Programming, Installation & Operation Manual

i5 Controller

Control Valves

Water Softening and Backwashing Systems

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Start-Up Procedure

After the inlet, outlet, drain, and electrical connections are complete a proper start-up procedure is critical to minimize the potential for damage to the system. Follow the instructions below.

1: Confirm water pressure is below 80 PSI and the water temperature is below 100°F.

2: Plug in the power to the system, set the bypass to the **Bypass Mode** and cycle the i5 valve to the **Backwash** cycle.

3: Slowly crack open the inlet of the bypass valve until you hear air going to the drain line. **Do not open fully!**

4: Allow the system to fill in the backwash position **very slowly!** If this is a softener, add 4 gallons of water and a packet of Sani System Softener Sanitizing Solution (or appropriate alternate) to the brine tank at this time.

5: As soon as water is coming out the drain, cycle the i5 control valve to the **Rinse** Cycle and slowly open the inlet of the bypass valve to the full open position.

6: Unplug the power cord from the wall and carefully inspect the system for leaks. Allow the system to **Rinse** for an extended period of time, typically no less than 30 minutes. If the water stops running to the drain during this time, check that the well can handle the systems regeneration cycle flow demands or cycle the system through a short backwash cycle to clear the bottom screen.

7: Plug the power back in and cycle the valve to the **Backwash** position. Allow the system to complete the regeneration process on its own.

8: Once the regeneration process is complete, run the system through a second regeneration process.

It is normal for the water to have variances in pH, taste, odor and color, along with air for the first couple weeks of operation. This start-up procedure helps to minimize these potential problems. Running the system through additional automated regeneration cycles can also lessen these common issues associated with the installation of new water quality improvement equipment. Media start-up procedures differ, but these general guidelines should satisfy most requirements. Some medias require up to 72 hours of soaking time, the extended **Rinse** cycle helps to satisfy this. Older plumbing systems may suffer from excessive debris in the plumbing due to the pipes and plumbing components being cleaned. This cleaning process can take many months and may result in clogged aerators, excessively dirty water especially after the water has been sitting in the plumbing for extended lengths of time. The picture below shows the possible results of a new water quality improvement installation and the excessive cleaning of the plumbing that can take place. This will usually subside in time.

The inlet and outlet diameter of the water softener must match the diameter of the water supply piping at the location where the softener will be installed. UPC 610.2

Setting Time of Day

Press the button. The HOUR and AM/PM will blink. Press the or button to change the hour and AM/PM to the correct time. Press the button and the minutes will blink. Set the minutes with the or buttons to the correct time and press the button to complete setting the time of day.

Typical Installer Programming "Softener"

1) Press the and button simultaneously for 1 second.
2) Use the or buttons to set the **"WATER HARDNESS"** to the proper hardness then press
3) Use the or buttons to set **"DAYS BETWEEN REGEN"** to **28** or desired alternate then press
4) Use the or buttons to set the **"REGENERATION TIME"** to **2:00 AM** or desired alternate then press
5) Use the button to set **"ENERGY SAVER"** to OFF. This will leave the backlight on, then press to exit installer programing or press the and simultaneously for 1 second to edit the name and phone number.

Typical Installer Programming "Filter"

1) Press the and button simultaneously for 1 second.
2) Use the or buttons to set the **"DAYS BETWEEN REGEN"** to the desired amount, then press
3) Use the or buttons to set **"REGENERATION TIME"** to **12:00 A.M.** or desired alternate then press
4) Use the button to set **"ENERGY SAVER"** to OFF. This will leave the backlight on, then press to exit installer programing or press the and simultaneously for 1 second to edit the name and phone number.

Adjusting the Salt Level on a Softener (adding salt to the brine tank)

If your valve has the Salt Level Alarm set to **"ON"** in the OEM programming mode, you can adjust the amount of salt by pressing the button repeatedly until "**SALT LEVEL**" appears on the screen, then push the button to enter the setting screen. Press the button once for every 10 pounds of salt you add to the brine tank. Press the button to lock the setting.

General Backwashing Filter Guidelines

Backwashing systems should be programmed to backwash at a different time than other water treatment equipment to lessen the potential for over running the drainage system. Backwash lengths and frequencies vary by the application. Below are typical settings for common medias.

Municipal Water Applications Common

Carbon: Every 28 days.
Sediment Reduction Medias: Every 14 days.

Well Water Applications Common

Carbon used for iron/chlorine reduction: Every 1-3 days.
Sediment Reduction Medias: Every 2-7 days.
Arsenic Reduction Medias: Every 28 days.
Iron Reduction Medias: Every 1-2 days.
Neutralizing Medias: Every 7 days.
Potassium permanganate, hydrogen peroxide or chlorine tablet regeneration, every 1-3 days.

Connector Set_____	Capacity_____
Injector Size _____	Salt #_____
DLFC GPM_____	Bypass_____
Day Override_____	Assembler_____

These are general use guidelines only. Regular testing should be done to determine proper frequency and duration.

Typical OEM Programming Standard "Softener"

1) Press the NEXT and ↓ button simultaneously for ~5 seconds.
2) Use the ↑ or ↓ buttons and set **"TYPE"** to **"SOFTENING DN POST"** then press NEXT
3) Use the ↑ or ↓ buttons to set **"BACKWASH TIME"** to **"8:00 MIN"** or desired alternate then press NEXT
4) Use the ↑ or ↓ buttons to set **"DRAW DN TIME"** to **"60:00 MIN"** or desired alternate then press NEXT
5) Use the ↑ or ↓ button to set **"BACKWASH TIME"** to **"4:00 MIN"** or desired alternate then press NEXT
6) Use the ↑ or ↓ button to set **"RINSE TIME"** to **"4:00 MIN"** or desired alternate then press NEXT
7) Use the ↑ or ↓ button to set **"FILL"** to **"8.0 LBS"** per cubic foot of resin or desired alternate then press NEXT
8) Use the ↑ or ↓ button to set **"GRAINS OF CAPACITY"** to **"24.0"**x1K per ft^3 of resin or desired alternate then press NEXT
9) Use the ↑ or ↓ button to set **"GALLONS CAPACITY"** to **"AUTO"** then press NEXT
10) Use the ↑ or ↓ button to set **"DELAYED REGENERATION"** then press NEXT
11) Use the ↑ or ↓ button to set **"RELAY 1"** to **"OFF"** then press NEXT
12) Use the ↑ or ↓ button to set **"RELAY 2"** to **"OFF"** then press NEXT
13) Use the ↑ or ↓ button to set **"SERVICE ALARM"** to either **"OFF"**, **"TIME"**, **"GALLONS"** or **"BOTH"**, it is typically recommended to set this to **"BOTH"** and to set the service to **"1.00 YR"** and **"100,000 GAL".** Most water treatment equipment should be inspected, tested and maintained annually. Press the NEXT button to review the Schedule for service
14) Use the ↑ or ↓ buttons to set **"SALT LEVEL ALARM"** to **"OFF"** or your desired amount. Most common is **"50 LBS"** then press NEXT this will exit the OEM programming mode.

Typical OEM Programming Standard "Filter Backwash"

1) Press the NEXT and ↓ button simultaneously for ~5 seconds.
2) Use the ↑ or ↓ buttons and set **"TYPE"** to **"FILTERING DN POST"** then press NEXT
3) Use the ↑ or ↓ buttons to set **"BACKWASH TIME"** to **"8:00 MIN"** or desired alternate then press NEXT
4) Use the ↑ or ↓ buttons to set **"DRAW TIME"** to **"OFF"** or desired alternate then press NEXT
5) Use the ↑ or ↓ button to set **"BACKWASH TIME"** to **"OFF"** or desired alternate then press NEXT
6) Use the ↑ or ↓ button to set **"RINSE TIME"** to **"4:00 MIN"** or desired alternate then press NEXT
7) Use the ↑ or ↓ button to set **"FILL"** to **"OFF" or** desired alternate then press NEXT
8) Use the ↑ or ↓ button to set **"GALLONS CAPACITY"** to **"OFF"** or desired gallons if you have installed the optional meter (Meter is standard on all i510 and i512 valves) then press NEXT
9) If you set the system to a set gallon amount instead of **"OFF"**, you will set the valve to **"DELAYED REGENERATION"** using the ↑ or ↓ button to then press NEXT
10) Use the ↑ or ↓ button to set **"RELAY 1"** to **"OFF"** then press NEXT
11) Use the ↑ or ↓ button to set **"RELAY 2"** to **"OFF"** then press NEXT
12) Use the ↑ or ↓ button to set **"SERVICE ALARM"** to either **"OFF"**, **"TIME"**, **"GALLONS"** or **"BOTH"**, it is typically recommended to set this to **"BOTH"** and to set the service to **"1.00 YR"** and **"100,000 GAL".** Most water treatment equipment should be inspected, tested and maintained annually. Press the button to review the service schedule and to exit the OEM programming mode

General Operation

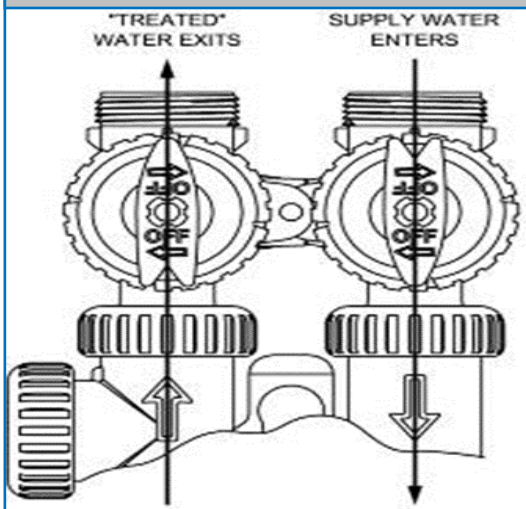
When the system is operating several displays may be shown including the contact information, time of day, gallons remaining before the next regeneration, days remaining between backwashes, current flow rate salt amount and more. To manually cycle through these screens push the NEXT button.

Manual Regeneration

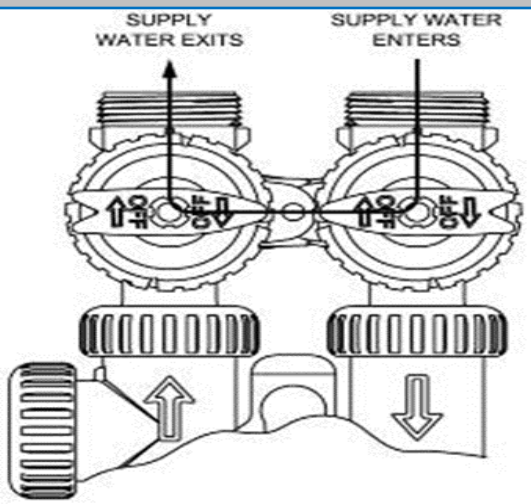
Press and release the button, the system will regenerate tonight. Press and hold the button for 5 seconds to start an immediate regeneration. Press and release the button to advance the valve to the next cycle.

Bypass Valve Operation

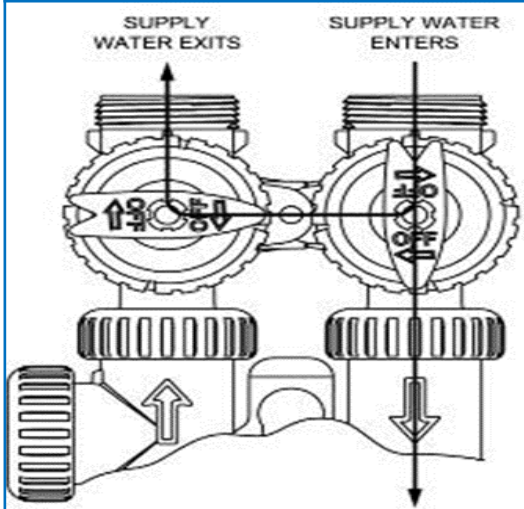
Service Mode



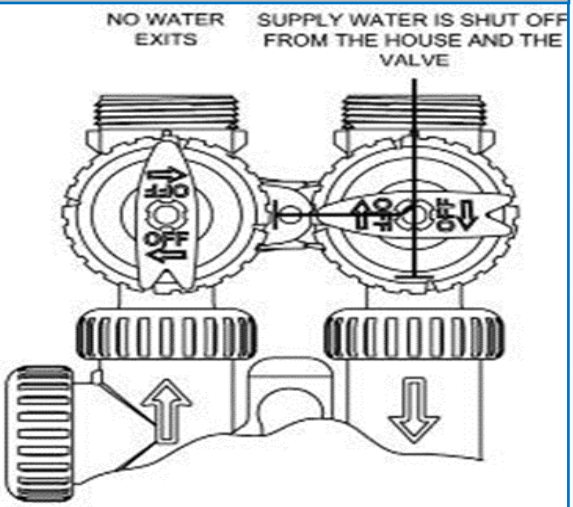
Bypass Mode



Diagnostic Mode



Shut Off Mode



General Warnings

Plastic control valves, fittings and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing. HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC., MAY DAMAGE PRODUCTS THAT CONTAIN O-RINGS OR PLASTIC COMPONENTS. EXPOSURE TO SUCH HYDROCARBONS MAY CAUSE THE PRODUCTS TO LEAK. DO NOT USE THE PRODUCT(S) CONTAINED IN THIS DOCUMENT ON WATER SUPPLIES THAT CONTAIN HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC. THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone for the unit. A silicone lubricant may be used on black O-rings but is not necessary.

