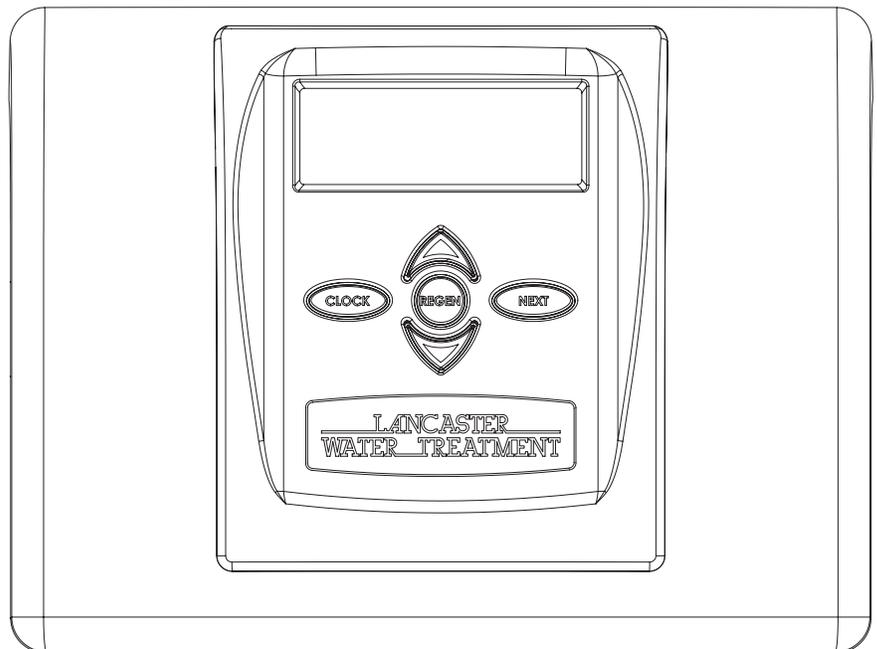




INSTALLATION, OPERATING AND SERVICE MANUAL

DIAMOND LINE LX-NB ELECTRONIC NITRATE CONDITIONER WITH THE X-FACTOR CONTROL VALVE

- 7-LX-100NB
- 7-LX-150NB
- 7-LX-200NB
- 7-LX-300NB



Congratulations on purchasing your new **Lancaster Nitrate Conditioner**. This unit is designed to give you many years of trouble free service. When installed in accordance with the following instructions and if given reasonable care, nitrate-free water will be the result. For servicing and future inspection purposes, please file this booklet with your important documents.

In the event that you need assistance for servicing your nitrate conditioner, please first contact the professional contractor who installed the system.

JOB SPECIFICATIONS

MODEL NO. _____
INSTALLATION DATE _____
SERIAL NUMBER _____
INSTALLER NAME _____ PHONE _____
ADDRESS _____

WATER TEST AT TIME OF INSTALLATION

_____ Hardness CaCo₃ (gpg) Nitrate NO₃-N (mg/L): _____
_____ Iron (ppm) Other: _____
_____ pH _____

Notes -
gpg: grains per gallon
ppm: parts per million
mg/L: milligrams per liter
1ppm = 1 mg/L

MISC. INFORMATION

All Water is Treated Except:
_____ Rear Hose Bib _____ Front Hose Bib _____ Toilets
_____ Other _____

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GENERAL INSTALLATION AND SERVICE WARNINGS

The control valve, 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.

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings.

The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench. If necessary a 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 connection or caps because of o-ring seals.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons for 3+ seconds. This resets the electronics and establishes the service piston position. The display should flash all wording, 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" (ID). Backwash flow rates in excess of 4.2 gpm, overhead drain line exceeding 5 ft. above control valve connection or length in excess of 20' require ¾" drain line. See installation diagrams.

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.

This glass filled Noryl (or equivalent) fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a water nitrate conditioner. The control valve intentionally does not have a built-in water meter and is programmed to regenerate as a time clock (passage of a particular number of days). **THE WATER METER HAS BEEN REMOVED BY THE FACTORY BECAUSE IT SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.**

It is not recommended to change control valves from downflow to upflow brining or vice versa in the field. The valve bodies for downflow and upflow are unique to the regeneration type and should not be interchanged. A mismatch of valve body and regeneration piston will result in untreated water bypass during service.

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 and 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 screwdriver, one large blade screwdriver, 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 made easy because 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 power adapter comes with a 15 foot power cord and is designed for use with the control valve. The power adapter is for dry location use only. In the event of a power outage, 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.

Allow clearance to service the valve. Refer to dimensional diagrams.

If this device is not maintained and operated as specified in the owner's manual, there is a risk of exposure to contaminants.

