788	Stainless Steel Flange
Not Shown	3023732	1-1/2-inch NPT Adapter Kit, includes inlet, outlet, and drain
Not Shown	3023736	1-1/2-inch BSP Adapter Kit, includes inlet, outlet, and drain

Miscellaneous Kits and Assemblies



External Pilot Feed Adapter



Pilot Filter Screen Assembly



Internal Pilot System Check Valve

Part Number	Description
1000226	Pilot Screen Assembly (includes Pilot Screen, Pilot Screen Cap and O-ring)
1040691	Valve O-ring Kit (tank adapter O-ring, (3) O-rings for 1-1/2-inch inlet, outlet, drain and distributor O-ring)
1040692	Pilot Flapper Kit (pilot, brine and springs)
1040668	External Pilot Feed Adapter (separate source pilot water)
3025780	Internal Pilot System Check Valve
1000878	Outdoor Cover
1009115	Top Stacking Distributor
1005953	Top Plate Screws (15 req'd)
1006093	Top Plate Screws (5 req'd)
1010162	Tank Adapter O-ring
1010160	Riser Tube O-ring
3025780	Internal Pilot System Check Valve