The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench. If necessary, pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in the slots on caps and/or tap with a hammer.

Do not use pipe dope or other sealants on threads. Use Teflon tape on the threaded inlet, outlet and drain fittings. Teflon tape is not necessary on the nut connections or caps with O-ring seals.

After completing any valve maintenance involving the drive/piston assembly, unplug power source jack from the printed circuit board (black wire), wait 3 seconds and plug back in. This resets the electronics and establishes the service piston position. The display should flash all of the available LCD's, then flash the software version and then reset the valve to the service position.

All plumbing should be done in accordance with local plumbing codes. The pipe size for the drain line should be a minimum of ½". Backwash flow rates in excess of 7 gpm (26.5 lpm) or length in excess of 20' (6.1m) require ¾" drain line.

Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" between the drain line control fitting and solder joints when soldering pipes that are connected on the drain line control fitting. Failure to do this could cause interior damage to the drain line flow control fitting.

When assembling the installation fitting package (inlet and outlet), connect the fitting to the plumbing system first and then attach the nut, split ring and O-ring. Heat from soldering or solvent cements may damage the nut, split ring or O-ring. Solder joints should be cool and solvent cements should be set before installing the nut, split ring and O-ring. Avoid getting primer and solvent cement on any part of the O-rings, split rings, bypass valve or control valve.

Plug into an electrical outlet. Note: All electrical connections must be connected according to local codes. (Be certain the outlet is uninterrupted.)

Install grounding strap on metal pipes in accordance with local plumbing codes.

The i510, i512 and i510T control valve can be set so that a softener can meet the NSF/ANSI Standard 44 efficiency rating.

The use of flexible connectors are recommended on all systems and is required on all Brass valves.

The use of a vacuum break is required on installations where a vacuum condition may occur. This includes vacuum breakers on the drain line if the drain will be run lower than 5 feet below the unit.

Systems must never be installed in locations where water damage can occur to the surrounding areas. Liability mitigation techniques must be used including redundant leak detection and automatic shut off devices.

Units must be protected from freezing, hot water damage, excessive pressure, vacuum and any other common water condition that can cause damage to the equipment. Appropriate installation of check valves, thermal expansion tanks, pressure reducing valves, backflow preventers and other common plumbing components need to be considered by a licensed plumber or water treatment specialist prior to installing the equipment.

General Warnings

The control valve is compatible with a variety of regenerants and resin cleaners. The control valve is capable of routing the flow of water in the necessary paths to regenerate or backwash water treatment systems. The injector regulates the flow of brine or other regenerants. The control valve regulates the flow rates for backwashing, rinsing, and the replenishing of treated water into a regenerant tank, when applicable.

The control valve uses no traditional fasteners (e.g. screws); instead clips, threaded caps, nuts and snap type latches are used. Caps and nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screw driver, one large blade screw driver, pliers and a pair of hands. A plastic wrench is available which eliminates the need for screwdrivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market. Control valve installation is simplified as the distributor tube can be cut ½" above to ½" below the top of tank thread. The distributor tube is held in place by an O-ring seal and the control valve also has a bayonet lock feature for upper distributor baskets.

The AC adapter comes with a 15 foot power cord and is designed for use with the control valve. The AC adapter is for dry location use only. If the power goes out, the control valve remembers all settings until the battery power is depleted. After the battery power is depleted, the only item that needs to be reset is the time of day; other values are permanently stored in the nonvolatile memory. The control valve battery is not rechargeable but is replaceable.

A vacuum break is required any time a vacuum situation may occur. This is common on wells, systems with booster pumps after the unit, or when the system is installed in areas of varying altitudes. No warranty is considered if the system has been subjected to a vacuum. A vacuum break should be installed between the softener and the potential cause of a vacuum.

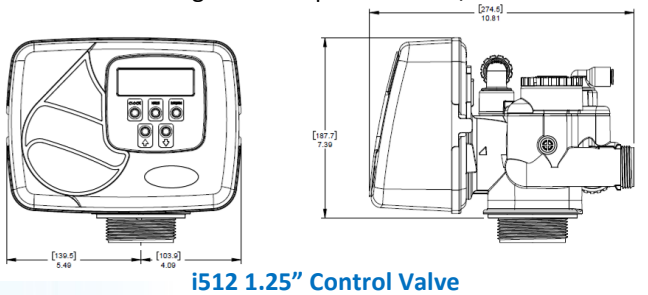
Typical multiple tank installation with pre and post filtration with UV. Special notes, a simple air gap is shown with a minimum of 2" of space between the drain tube and the P-Trap. A vacuum break must be installed on systems where a vacuum condition could occur. Install the vacuum break between the systems and the potential vacuum source. A well, booster pump, or even a drain pipe running down a few feet can cause a vacuum condition that will damage the system. The brine tank has a small barbed fitting that can be run to a gravity drain but this is typically not necessary.

Valve Specifications

Minimum/Maximum Operating Pressures: 20 psi (138 kPa or 1.4 bar) to 125 psi (862 kPa or 8.6 bar)
Minimum/Maximum Operating Temperatures: 40°F (4°C) - 110°F (43°C)
Power Adapter: Supply Voltage 120 VAC/60 Hz
Output Voltage: 15 VDC, Output Current: 500 mA

i510 1” Control Valve

Valve flow rate @ 15 PSI drop: 27 GPM
Valve maximum backwash rate @ 25 PSI drop: 27 GPM
Valve distributor pilot: 1.05” (3/4” PVC)
Tank Mounting 2-1/2” - 8 UN
Height from top of tank: 7-3/8”

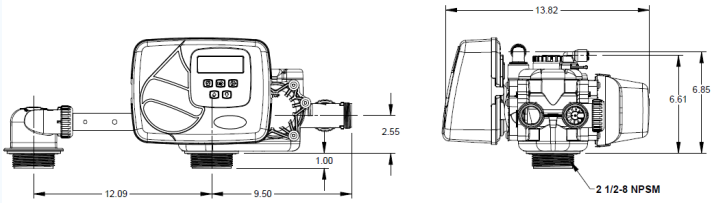


i512 1.25” Control Valve

Valve flow rate @ 15 PSI drop: 34 GPM
Valve maximum backwash rate @ 25 PSI drop: 32 GPM
Valve distributor pilot: 1.32” (1” PVC)
Drain Line Connection: 3/4” or 1” MNPT
Tank Mounting 2-1/2” - 8 UN
Height from top of tank: 7-3/8”

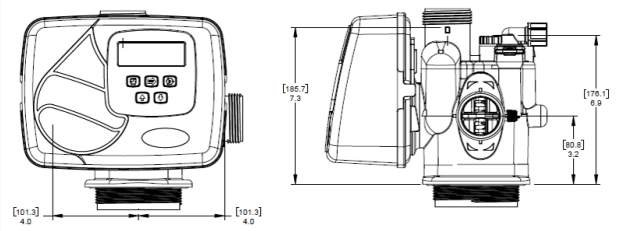
i510T 1” Twin Control Valve

Valve flow rate @ 15 PSI drop: 28 GPM
Valve maximum backwash rate @ 25 PSI drop: 15 GPM
Valve distributor pilot: 1.05” (3/4” PVC)
Drain Line Connection: 3/4” or 1” MNPT
Tank Mounting 2-1/2” - 8 UN
Height from top of tank: 7-3/8”



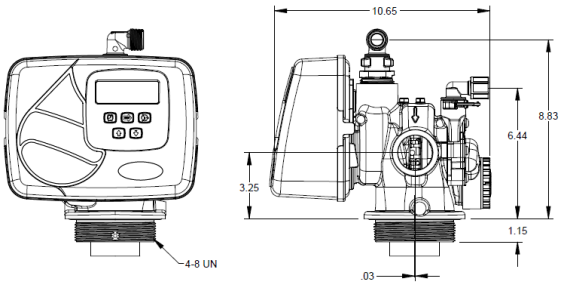
i515P 1.5” Plastic Control Valve

Valve flow rate @ 15 PSI drop: 60 GPM
Valve maximum backwash rate @ 25 PSI drop: 43 GPM
Valve distributor pilot: 1.9” (1.5” PVC)
Drain Line Connection: 1” MNPT
Tank Mounting 4” - 8 UN
Height from top of tank: 10.75”



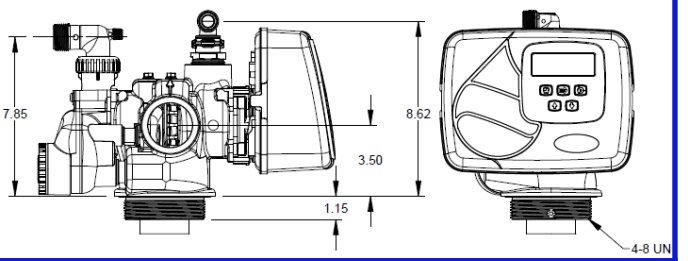
i515 1.5” Brass Control Valve

Valve flow rate @ 15 PSI drop: 70 GPM
Valve maximum backwash rate @ 25 PSI drop: 52 GPM
Valve distributor pilot: 1.9” (1.5” PVC)
Drain Line Connection: 1.25” FNPT
Tank Mounting 4” - 8 UN
Height from top of tank: 7.75”



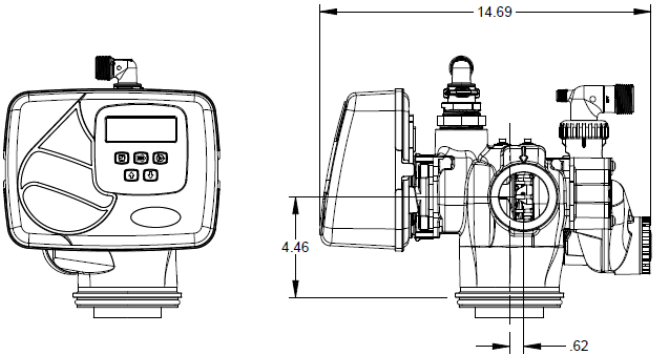
i520 2” Brass Control Valve 4” Threaded

Valve flow rate @ 15 PSI drop: 115 GPM
Valve maximum backwash rate @ 25 PSI drop: 80 GPM
Valve distributor pilot: 1.9” (1.5” PVC)
Drain Line Connection: 1.5” FNPT
Tank Mounting 4” - 8 UN
Height from top of tank: 8.5”



i520Q 2” Brass Control Valve Quick Connect

Valve flow rate @ 15 PSI drop: 125 GPM
Valve maximum backwash rate @ 25 PSI drop: 85 GPM
Valve distributor pilot: 2.375” (2” PVC)
Drain Line Connection: 1.5” FNPT
Tank Mounting 4” - 8 UN, 6” Flange or Side Mount
Height from top of tank: 4” QC 11.2”, 6” QC 11.3”



Error Codes

101: Unable to start, motor output is energized but the board does not sense motion.
102: Motor stalled, valve is unable to find the next position.
103: Motor ran too long, valve was unable to find the next position.
104: Valve was unable to find the “Home” position.
106: ALT MAV ran too long
107: ALT MAV stalled, motor ran too short.
109: Invalid motor state, the control can no longer operate properly due to the detection of an invalid motor state.
116: AUX MAV ran too long
117: AUX MAV stalled, motor ran too short.
201: Invalid regeneration step, control can no longer operate properly due to the detection of an invalid regeneration cycle step, internal software error.
202: Unexpected stall, motor encountered an unexpected stall which it was able to recover from and proceed normally.
402, 403, 404, 405, 406: Control can no longer operate due to E^2PROM memory error, reset or replace board.
406, 407, 408: RAM memory error, Control can no longer operate due to RAM memory error, reset or replace board.
410: Configuration download error, the configuration file and the valve have different software revisions.

Relay and MAV/NHWBP Operation while in Error Modes

1) The regeneration valve itself will complete regeneration only if already in regeneration and the current Error Code is not 101/102/103/104.
2) The regeneration valve itself will not enter regeneration if the control is already in Error Mode regardless of the error code.
3) All relays will deactivate immediately and remain deactivated when any error code is generated until the control is reset.
4) Error 101/102/103/104 will cancel any regeneration and all MAV valves are then either kept in the Service Position or returned sequentially to Service and will remain there until the control is reset. This excludes the ALT MAV in Alternator Systems which will remain in their current position and System Controller applications whenever an ALT MAV has already transitioned to By-pass during the regeneration and an error code was then generated sometime later on that same control. The ALT MAV will remain in bypass until the valve is reset and generates an error 10/107 during a non regeneration transition, the ALT MAV valve in this case should remain in its current position until the control is reset.
5) Any MAV error (106/107/116/117) before regeneration is entered will cause any regeneration to be canceled and all MAV’s will remain or cycle sequentially to the Service Position until the control is reset. This excludes the ALT MAV in alternator systems which should remain in their current position and System Controller applications whenever an ALT MAV generates an error (106/107) during a non regeneration transition. The ALT MAV in this case should remain in its current position until the control is reset. In this state, service flow will still be monitored by the same control.
6) Any MAV error (106/107/116/117) during regeneration will allow the valve to complete the regeneration normally however all remaining scheduled MAV drives will be immediately canceled and all remaining functional MAVs will be sequentially returned to the Service position and will remain there until the control is reset. This excludes ALT MAVS in alternator systems which should remain in their current position.