PRE-INSTALLATION REVIEW

WATER QUALITY: If sand or sediment is present in the water supply, a sediment filter should be installed ahead of the nitrate conditioner. Air must not come in contact with water until after it has passed through the nitrate conditioner. In some cases, additional treatment equipment may be needed to treat water having special characteristics, such as: ferric hydroxide iron, iron bacteria, low pH, tastes and odors, hardness, etc. Consult your dealer if you have any questions. **This nitrate conditioner is not to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after treatment.**

PRE-TREATMENT

- Filtration may be required to remove Iron, Manganese, turbidity, total suspended solids (TSS) and organic matter as these could foul the resin.
- Water Softening will be required for hardness levels of 4 grains or higher to prevent scaling.
- Dechlorination of Chlorine and Chloramines will be required to prevent oxidation degradation of the resin.

POST-TREATMENT

- pH adjustment may be required after the unit to avoid corrosion. Nitrate and other anions displace chloride on the resin, releasing the chloride to the product water. Chloride can cause taste issues, dezincification, and galvanic corrosion.

IMPORTANT:

NITRATES MUST BE TESTED BEFORE INSTALLATION AS MILLIGRAMS PER LITER (mg/L) OF NITRATE-NITROGEN (NO₃-N).

REGULARLY MONITOR NITRATE LEVELS BEFORE AND AFTER SYSTEM.

NITRATE LEVELS CAN CHANGE OVER TIME.

ON PAGE 12 and 13 OF THIS MANUAL, TABLES ARE PROVIDED FOR THE FOUR NITRATE CONDITIONER MODELS. FIND THE TABLE FOR YOUR MODEL. USE THE LATEST NITRATE TEST RESULTS IN CONJUNCTION WITH THE NUMBER OF PEOPLE OR ESTIMATED GALLONS PER DAY WATER USAGE TO DETERMINE THE NUMBER OF DAYS BETWEEN THE REGENERATIONS (DAYS OVERRIDE SETTING).

USE A HOME TEST KIT TO MONITOR LEVELS MONTHLY AS WELL AS HAVING YOUR WATER PROFESSIONALLY TESTED FOR NITRATE QUARTERLY OR AT LEAST ANNUALLY.

EFFICIENCY OF NITRATE REMOVAL NORMALLY DEPENDS ON THE PRESENCE OF COMPETING ANIONS, ESPECIALLY SULFATES, WHICH CAN CAUSE THE DUMPING OF THE NITRATES. HOWEVER, THE ANION EXCHANGE RESIN USED IN THESE CONDITIONERS HAS BEEN SPECIALLY DEVELOPED FOR SELECTIVE NITRATE REMOVAL FROM POTABLE WATER IN THE PRESENCE OF HIGH LEVELS OF SULFATE.

AS A RESULT, THERE IS NO DANGER OF NITRATE DUMPING IN THESE NITRATE REMOVAL SYSTEMS.

WATER PRESSURE: A minimum water pressure of 20 psi is required for regeneration. Maximum 100 psi. CAUTION: the nitrate conditioner cannot be subject to a vacuum due to loss of pressure (such as a water main break or submersible well pump check valve failure).

WATER TEMPERATURE: The range of water temperature is 40°F to 100°F. DO NOT install any nitrate conditioner with less than 10 feet of piping between its outlet and the inlet of a water heater.

AMBIENT TEMPERATURE: DO NOT locate nitrate conditioner where it or its connections (including the drain and overflow lines) will ever be subject to room temperatures under 33°F.

ELECTRICITY: An uninterrupted 120 volt 60Hz source is required. *Make sure electrical source is not on a timer or switch.* All electrical connections must be connected according to local codes. The plug-in transformer is for dry locations only. Surge protection is recommended with all electrical connections.

DRAIN: All plumbing should be done in accordance with local plumbing codes. The distance between the drain and the nitrate conditioner should be as short as possible. The pipe size for the drain line should be a minimum of 1/2" (inside diameter of pipe).

NITRATE REDUCTION: It is recommended that the nitrate conditioner be installed to treat both the hot and cold water supply. Outside faucets for non-potable use can be left on untreated water.

BYPASS: A bypass valve should be installed so that water will be available if it should be necessary to shut off the pressure in order to service the nitrate conditioner.

BYPASS VALVE

The bypass valve is typically used to isolate the control valve from the plumbing system's water pressure in order to perform control valve repairs or maintenance. The bypass valve is particularly unique in the water treatment industry due to its versatility and state of the art design features. The 1" full flow bypass valve incorporates four positions, including a diagnostic position that allows service personnel to work on a pressurized system while still providing untreated bypassed water to the facility or residence. Its completely non-metallic, all-plastic design allows for easy access and serviceability without the need for tools.

The bypass body and rotors are glass filled Noryl® (or equivalent) and the nuts and caps are glass filled polypropylene. All seals are self-lubricating EPDM to help prevent valve seizing after long periods of non-use. Internal o-rings can easily be replaced if service is required.

The bypass consists of two interchangeable plug valves that are operated independently by red arrow-shaped handles. The handles identify the flow direction of the water. The plug valves enable the bypass valve to operate in four positions.