Soft Reset

Unplug the power from the board, wait 5 seconds, plug the power back into the board. This will reset the board.

Soft Reset Level 2

Press the 

and  buttons for ~3 seconds to sequentially activate/test the LCD display, display software version, re-homes valve and all active MAV valves, resets manual regeneration request. All other settings are saved.

Hard Reset

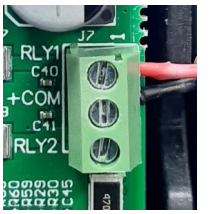
To reset the valve back to factory defaults, press and hold the 

and  buttons to enter programming mode. Next press the  and  buttons for ~3 seconds to initiate a complete factory reset. This will retain the current history level displays.

AIO3 Ozonated Air Draw Systems

1) Press the NEXT and ↓ button simultaneously for ~5 second. Use the ↓ button and set the valve to **"FILTERING DN POST"**
2) Press the NEXT button to display **"BACKWASH TIME"**, use the ↑ or ↓ buttons to set the time to **10** minutes.
3) Press the NEXT button to display the **"DRAW TIME"**, use the ↑ or ↓ buttons to set the time to **45** minutes.
4) Press the NEXT button to display **"BACKWASH TIME"**, use the ↑ or ↓ buttons to set the time to **OFF**.
5) Press the NEXT button to display **"RINSE TIME"** use the ↑ or ↓ buttons to set the time to **OFF**.
6) Press the NEXT button to display **"FILL"** use the ↑ or ↓ buttons to set the time to **OFF**.
7) Press the NEXT button to display **"GALLON CAPACITY"** use the ↑ or ↓ buttons to set the Capacity to the **desired capacity**. Set the regeneration type to **DELAYED**.
8) Press the NEXT button to display **"RELAY 1"** use the ↑ or ↓ buttons to set RELAY 1 to **"REGEN TIME"**. If this is for an **Air Regeneration** system without the **Ozone Generator** then the Relay can be left **"OFF"**.
9) Press the NEXT button to display **"RELAY 1 SETPOINT"** use the ↑ or ↓ buttons to set RELAY 1 to **"11 MIN"**.
10) Press the NEXT button to display **"RELAY 1 DURATION"**, use the ↑ or ↓ buttons to set the duration to **"43:00 MIN"**.
11) Press the NEXT button to display **"RELAY 2"** use the ↑ or ↓ buttons to set RELAY 2 to **"OFF"**.
12) Press the NEXT button to display **"SERVICE ALARM"** use the ↑ or ↓ buttons to set SERVICE ALARM to **"TIME"**.
13) Press the NEXT button to display **"SCHEDULED SERVICE"** use the ↑ or ↓ buttons to set SCHEDULED SERVICE to **"1.00 YR"**. The CD cell should be serviced annually.
14) Press the NEXT button to display **"SCHEDULE SERVICE"** the screen will display **"364 DAYS"**.
15) Press the NEXT button to exit programming.
16) Press the NEXT and ↑ buttons simultaneously for 1 second. Use the ↑ or ↓ button to set **"DAYS BETWEEN REGEN"** to **1**. This will set the unit to regenerate daily. Changing the regeneration frequency to less than daily in most applications is not recommended.
17) Press the NEXT button to display **"REGENERATION TIME"**. Set the time to your desired regeneration time. Typical is 12:00 A.M. The system should be set so that it does not regenerate when water is being used in the application or when other water filtration components are regenerating.
18) Press the NEXT button to display **"ENERGY SAVER"**. Set to **OFF** if you want the backlight to stay on, **ON** if you want the backlight to turn off after 5 minutes.

The ozone generator is mounted as shown. Connect the red wire into **RLY1** and the black wire into the **+COM**. Plug in the supplied transformer to the back of the ozone generator. The ozone generator will now be controlled by the control valve. The LED light on the ozone generator indicates the following.



Green Light Slow Blinking: Standby Mode

Green Light Quick Blinking: High voltage startup (up to 3 seconds)

Green Light Solid: CD cell is stable and producing ozone

Red Light Solid: Unstable, Clean CD Cell

Green/Red Alternating: Clean CD Cell

Red Light Flashing: NO/NC contacts are shorted, correct wiring

Orange Light: 1 year timer has expired. Clean the CD cell and replace the external check valve. Reset the timer by pushing the "ALARM RESET" button once.

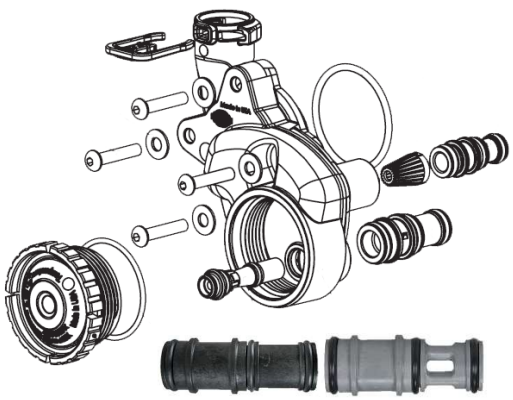
55-CV39 Internal inlet check valve

Upflow and Variable/Proportional Upflow Brining

Variable upflow brining (proportional fill) can be advantageous in a multitude of applications. i510 and i512 valves can not be modified in the field as the valve bodies are different. i510T, i515, i515P, i520 and i520Q valves can be modified for upflow regeneration. With variable brining, the controller determines how much reserve capacity has been used when the regeneration time is reached. Based on that remaining capacity, the system adjusts the salt dose used for that regeneration. This salt dose adjustment avoids using salt for resin that is still regenerated. Fill time is varied to allow the salt dose to be matched to the actual amount of resin that is exhausted. The most common application for variable brining is residential and commercial applications where the system is undersized.

1) Press the NEXT and ↓ button for ≈5 seconds and use the ↑ button to set **"TYPE"** to **SOFTENING UP PRE**
2) Press the NEXT button to display the **"FILL SET,** use the ↑ or ↓ buttons to set salt amount to your desired amount.
3) Press the NEXT button to display **"SOFTENING TIME"**, use the ↑ or ↓ buttons to set the time to **120:00 MIN**. This is the time between the brine fill and the system starts to regenerate.
4) Press the NEXT button to display **"DRAW UP TIME"**, use the ↑ or ↓ buttons to set the time to **100 MIN**. Upflow brining uses smaller injectors to prevent the resin bed from expanding so longer draw times are needed.
5) Press the NEXT button to display **"BACKWASH TIME"**, use the ↑ or ↓ buttons to set the time to **6:00 MIN**.
6) Press the NEXT button to display **"RINSE TIME"**, use the ↑ or ↓ buttons to set the time to **4:00 MIN**.
7) Press the NEXT button to display **"GRAINS OF CAPACITY"** based on the system size and salt setting**.**
8) Press the NEXT button to display **"TYPE"**, use the ↑ or ↓ buttons to set the valve to **PROPORTIONAL FILL or NORMAL FILL**. Proportional fill is more common and highly recommended if the system is undersized.
9) Press the NEXT button to display **"GALLONS CAPACITY"**, set to **AUTO**.
10) Press the NEXT button to display **"TYPE"** use the ↑ or ↓ buttons to set the regeneration type to **DELAYED REGENERATION.**
11) Press the NEXT button to display **"RELAY 1"**, use the ↑ or ↓ buttons to set the relay to **OFF**.
12) Press the NEXT button to display **"RELAY 2"**, use the ↑ or ↓ buttons to set the relay to **OFF**.
13) Press the NEXT button to display **"SERVICE ALARM"** use the ↑ or ↓ buttons to set **SCHEDULED SERVICE** to either **OFF**, **TIME**, **GALLONS**, or **BOTH**. Set the service alarm gallon and frequency as desired.
14) Press the NEXT button to display **"SALT LEVEL ALARM"** to either **OFF** or your desired amount of salt left in the brine tank before the salt level alarm is triggered.
15) Press the NEXT button to exit programming.

39V-V3968 39V-V3968-01



39V-V3730 39V-V3730-01

Upflow/Downflow Notes

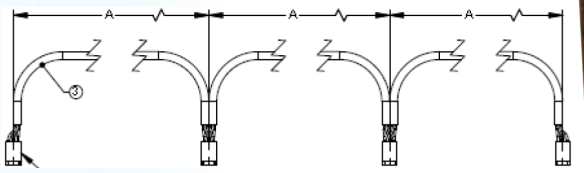
The i510 and i512 Valves have different valve bodies for Upflow and Downflow and can not be converted. The i515 Brass valve uses different feed and draw tubes (Black-Downflow 39V-V3968, 39V-V3969 and Grey-Upflow 39V-V3968-01, 39V-V3969-01) and a different piston and can be converted in the field with these parts. The i510T twin alternating valve and the i515P Plastic valve require the piston be changed and the injector and injector plug locations be switched to the correct position. The i520 and 1520Q valve uses different feed and draw tubes (Black-Downflow 39V-V3731, 39V-V3730 and Grey-Upflow 39V-V3731-01, 39V-V3730-01) and a different piston and seal spacer kit and can be converted in the field with these parts. Be sure to change the injector size according to the injector chart on page 23.

Progressive Flow

The “i5” valve is capable of progressive flow applications for 2-4 systems with meters. This requires a NHWBP valve on the outlet connected to the MAV Driver. All units must be connected prior to programming.

1) Press the NEXT and ↓ button simultaneously for ~5 seconds to access OEM Programming.
2) Press the NEXT and ↓ button simultaneously again for ~5 seconds to access Factory Programming.
3) Valve Type: Use the ↑ button to set the valve to the correct type. **1.0** IN., **1.25** IN, **1.5** IN or **2.0** IN
4) Press the NEXT button to display SET “**ALT MAV**”, use the ↑ button to set the valve to “PROGRESSIVE FLOW”.
5) Press the NEXT button to display SET “**VALVE**”, use the ↑ button to change the “UNIT NAME” to 1-4 with the first unit being 1, the second unit being 2, and so on up to 4 units.
6) Press the NEXT button to display SET “**ADD ANOTHER UNIT**”, use the ↑ or ↓ button to change to the desired flow rate you would like another unit to come online. This will only appear on unit #1.
7) Press the NEXT button to display SET “AUX MAV” to OFF unless you will be using the AUX MAV for another function.
8) Press the NEXT button to exit programming mode. Repeat for all successive valves.

Item #	Cable
39V-V3475-12	2 Units
39V-V4244-12	3 Units
39V-V4245-12	4 Units



MAV's, NHWBP Valves

The "i5" valve is capable of driving two MAV valves. Separate source regeneration, No Hard Water Bypass (NHWBP) and twin alternating systems are common applications for this feature.

1) Press the NEXT and ↓ button simultaneously for ~5 seconds to access OEM Programming.
2) Press the NEXT and ↓ button simultaneously again for ~5 seconds to access Factory Programming.
3) Valve Type: Use the ↑ button to set the valve to the correct type. 1.0 IN., 1.0T, 1.25 IN, 1.5 IN or 2.0 IN. You may be prompted to set the meter size, pre-rinse etc. Set as desired.
4) Press the NEXT button to display SET **"ALT MAV"**, use the ↑ button to set the valve to the correct setting.
5) Press the NEXT button to display SET **"AUX MAV",** use the ↑ button to set the valve to the correct setting.

ALT A and ALT B are for twin alternating systems using a 3 way MAV. The MAV will have an "A" and "B" port molded into the valve. Each valve must be programmed as either A or B and the Valve programmed as "ALT A" needs to be installed to the "A" port and the valve programmed as "ALT B" needs to be installed to the "B" port.

SYSTEM CONTROLLER is used when the system will be used with a system controller with up to 6 valves. These will typically be connected to a NHWBP valve on the outlet of each unit.

PROGRESSIVE FLOW is used when multiple metered systems will be installed and units will turn on and off (NHWBP) as dictated by flow. See the progressive flow instructions for more details.

SEPARATE SOURCE is commonly used when a clean water regeneration is desired. A three way MAV is installed on the inlet and alternates water supplies when the system goes into regeneration. Port "C" connects to the inlet on the i5 valve, port "A" connects to the clean separate source supply, port "B" connects to the raw untreated water.

NO HARD WATER BYPASS is used when you want to stop water flow from exiting the system during the regeneration process.

TIME is available on the **AUX MAV** setting. You can program the MAV to alternate at a set time during the regeneration and to cycle back to the original position after a certain number of minutes.

Diagnostics

1) Press the ▲ and ▼ button simultaneously for ~5 second. **"DAYS SINCE LAST REGEN"** will be displayed.
2) Press the NEXT button to display **"GALLONS SINCE LAST REGEN"**
3) Press the NEXT button to display the current days **"RESERVE HISTORY" (0)** which is the average water used on that day of the week based on the previous 4-6 weeks.
4) Press the ▲ button to see the previous days **"RESERVE HISTORY" (1)**, keep pressing the ▲ Button to see all 7 days of the weeks average usage history. This is only displayed if the reserve capacity is determined by the control.
5) Press the NEXT button to see todays water **"USAGE HISTORY" (0),** press the ▲ button to see the previous days water usage for up to 63 days.
6) Press the NEXT button to display **"MAX FLOW" (0),** the maximum sustained water flow the system registered today. Press the ▲ button to view the maximum sustained flow for the past 6 days.
7) Press the NEXT button to exit diagnostics.

i510T Twin Alternating Diagnostics

If the valve is an **i510T** the diagnostics will continue to show the tank transfer history. Press the ▲ button to review the past 10 tank transfers.

"1" = Transfer number (10 transfers max)

A or B = Tank Transferring

"3" = How many days ago the tank transferred (99 days max)

0 = Gallons used at time of transfer

Auxiliary Driver Diagnostics

If the control valve has a Motorized Alternating Valve(s) or No Hard Water Bypass Valve(s) attached to the either or both of the auxiliary drivers, the diagnostics mode will continue. Press the NEXT button to review the MAV drive history.

ALT= Main Auxiliary Drive, AUX= 2nd Auxiliary drive.

- = Indicates Piston drive into the MAV valve.

+ = Indicates Piston drive out of the MAV valve.

First = Average of the first 3 drive times measured for that MAV in that direction.

Last = Last drive time measured for that MAV in that direction since last reset.

Avg = Current average drive time calculated for that MAV in that direction.

TTT = Voltage compensated MAV drive time (in 1/100th sec) measured (First/Last/Avg).

CCC = Total number of cycles in/out for the MAV.

VVV = Relative MAV drive voltage measured (First/Last/Avg).

Factory Level Programming

1) Press the NEXT and ↓ button simultaneously for ~5 seconds to access OEM Programming.
2) Press the NEXT and ↓ button simultaneously again for ~5 seconds to access Factory Programming.

Several settings are available inside of the Factory Programming settings.

Valve Type and size must match the actual valve.

Meter must match the actual meter size. For generic meters the K Factor can be programmed.

MAV and Auxiliary MAV can be programmed according to the application.

AUXILIARY INPUT is labeled on the board as "DP SW" and is used to initiate or to prevent a regeneration by connecting a switched line to the connector. NOTE: In a twin alternating system each control must have a separate DP signal or DP switch. One DP signal or one DP switch cannot be used for both controls.

1) **OFF** has no affect, the input is not used and any input will be ignored.
2) **IMMED REG:** If the auxiliary input switch is closed for a cumulative total of 2 minutes, an immediate regeneration will be initiated. Commonly used with differential pressure switches. In a twin alternating system the MAV will transition first to switch units so that the signaled unit can start the regeneration. After the MAV has fully transitioned the regeneration begins immediately.
3) **DELAY REG:** If the auxiliary input switch is closed for a cumulative total of 2 minutes, a regeneration will occur at the scheduled delayed regeneration time.
4) **HOLD:** If the switch is closed, a regeneration will not be allowed even if the scheduled time of regen occurs or the meter capacity reaches zero.

FILL UNITS: For 1" to 1.5" valves. These can be set to either **LBS** or **MIN** (minutes). This should be left at LBS for most applications unless your application requires that you change the refill flow control size. The 2" valve typically has a 2.2 GPM Brine Line Flow Control (BLFC) installed and each minute of refill is approximately 6.6 pounds. The BLFC can be changed as needed.

Relay Driver Programming

The i5 valve includes a dual 15 volt DC relay driver (wetted contact) integrated on the board. These relay drivers can be programmed in a multitude of ways. A dry contact relay kit is available, part #39-VX4Y for all applications when using the on-board relay driver. The relay programming is accessed in the "OEM" programming mode.

Relay Driver Options

REGEN TIME: Available on relay drivers 1 and 2. The relay can be programmed to turn on at a set time from the start of the regeneration for a preset length of time.

VOLUME: Available on relay drivers 1 and 2. The relay activates based on the outlet flow meter. The gallons and length of time can be set. Commonly used for controlling a pulsed input chemical injection pump.

REGEN VOLUME: Available on relay drivers 1 and 2. The relay activates based on the outlet flow meter when in regeneration and service. The gallons and length of time can be set.

LOW SALT: Available on relay driver 1. The relay activates when the low salt trigger value is reached and deactivates when the salt level trigger value is no longer exceeded.

ERROR MONITOR: Available on relay driver 2. The relay activates when any error is detected.

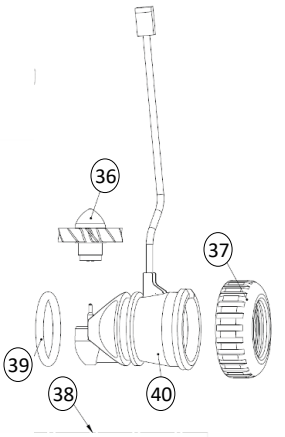
i510, i510T and i512 Service and Repair Parts

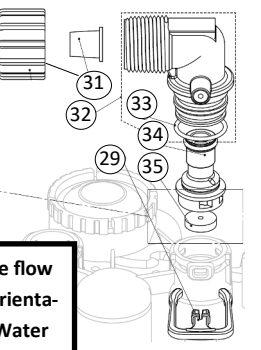
Item #	Valve Rebuild Kits*
39-CK10-K	i510 Softener Valve Rebuild Specify Injector Size.
39-CK10-KF	i510 Filter Valve Rebuild
39-WS125-K	i512 Softener Valve Rebuild Specify Injector Size
39-WS125-KF	i512Filter Valve Rebuild

***Rebuild kit includes the most recommended replacement parts including piston, seal/spacer stack, Drive cap/gear assembly, several O-rings, the brine piston and injector assembly for softener valves.**

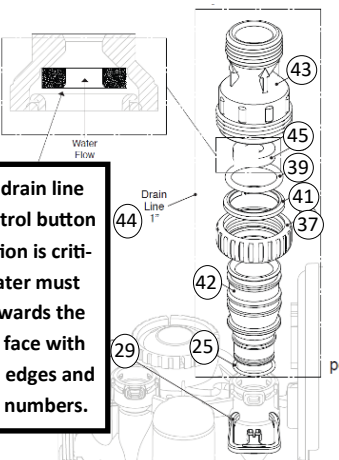
Item #	Description
40-V4420K	(1) “i5” Cover
39V-V3107-01	(2) 12V Motor
39V-V3106-01	(3) Drive Bracket & Spring Clip
39V-V3110	(4) Reducing Gear, order 3 pieces
39V-V3109	(5) Drive Gear Cover
39V-V3004	(6) Drive Cap Assy.
39V-V3135	(7) O-ring 228
39V-V3011	(8) Piston Downflow i510
39V-V3407	(8) Piston Downflow i512
39V-V3011-01	(9) Piston Upflow i510/i510T
39V-V4042	(9) Piston Upflow i512 (Black)
39V-V3174	(10) Regenerant piston
39V-V3005	(11) i510/Twin Seal Spacer Stack
39V-V3430	(11) i512 Seal/Spacer Stack
40-V4423	(12) “i5” Back Plate
39V-V3180	(13) O-ring 337 Tank/Valve
39V-V3105	(14) i510/Twin Riser O-ring
39V-V3357	(14) i512 Riser O-ring
40-V4445	(15) Electronic Board
39V-V3176	(16) Injector Cap
39V-V3152	(17) Injector Cap O-ring
39V-V3177-01	(18) Injector Screen
39V-V3010-Z	(20) Injector Plug
39V-V3330-01	(21) Brine Elbow Assy. ⅜”
39V-V3552	(21) Brine Elbow Assy. ½”
39V-V3195-01	(24) Refill Plug
39V-V3163	(25) O-ring
39V-V4144-01	(26) RFC Assy. w/.5 GPM button
39V-V3182	(27) RFC Button .5 GPM
39V-H4628	(28) Brine Elbow Legris Liquifit

Item #	Description
39V-H4615	(29) Red RFC/Drain Clip
39V-V3192K	(31) ¾” x ⅝” Drain Nut & Tube Insert
39V-V3158-02	(32) Drain Elbow
39V-V3962	(32-34) Drain Elbow Assy. (No Silencer)
39V-V3163	(33) O-ring
39V-V3159-01	(34) DLFC Retainer
39V-V3162-XX	(35) Small Button (see pg. 19)
39V-V3118-01	(36) Turbine Assembly
39V-V3151	(37) QC Nut
39V-V3003-01	(38) Meter Plug Assembly
39V-V3104	(39) QC O-ring
39V-V3003	(40) Meter includes 36, 39
39V-3150	(41) Split Ring
39V-V3167	(42) 1” Drain Fitting Adapter
39V-V3166	(43) Drain Fitting Body 1” MNPT
39V-V3008-04	(44) 1” Drain Assembly
39V-V3190-XX	(45) Lg. DLFC Button (see pg. 19)
39V-V3193-02	(46) Service Wrench
40-V3666W	(47) “i5” Weather Cover
39V-V3186	(48) Transformer
39V-V3022	(49) i510, i510T Stack Puller
39V-V3022-15	(50) i5125, i515, i515P Stack Puller
39V-V3814-01	(51) Drive Bracket with Relay Holder
93-R305	(52) 12-15V Relay Dry Contact NO/NC



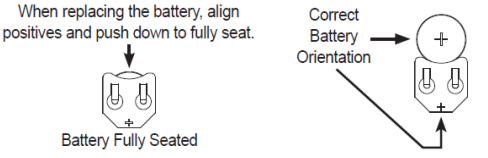


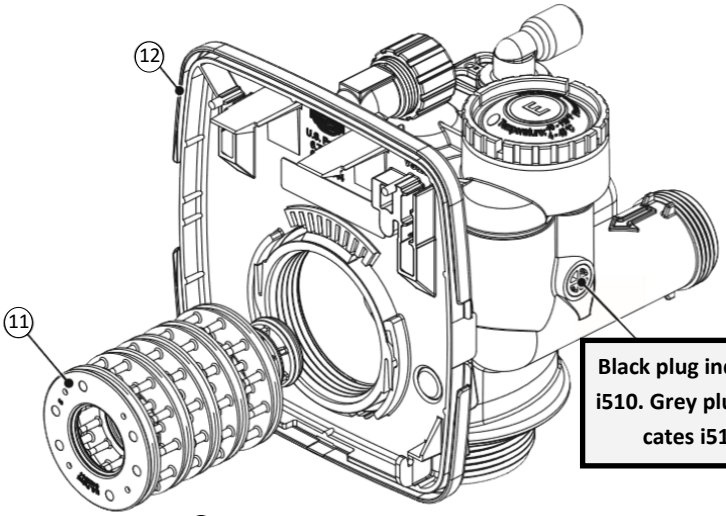
Proper drain line flow control button orientation is critical. Water must flow towards the washer face with rounded edges and molded numbers.



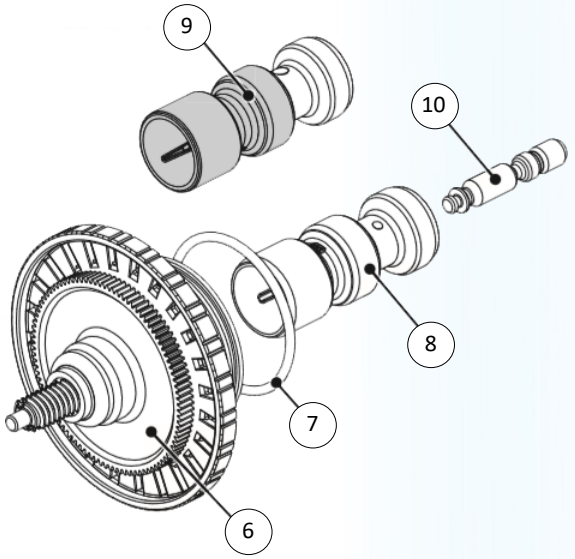
Proper drain line flow control button orientation is critical. Water must flow towards the washer face with rounded edges and molded numbers.

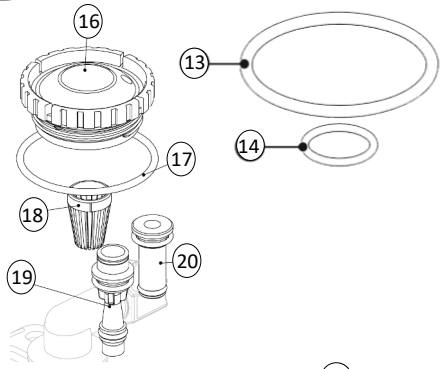
3 Volt Lithium Coin Cell Type 2032





Black plug indicates i510. Grey plug indicates i512.





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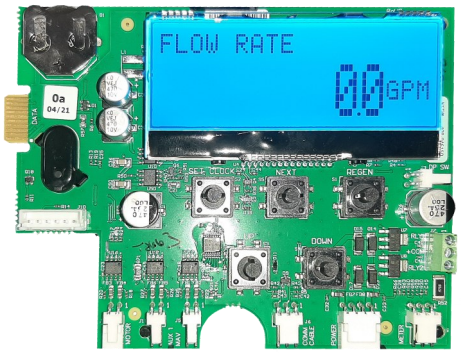
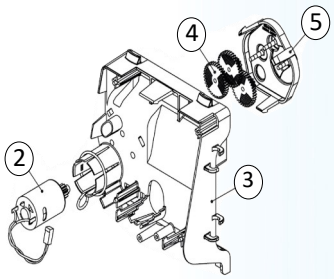
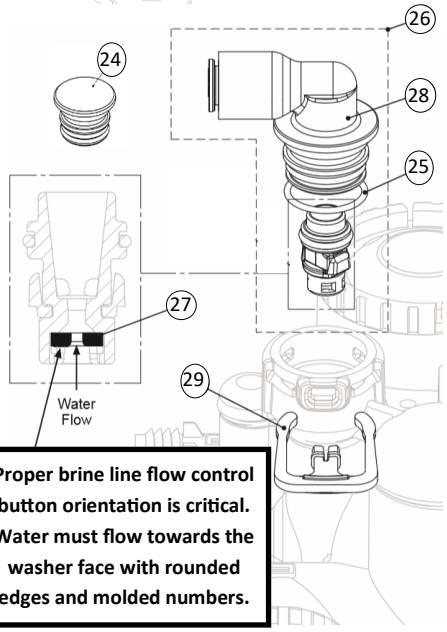
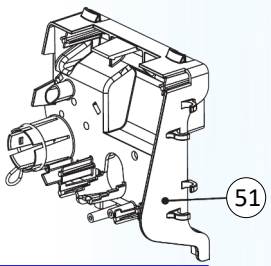






Proper brine line flow control button orientation is critical. Water must flow towards the washer face with rounded edges and molded numbers.

The i5 valve includes a dual 15 volt relay driver integrated on the board. A dry contact option is available. Part # **39-VX4Y** includes the proper drive plate and relay kit.



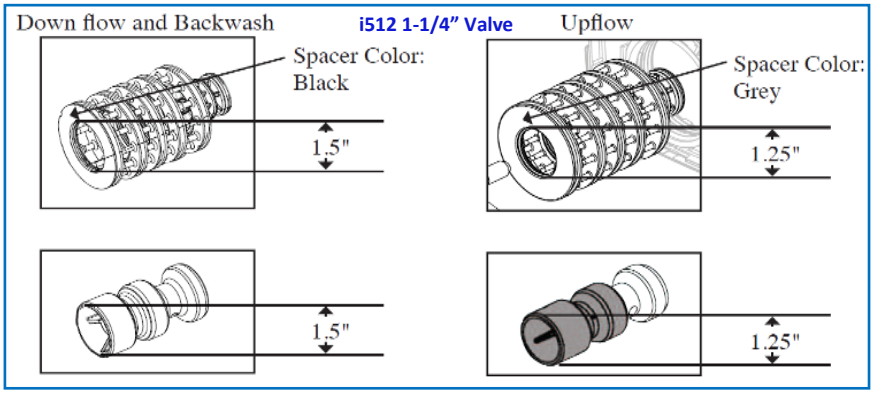
BLACK wire goes to COM

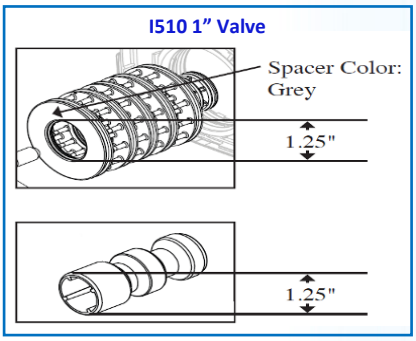
WHITE wire goes to RLY1 or RLY2

BLUE wire is common

YELLOW wire is NO

RED wire is NC

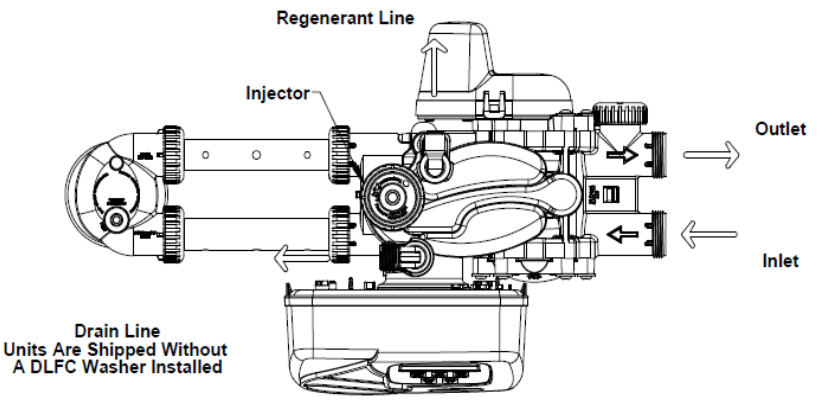


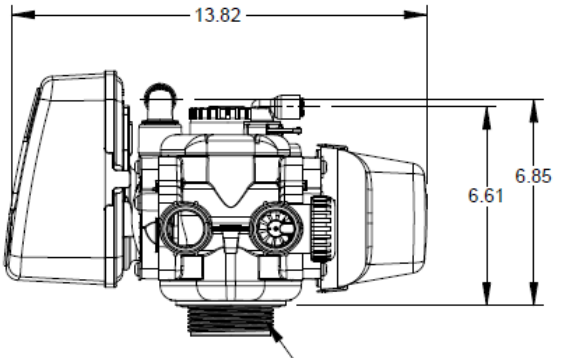


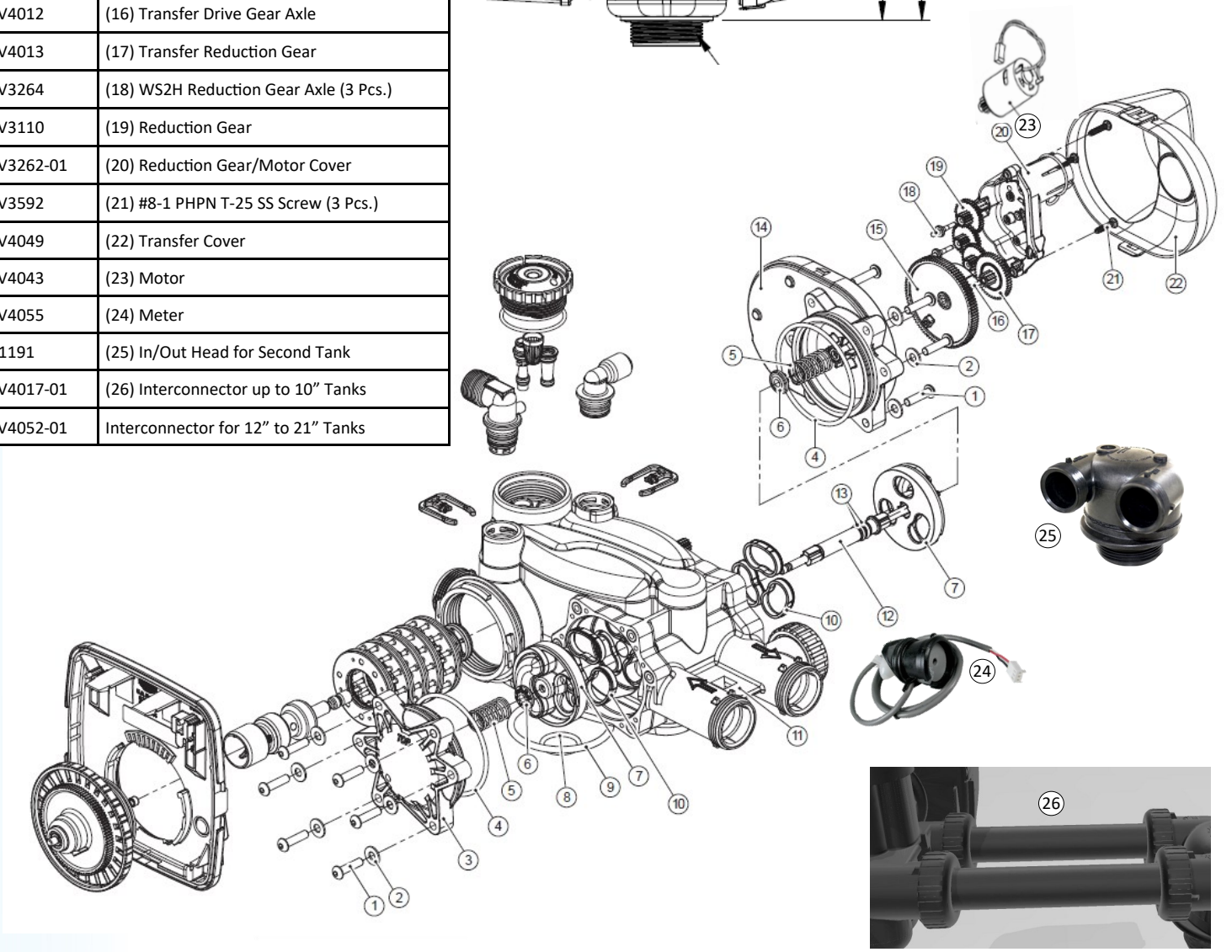
Downflow Piston is Amber. Upflow Piston is Amber/Black

i10T Twin Transfer Repair Parts

Item #	Description i10T Twin Transfer
39V-V3470	(1) BHCS 1/4"x20 x 1" SS (12 Pcs.)
39V-V3724	(2) Flat Washer 1/4" SS (12 Pcs.)
39V-V4005-01	(3) Transfer Cap
39V-V4029	(4) O-Ring 236 (2 Pcs.)
39V-V4015	(5) Transfer Spring (2 Pcs.)
39V-V4014	(6) Transfer Spring Support (2 Pcs.)
39V-V4036	(7) Rotor Disk (2 Pcs.)
39V-V3105	(8) 1.05" Riser O-Ring
39V-V3180	(9) Tank Neck O-Ring
39V-V4016	(10) Transfer Seal (6 Pcs.)
39V-V3031	(11) Valve body
39V-V4023	(12) Transfer Drive Shaft
39V-V3287	(13) Transfer Drive Shaft O-Ring (2 Pcs.)
39V-V4006-01	(14) Transfer Drive Cap
39V-V4011-01	(15) Transfer Gear
39V-V4012	(16) Transfer Drive Gear Axle
39V-V4013	(17) Transfer Reduction Gear
39V-V3264	(18) WS2H Reduction Gear Axle (3 Pcs.)
39V-V3110	(19) Reduction Gear
39V-V3262-01	(20) Reduction Gear/Motor Cover
39V-V3592	(21) #8-1 PHPN T-25 SS Screw (3 Pcs.)
39V-V4049	(22) Transfer Cover
39V-V4043	(23) Motor
39V-V4055	(24) Meter
26-D1191	(25) In/Out Head for Second Tank
39V-V4017-01	(26) Interconnector up to 10" Tanks
39V-V4052-01	Interconnector for 12" to 21" Tanks



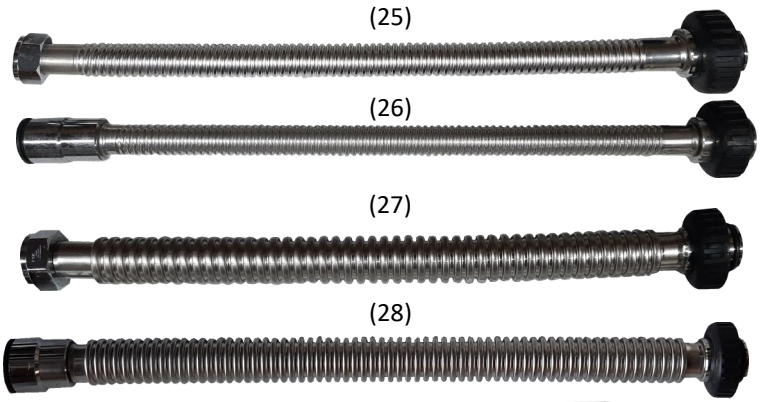


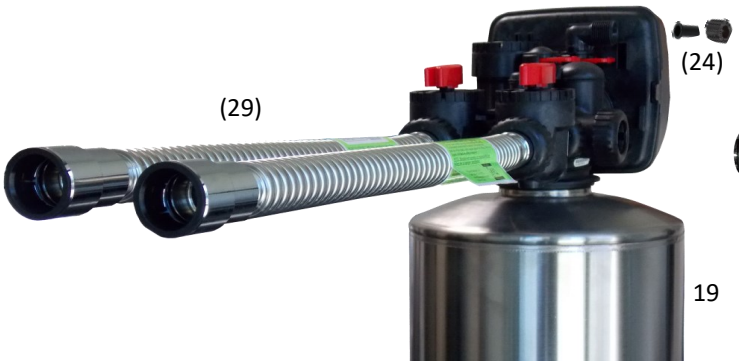


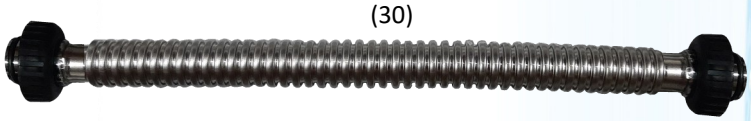
Drain Line Flow Control Buttons and Injectors

Small DLFC Button	DLFC GPM
39V-V3162-007	0.7
39V-V3162-010	1.0
39V-V3162-013	1.3
39V-V3162-017	1.7
39V-V3162-022	2.2
39V-V3162-027	2.7
39V-V3162-032	3.2
39V-V3162-042	4.2
39V-V3162-053	5.3
39V-V3162-065	6.5
39V-V3162-075	7.5
39V-V3162-090	9.0
39V-V3162-100	10

Large DLFC Button	DLFC GPM
39V-V3190-090	9.0
39V-V3190-110	11
39V-V3190-130	13
39V-V3190-170	17
39V-V3190-200	20
39V-V3190-250	25







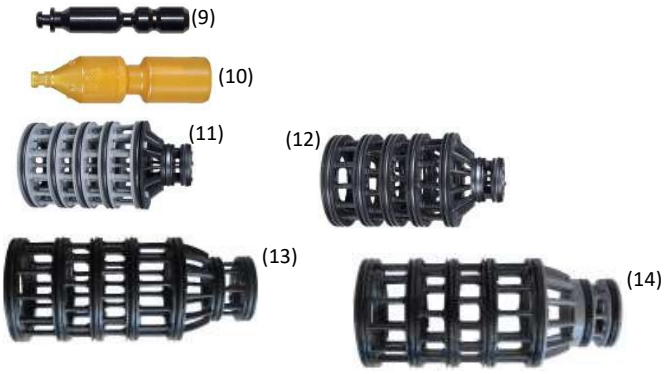
i510, i512, i510T Installation Parts and Accessories

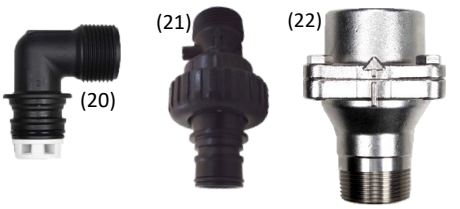
Item #	Description
39V-V3007-18	(1) 3/4” Plastic Male NPT
39V-V3007-04	(2) 1” Plastic Male NPT
39V-V3007-05	(3) 1.25” Plastic Male NPT
IWP-V3007-07T	(4) 1.5” Plastic Male NPT
39V-V3007	(5) 1” PVC Male NPT Elbow
39V-V3007-01	(6) 3/4” x 1” PVC Solvent Elbow
39V-V3007-07	(7) 1.25” x 1.5” PVC Solvent
39V-V3007-03LF	(8) 3/4” Brass Sweat (Lead Free)
39V-V3007-02LF	(9) 1” Brass Sweat (Lead Free)
39V-V3007-09LF	(10) 1.25” x 1.5” Brass Sweat (Lead Free)
39V-V3007-15	(11) 3/4” John Guest Elbow
39V-V3007-20	(12) 1” John Guest Elbow
IC-V3712	(13) 1.05” Inter-Connector for 8”-16” (Specify)
IWP-V3007-GHT	(14) 3/4” Garden Hose Thread x Clack Purge Kit
39V-V3191-01	(15) Vertical 90˚Adapter
39V-V3006	(16) Bypass Assembly
39V-V4099	(17) External In-line Mixing Valve
39V-V3014	(18) Micro switch Kit w/Wire
39V-V3193-02	(19) i5 Service Tool
39V-V3022	(20) i510, i510T Stack Puller
39V-V3022-15	(21) i512, i515, i515P Stack Puller
40V-3666W	(22) i5 White Weather Cover
39V-V3467	(23) Inline Adapter Set
39V-V3192K	(24) Drain 5/8” Nut (1/2” PEX) and Insert
Item #	**3/4” Flex Lines 304 S.S.**
51-331	(25) Clack QC x 3/4” FNPT x 18”
51-333	(26) Clack QC x 3/4” John Guest x 18”
51-335	Clack QC x 3/4” John Guest x 24”
Item #	**1” Flex Lines 304 S.S.**
51-449	(27) Clack QC x 1” FNPT x 18”
51-451	Clack QC x 1” FNPT x 24”
51-453	(28) Clack QC x 1” FNPT x 18”
51-455	(29) Clack QC x 1” FNPT x 24”
51-459	(30) Clack QC x Clack QC x 24” (Connects 2 Tank)

Common Service Parts

Item #	Drive Caps
39V-V3004	(1) i510, i510T, i512,1515P, i515
39V-V3728	(2) i520
Item #	**Pistons**
39V-V3011	(3) i510, i510T Downflow
39V-V3011-01	(4) i510, i510T Upflow
39V-V3407	(5) i512, i515, i515P Downflow
39V-V4042	(6) i512, i515, i515P Upflow
39V-3725	(7) i520 Downflow
39V-V4059	(8) i520 Upflow
Item #	**Brine Piston**
39V-V3174	(9) i510, i510T, i512,1515P, i515
39V-V3726	(10) i520
Item #	**Seal/Spacer**
39V-V3005-02	(11) i510, i510T
39V-V3430-01	(12) i512, i515, i515P
39V-V3729	(13) i520 Downflow
39V-V3729-01	(14) i520 Upflow
Item #	**Meter Rebuild**
39V-V3003	(15) i510, i512
39V-V4055	i510T
39V-V3003-02	i515- i520 28” Cord
39V-V3221	(16) i515- i520 15’ Cord
Item #	**Motor**
39V-V3107-01	(17) All Valves Except i10T Transfer
39V-V4055	(18) i510T Transfer Valve
39V-V3476	(19) MAV/NHWBP
Item #	**DLFC for i515 Valve**
39V-V3962*	(20) 3/4” 0.7-10 GPM Small Button
39V-V3008-04*	(21) 1” 9-25 GPM Large Button
39V-V3079*	(22) 1.25” MNPT x 1.5” FNPT 9-85 GPM
Item #	**DLFC for i20 Valve**
39V-V3158-04*	(23) 3/4” 0.7-10 GPM Small Button
39V-V3008-05*	(24) 1” 9-25 GPM Large Button
39V-V3080*	(25) 1.5” MNPT x 1.5” FNPT 9-85 GPM

*Must add DLFC button(s)





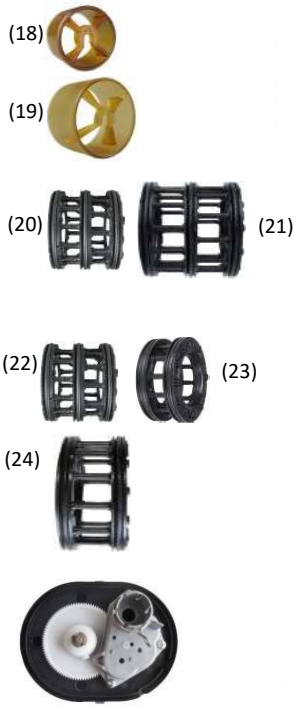
Item #	Ozone Parts
79T-47035	Kynar Check Valve
79T-47044	CD Cleaning Kit
79T-218	Replacement CD Cell

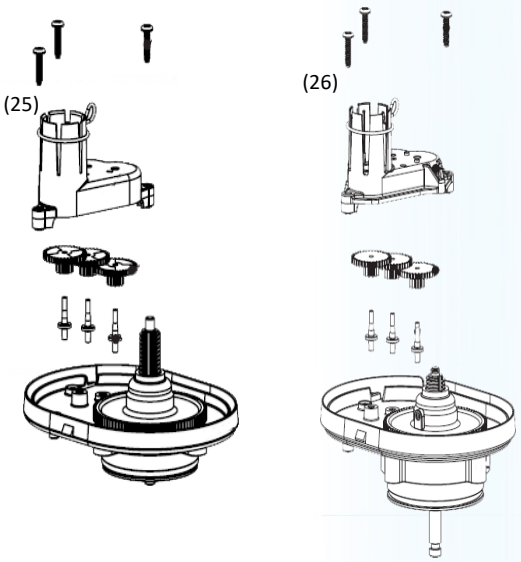
MAV, NHWBP, Separate Source Valves

Item #	No Hard Water Bypass
39V-V3070FF	1” & 1.25” FxF Clack QC
39V-V3070FM	(12) 1” & 1.25” FxM Clack QC
39V-V3097	(13) 1.5” MxF
39V-V3098	(14) 2” MxF
Item#	**Motorized Alternating Valve**
39V-V3069FF-01	(15) 1” &1.25” FxF Clack QC
39V-V3069MM-01	1” &1.25” MxM Clack QC
39V-V3071	(16) 1.5” FxFxF
39V-V3076	(17) 2” FxFxF

MAV, NHWBP Repair Parts

Item #	NHWBP/MAV Piston
39V-V3506-01	(18) 1”, 1.25”, & 1.5”
39V-V3634-01	(19) 2”
Item#	**MAV Seal/Spacer**
39V-V3074	(20) 1”, 1.25”, 1.5”& 1.5”Plastic
39V-V3077	(21) 2” Metal and Plastic
Item#	**NHWBP Seal/Spacer**
39V-V3074	(22) 1”, 1.25” 1.5” Plastic
39V-V3886	(23) 1.5” Stainless (Not for 1.5” Plastic)
39V-V3077	(21) 2” Plastic
39V-V3887	(24) 2” Metal
Item#	**Service Repair Kit**
39V-V3042	(25) 1”, 1.5”,
39V-V3043	(26) 2”





MAV, NHWBP Rebuild Kits

Item #	Complete Rebuild Kit
39-WS15-KV	1”, 1.25”, & 1.5” Plastic MAV & NHWBP, 1.5” Metal MAV
39-WS15-KV2	1.5” NHWBP Metal Valve
39-WS2-KV	2” Metal and Plastic MAV , Plastic NHWBP
39-WS2-KV2	2” Metal NHWBP

Includes drive gear, piston, seal/spacer kit.

i515P 1.5” Plastic Install Parts

Item #	Description
39V-V3045QC	(1) 1.5” Meter with QC Coupler
39V-V3045QC-15	1.5” Meter with QC Coupler w/15’ Cable
39V-V3045	(2) 1.5” Inline Meter w/1.5” MNPT
39V-V3045-15	1.5” Inline Meter w/1.5” MNPT w/15’ Cable
39V-V4430-01	(3) 1.5” MNPT QC Straight Fitting (2 Pieces)
39V-V4430-07	(4) 1.5” MNPT QC Elbow Fitting (2 Pieces)
39V-V4430-03	(5) 1.5” QC to QC Coupler Straight
39V-V4430-09	(6) 1.5” QC to QC Coupler Elbow
39V-V4430-04NPT	(7) 1” Drain Elbow Kit (1-40 GPM)*
39V-V4367	(8) QC O-ring
39V-V4345	(9) QC Split Ring
39V-V4344	(10) QC Nut
39V-V3035	(11) No Hard Water Bypass
39V-V3034	(12) Motorized Alternating Valve

i520P 2” Plastic Install Parts

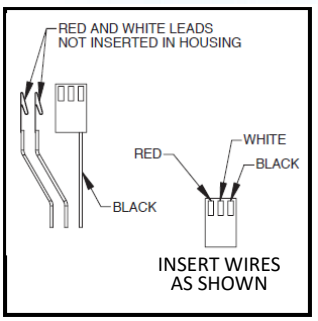
Item #	Description
39V-V3048QC	(13) 2” Meter with QC Coupler
39V-V3048QC-15	2” Meter with QC Coupler w/15’ Cable
39V-V3048	(14) 2” Inline Meter w/1.5” MNPT
39V-V3048-15	2” Inline Meter w/1.5” MNPT w/15’ Cable
39V-V4460-01	(15) 2” MNPT QC Straight Fitting
39V-V4460-04	(16) 2” MNPT QC Elbow Fitting
39V-V4460-03	(17) 2” QC to QC Coupler Straight
39V-V4460-06	(18) 2” QC to QC Coupler Elbow
39V-V3441	(19) QC O-ring
39V-V4418	(20) QC Split Ring
39V-V4417	(21) QC Nut
39V-V3035	(22) No Hard Water Bypass
39V-V3034	(23) Motorized Alternating Valve

1.5” and 2” Valves Using Non Standard Meters, Different Sized Standard Meters

The i515, i515P, i520, i520P and i520Q valves can use almost any “Hall Effect” meter as long as you know the “K” factor in pulses per gallon (PPG) ranging from .1-150 PPG. You can access the meter setting in the “FACTORY PROGRAMMING MODE”.

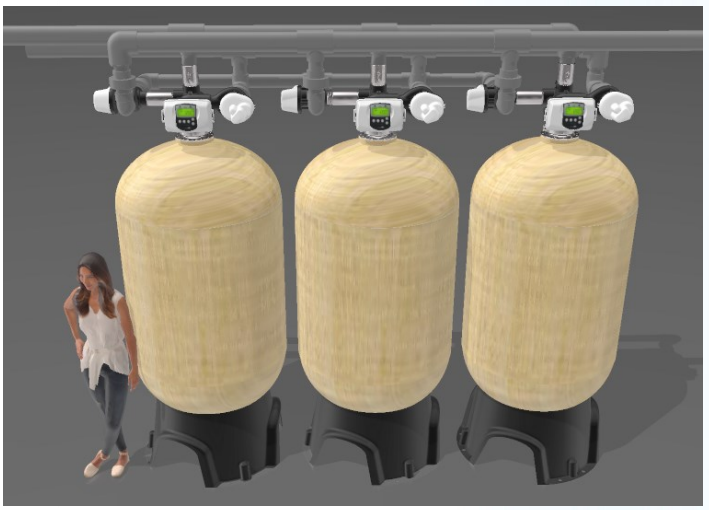
1) Press the NEXT and ▲ button simultaneously for ~5 seconds to access OEM Programming.
2) Press the NEXT and ▲ button simultaneously again for ~5 seconds to access Factory Programming.
3) **Valve Type:** Use the ▲ button to set the valve to the correct size **1.5** IN or **2.0** IN
4) Press the NEXT button to display SET **“METER SIZE”** use the ▲ or ▼ button to set the meter size to the desired meter type. Options are **1.0r** (Clack 1” remote meter), **3.0”** IN (Clack 3” meter), **2.0”** (Clack 2” Meter), **1.5”** (Clack 1.5” Meter), or “**VARIABLE METER**”. In the “**VARIABLE METER**” setting screen you can set the K-Factor (PPG) from 0.1 to 150.

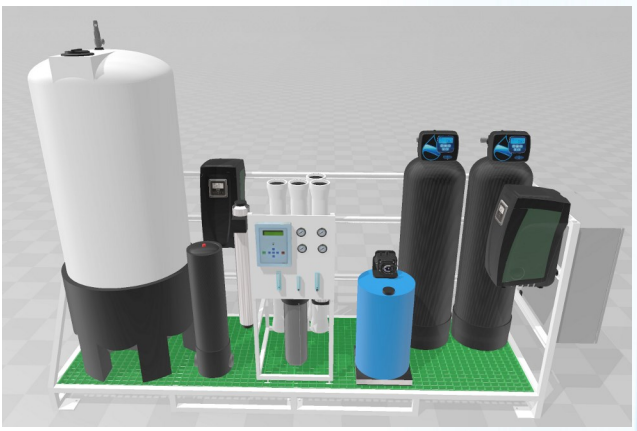
Continue programming the valve.



Custom Commercial Systems

Custom built commercial grade systems available. From the smallest café to the largest hotels, we are here to assist you with the design, planning and implementation of your water quality improvement equipment! Systems up to 3” are typically good in stock! ASME tanks, specialty medias, fiberglass or steel tanks, side mount valves and much more!





Upflow Regen Chart

Item #	Same Body	Change Piston	Feed Tube	Draw Tube	Filter Plug/ Injector
i5 1”	No	39V-V3011-01	N/A	N/A	Switch
i5 Twin	Yes	39V-V3011-01	N/A	N/A	Switch
i5 1.25”	No	39V-V4042	N/A	N/A	Switch
i5 1.5” Plastic	Yes	39V-V4042	N/A	N/A	Switch
i5 1.5” Brass	Yes	39V-V4042	39V-V3968-01	39V-V3969-01	N/A
i5 2” Brass	Yes	39V-V4059	39V-V3730-01	39V-V3731-01	N/A

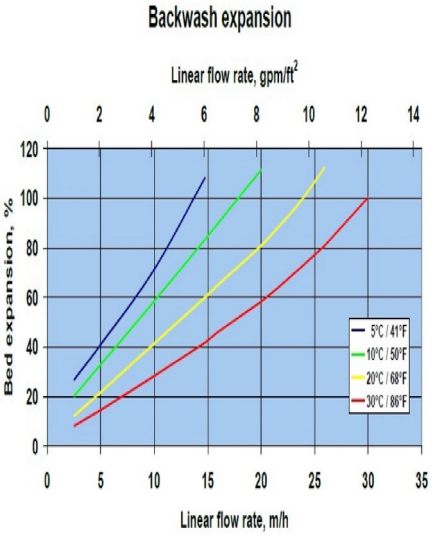
Drain Line Flow Control Chart (≈65˚F)

Tank	Softener (NOT FINE)	12x40 GAC AA	Katalox Light	Clinoptilolite or Filter AG+ (Not Filter AG)	Calcite Or Filter AG	20x50 GAC	8x30 GAC and Bone Char	NTO	Anion or Fine Mesh Resin
6"	.7	1.7	2.7	2.7	1.7	1.0	2.7	1.0	0.7
8"	1.3	3.2	4.2	5.3	3.2	1.7	5.3	1.7	0.7
9"	1.7	4.2	5.3	6.5	4.2	2.2	6.5	2.2	1.0
10"	2.2	4.2	6.5	7.5	4.2	2.7	7.5	2.7	1.3
12"	3.2	6.5	10	11	6.5	3.2	11	3.2	1.7
13"	4.2	9.0	11	13	9.0	4.2	13	4.2	2.2
14"	4.2	10	13	15	10	5.3	15	5.3	3.2
16"	5.3	13	17	20	13	6.5	20	6.5	4.2
18"	7	15	20	25	15	9	25	9	5.3
21"	10	20	30	35	20	11	35	11	7.5
24"	13	30	40	45	30	15	45	15	10
30"	20	50	65	75	50	25	75	25	15
36"	39	70	90	100	70	35	100	35	20
42"	40	95	125	145	95	48	145	48	25
48"	50	125	165	185	125	60	185	60	40
63"	90	200	280	325	200	100	325	100	65
9" Vortech	1.3	3.2	4.2	5.3	3.2	1.7	5.3	1.7	0.8
10" Vortech	1.7	3.2	5.3	6.5	3.2	2.2	6.5	2.2	1.2
12" Vortech	2.2	5.3	7.5	9.0	5.3	2.7	9.0	2.7	1.3
13" Vortech	3.2	7.5	9.0	10	7.5	3.2	10	3.2	1.7
16" Vortech	4.2	10	13	15	10	5.3	15	5.3	3.2

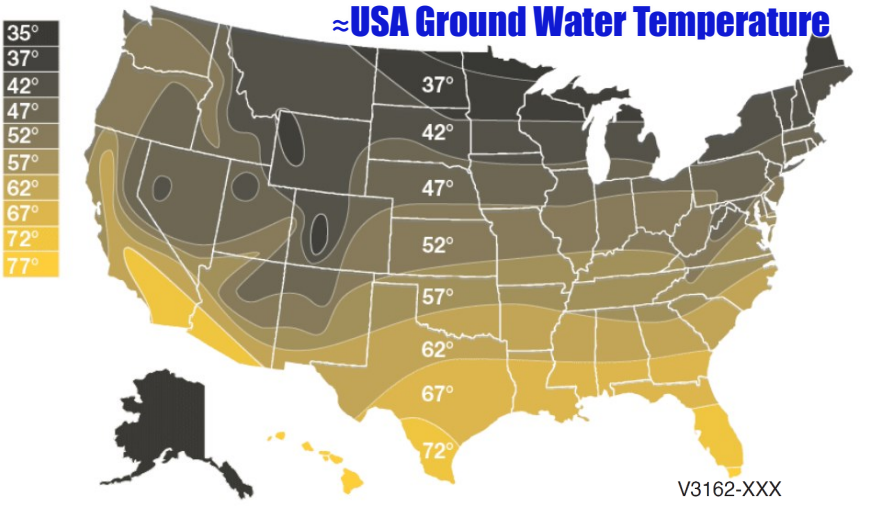
Backwash Rates & Water Temperature

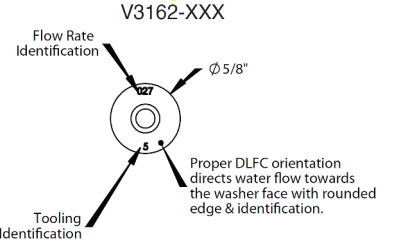
Water temperature plays a critical role in properly installing a water treatment system. Water temperature affects flow rates, backwash rates, and even systems capacities. The most critical of these is the backwash rate. Colder water is more dense and requires considerably less water to properly backwash a system. Hot water requires much more. The chart below shows standard cation water softening resin backwash expansion at varying temperatures. A 50% bed expansion is achieved with only 2.5 gpm/ft² at 40°F. At 86°F, it requires 7 gpm/ft² or nearly three times more water to achieve the same bed expansion. Common backwash rate charts assume a water temperature of 68°F. It is important to consult with each media manufacturers temperature charts to ensure your system is properly applied.

Softening Resin



≈USA Ground Water Temperature

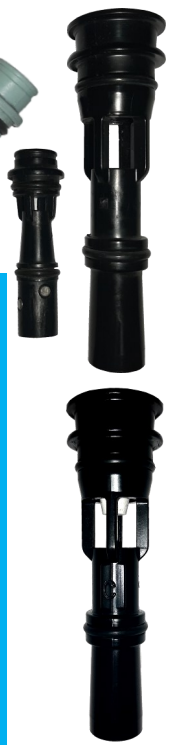




Injector Chart

Tank	Part #	Injector i510, i512, i10T	≈Draw Rate GPM
6x12	39V-V3010-1A	A BLACK	.06
6x18	39V-V3010-1A	A BLACK	.06
8x18	39V-V3010-1A	A BLACK	.06
8x44	39V-V3010-1C	C VIOLET	.18
9x18	39V-V3010-1A	A BLACK	.06
9x48	39V-V3010-1D	D RED	.22
10x18	39V-V3010-1B	B BROWN	.13
10x35	39V-V3010-1D	D RED	.22
10x40	39V-V3010-1D	D RED	.22
10x44	39V-V3010-1D	D RED	.22
10x54	39V-V3010-1E	E WHITE	.28
10x65	39V-V3010-1F	F BLUE	.37
12x36	39V-V3010-1E	E WHITE	.28
12x42	39V-V3010-1E	E WHITE	.28
12x48	39V-V3010-1F	F BLUE	.37
12x52	39V-V3010-1F	F BLUE	.37
13x54	39V-V3010-1G	G YELLOW	.43
13x65	39V-V3010-1H	H GREEN	.47
14x47	39V-V3010-1G	G YELLOW	.43
14x65	39V-V3010-1H	H GREEN	.47
16x36	39V-V3010-1H	H GREEN	.47
16x52	39V-V3010-1I	I ORANGE	.52
16x65	39V-V3010-1I	I ORANGE	.52
18x65	39V-V3010-1J	J LIGHT BLUE	.68
21x36	39V-V3010-1J	J LIGHT BLUE	.68
21x62	39V-V3010-1K	K LIGHT GREEN	.8

Tank	Part #	Injector i515, i515P	≈Draw Rate GPM
12x52	39V-V3010-15B	B VIOLET	.45
13x54	39V-V3010-15C	C RED	.57
13x65	39V-V3010-15D	D WHITE	.78
14x47	39V-V3010-15C	C RED	.57
14x65	39V-V3010-15D	D WHITE	.78
16x36	39V-V3010-15D	D WHITE	.78
16x52	39V-V3010-15E	E BLUE	.95
16x65	39V-V3010-15E	E BLUE	.95
18x65	39V-V3010-15F	F YELLOW	1.27
21x36	39V-V3010-15F	F YELLOW	1.27
21x62	39V-V3010-15G	G GREEN	2.0
24x38	39V-V3010-15G	G GREEN	2.0
24x50	39V-V3010-15H	H ORANGE	2.3
24x60	39V-V3010-15H	H ORANGE	2.3
24x72	39V-V3010-15H	H ORANGE	2.3



The actual injector size may vary depending on the design and application of the system. The injectors are sized for a typical down-flow softener application using standard mesh synthetic cation exchange media regenerating with sodium chloride. Variances in water pressure, temperature, drain and draw line restrictions will effect injector performance. For up-flow brine applications downsize your injector by two tank sizes minimum and use the **"≈Draw Rate GPM"** charts to determine the brine and slow rinse times. The total brine and slow rinse time should be ≈4X the amount of time it takes to remove the water from the brine tank.

Tank	Part #	Injector i520	≈Draw Rate GPM
12x52	39V-V3010-2R-15B*	B VIOLET	.45
13x54	39V-V3010-2R-15C*	C RED	.57
13x65	39V-V3010-2R-15D*	D WHITE	.78
14x47	39V-V3010-2R-15C*	C RED	.57
14x65	39V-V3010-2R-15D*	D WHITE	.78
16x36	39V-V3010-2R-15D*	D WHITE	.78
16x52	39V-V3010-2R-15E*	E BLUE	.95
16x65	39V-V3010-2R-15E*	E BLUE	.95
18x65	39V-V3010-2A	A	1.25
21x36	39V-V3010-2A	A	1.25
21x62	39V-V3010-2B	B	1.75
24x38	39V-V3010-2B	B	1.75
24x50	39V-V3010-2C	C	2.0
24x60	39V-V3010-2C	C	2.0
24x72	39V-V3010-2C	C	2.0
30x72	39V-V3010-2D	D	3.2
36x57	39V-V3010-2E	E	4.25
36x72	39V-V3010-2E	E	4.25
42x72	39V-V3010-2F	F	5.0
48x72	39V-V3010-2G	G	6.5

* 2 Piece Injector. Combine 39V-V3010-2-15 injector adapter with an i515" Injector.

How to Size a Softener

Proper water softener sizing must recognize the balance between water quality and efficiency. Under-sizing will lead to salt and water inefficiency and low quality water, over-sizing can lead to channeling and excessive equipment costs. Use the chart below as a guideline to properly size a softener. Local efficiency requirements, high TDS, and other competing ions may affect your system sizing. When in doubt, a larger or twin alternating system is preferable.

Water Consumption is an important factor to consider. The average residential water use in the USA is approximately 60 gallons of water per person per day. This does not include irrigation. Large multi-head showers, older plumbing fixtures, animals and other variables may impact your actual water usage.

Water Hardness must be tested every job, every time. Water hardness will vary and it is not uncommon to realize significant fluctuations. Every customer should be supplied with a quality hardness test kit. Employing proper analysis, even hardness levels in excess of 100 GPG (1 GPG = 17.1 ppm of hardness) can be treated with a softener. Since water softeners are an "Ion Exchange" technology, the hardness levels will decrease and the sodium levels will increase.

Compensated Hardness should be applied as the chart below indicates. Iron and manganese are discussed later in this catalog in the iron removal sections. It is IWP's belief that iron and manganese removal by traditional softening is highly inefficient and should be avoided whenever possible. Compensated hardness takes into consideration minerals and other ions that are not detected by a standard hardness test. To arrive at compensated hardness multiply your hardness by the factor in the chart below.

System Capacity is based on the balance of quality and efficiency. A cubic foot of resin can remove 32,000 grains of hardness but this will require excessive amounts of salt and is highly inefficient. 16 pounds of salt will net 30,000 grains removal, 4 pounds of salt per cubic foot will net approximately 15,000 grains removal. 4 times the salt for half the capacity is not a proper way to size a softener. The balance to consider is that lower salt settings will marginally lower water quality and efficiency. For most applications our personal preference is 4-8 pounds of salt per cubic foot for good efficiency and quality.

Regeneration Frequency greatly affects system efficiency. A single tank system should be sized to regenerate no less than every 7 days for high efficiency. You do not gain any noticeable efficiency increases beyond 15 days, and systems should regenerate no less than every 30 days. Modern high end softeners have automated reserve calculations and several of IWP's systems include highly complex algorithmic based regenerations that further increase system efficiencies. Twin alternating systems are ideal in excessive hardness or households with a high number of occupants. Twin alternating systems provide 24 hour soft water and can regenerate multiple times per day if needed. Twin alternators are highly recommended for most commercial applications.

Water Softener Sizing Chart for Residential Applications

Number of Residents

Water Hardness in GPG	2	4	6	8	10
10	1 ft^3	1 ft^3	1.5 ft^3	2 ft^3	2.5 ft^3
15	1 ft^3	1.5 ft^3	2 ft^3	2.5 ft^3	1.5 ft^3 per tank Twin
20	1 ft^3	2 ft^3	2.5 ft^3	1.5 ft^3 per tank Twin	1.5 ft^3 per tank Twin
30	1.5 ft^3	2.5 ft^3	1.5 ft^3 per tank Twin	1.5 ft^3 per tank Twin	2 ft^3 per tank Twin
40	2 ft^3	1.5 ft^3 per tank Twin	1.5 ft^3 per tank Twin	2 ft^3 per tank Twin	2.5 ft^3 per tank Twin
50	2.5 ft^3	1.5 ft^3 per tank Twin	2 ft^3 per tank Twin	2.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin
75	1.5 ft^3 per tank Twin	2 ft^3 per tank Twin	2.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin
100	1.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin	2.5 ft^3 per tank Twin

System sizing is based on 6 pounds of salt per ft^3, 7 days between regenerations (Single Tank)

IRON, MANGANESE, H2S REDUCTION

Next to hardness, iron is probably the most common water problem. The secondary (aesthetic) maximum contaminant level (MCL) for iron is 0.3 ppm and 0.05 ppm for manganese. Discolored water, laundry, and plumbing fixtures are the inevitable results. Iron is common in water due to the large amount of naturally occurring iron present in the soil and because corrosive water can pick up iron from pipes and well casings. Iron in water is usually dissolved (ferrous Fe 2+) clear and colorless. When this water contacts air, the iron precipitates to a solid (ferric or rust Fe 3+) which will stain bathtubs, sinks, laundry, sidewalks etc., a reddish brown color. Manganese will cause a darker brown to black stain. These impurities impart a metallic taste to water and food. The stains are not removed by soaps or detergents, and bleach will only make the staining worse. Iron can build up in plumbing, fixtures, water heaters and pipes reducing water pressure and quality even further. The pH of water should be above 6.5 and levels as high as 8.5 are preferred when using oxidizing media. Increasing the pH is usually done with a simple calcium carbonate or magnesium oxide filtration system. Sodium carbonate (soda ash Na_2CO_3) or sodium hydroxide (caustic soda NaOH) injection can also be considered.

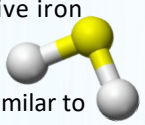
Types of iron and Treatment Methods

Bacterial Iron: A dark slime in toilet tanks, water filters or softeners can indicate the presence of bacterial Iron. Iron bacteria should be controlled by continuous injection of chlorine with a contact tank and a carbon tank for dechlorinization. Do not use aeration or hydrogen peroxide.

Ferric iron: "Red water iron." When Ferrous iron is exposed to air or other oxidant (bleach, ozone, potassium permanganate, or hydrogen peroxide) oxygen combines with the iron to form ferric iron (Fe+++). Simple sediment filtration can be used, but some ferrous iron is usually present so some additional oxidizing filtration (Katalox-Light) should be used.

Ferrous Iron: "Clear water Iron" is found in water which contains low oxygen levels. Carbon dioxide reacts with iron in the ground to form water-soluble ferrous bicarbonate (Fe++). Treating water with ferrous iron is simple. Several methods should be considered depending on the application and other water factors. Oxidation/filtration and ion exchange are the two most common methods for removing ferrous iron. IWP manufactures a highly efficient Hybrid design combining these two technologies for the most efficient and effective treatment method when softening is also desired. Water softening is used by many companies due to its low cost. This method is highly inefficient and should be avoided without removing the iron first. 1 ppm of iron or manganese use the same "compensated" capacity as 88 ppm of hardness. Only very low levels of iron or manganese should be removed with traditional softening and the pH should be below 7. Many companies will treat up to 5 ppm of iron with softening but special resins, chemical feeders, expensive salts, and periodic acid cleaning of the resin should be considered. Softening does not remove Ferric iron. Softeners prefer a lower pH as higher pH levels can cause excessive resin fouling. Ferrous iron needs to be converted to a ferric iron (rust particle) which is then easily filtered. Oxidizers or oxidizing filter media are commonly used for this process. Aeration with ozone is effective at lower iron and manganese levels. Hydrogen peroxide or other oxidants may be needed when higher levels of iron or manganese are present. A simple ORP test can help you determine the likelihood of oxidation-reduction media's working effectively. ORP should be above -170MV otherwise an oxidizer should be used.

Oxidation Medias: IWP distributes many manganese dioxide ore based hybrid medias that are proven to be an effective iron reduction media for most residential, commercial and municipal applications.



Hydrogen Sulfide: Treatment methods for the rotten egg odor produced by the dissolved gas Hydrogen Sulfide (H_2S) are similar to those used to combat iron and manganese. However, the use of a softener will be insufficient in nearly all H_2S applications. The other methods described herein will generally work for H_2S, though longer contact times and more stringent adherence to method may be required. In many low level H_2S applications, catalytic carbon has proven to be an excellent solution, but contact time must be significant and media replacement will be more frequent than normally expected.

Contaminant	Hydrogen Peroxide Injection	Chlorine Injection
Iron	1 ppm Iron = .5 ppm H_2O_2	1 ppm Iron = 1 ppm Chlorine
Manganese	1 ppm Manganese = 1 ppm H_2O_2	1 ppm Manganese = 2 ppm Chlorine
Hydrogen Sulfide	1 ppm Hydrogen Sulfide = 1.5 ppm H_2O_2	1 ppm Hydrogen Sulfide = 3 ppm Chlorine

We developed our POE product line using a less traveled path. Rather than using the **lowest cost** as a key motive, our systems feature only **quality** components with price being an important, yet secondary factor. We literally examined every component looking for the best quality while still maintaining a relatively competitive price. We also look to buy **USA** made components wherever reasonable and if not, to source them from respected USA companies. Here is a list of some of the reasons our systems are a notch above…

1. USA labor by well trained, closely supervised, caring, permanent employees.
2. USA made NSF Certified mineral tanks whenever possible. The exceptions include unusual tank sizes that are not available by our US manufacturers.
3. USA made brine tank. High quality safety float assemblies in every system to act as a secondary shut off to prevent water damage.
4. Certified medias, even our quartz under-bedding is NSF listed!
5. Top of the line riser assemblies provide the highest flow and the best durability.
6. Optional high quality stainless steel, aluminum, or HDPE jackets. No thin plastic decorative wraps, our jackets perform!
7. Custom programmed to our customers needs ensuring excellent efficiency and water quality!
8. USA made heavy duty boxing. Note that our box does not make ambiguous implications by having “Made in the USA” printed on the box. Most of our components are USA made, but great care must be taken when making a “Made in the USA” claim.

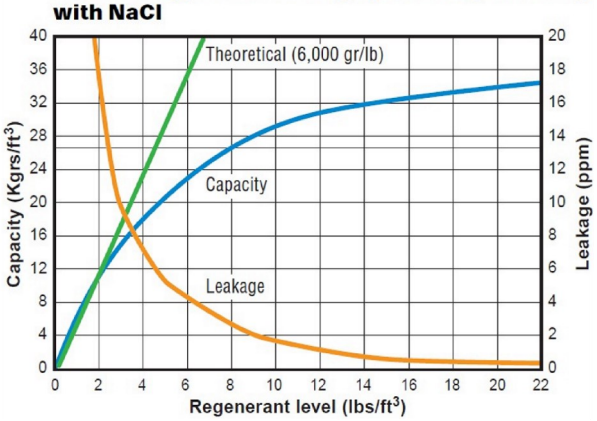
It is our intention to build and sell truly high quality systems, using only components made in the USA, sourced from USA companies or the very best of the overseas offerings. Our company philosophy is not just a motto, but a way of life.

“WE WILL NOT COMPETE IN THE RACE TO THE BOTTOM.”

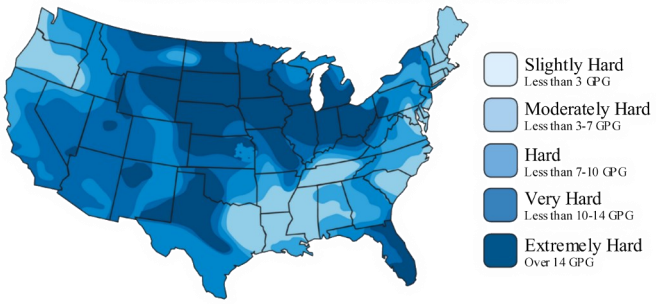
Softening Efficiency, Capacity, Hardness Leakage

Lbs. per Ft³	3	4	6	8	10	15
≈Capacity (gr/cu ft)	12,800	15,200	20,000	24,000	27,000	30,000
≈Efficiency (gr/lb salt)	4267	3800	3333	3000	2700	2000
Soft Water Quality	Fair	Fair	Good	Very Good	High	Highest

Figure 1. Typical softening system regenerating with NaCl



Water Hardness Levels in the U.S.



Compensated Hardness Chart

Water Hardness	Multiply by
1 - 20 GPG	1.1
21 - 40 GPG	1.2
41 - 70 GPG	1.3
71 - 100 GPG	1.4
100+ GPG	1.5