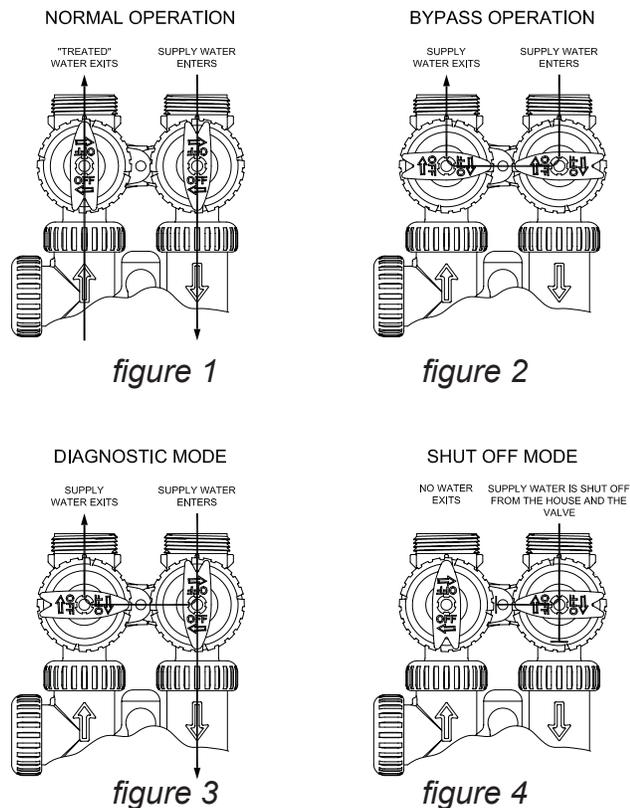
OPERATION:

1. Normal Operation Position: The inlet and outlet handles point in the direction of flow indicated by the engraved arrows on the control valve. Water flows through the control valve during normal operation and this position also allows the control valve to isolate the media bed during the regeneration cycle. (see figure 1)

2. Bypass Position: The inlet and outlet handles point to the center of the bypass, the control valve is isolated from the water pressure contained in the plumbing system. Untreated water is supplied to the plumbing system. (see figure 2)

3. Diagnostic Position: The inlet handle points in the direction of flow and the outlet handle points to the center of bypass valve, system water pressure is allowed to the control valve and the plumbing system while not allowing water to exit from the control valve to the plumbing. (see figure 3)

4. Shut Off Position: The inlet handle points to the center of the bypass valve and the outlet handle points in the direction of flow, the water is shut off to the plumbing system. If water is available on the outlet side of the nitrate conditioner it is an indication of water bypass around the system (i.e. a plumbing connection somewhere in the building bypasses the system). (see figure 4)



The working parts of the bypass valve are the rotor assemblies that are contained under the bypass valve caps. Before working on the rotors, make sure the system is depressurized. Turn the red arrow shaped handles towards the center of the bypass valve and back several times to ensure rotor is turning freely.

The nuts and caps are designed to be unscrewed or tightened by hand. If necessary a 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 screwdriver in slots on caps and/or tap with a hammer. To access the rotor, unscrew the cap and lift the cap, rotor and handle out as one unit. Twisting the unit as you pull it out will help to remove it more easily. There are three o-rings: one under the rotor cap, one on the rotor stem and the rotor seal. Replace worn o-rings. Clean rotor. Reinstall rotor.

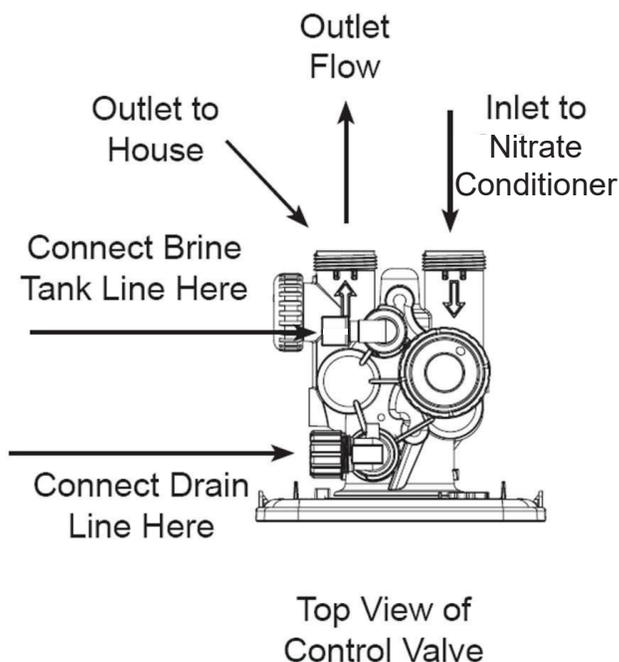
When reinstalling the red arrow handles be sure that:

1. The handle pointers are lined up with the control valve body arrows, and the rotor seal o-ring and retainer on both rotors face to the right when being viewed from the front of the control valve; or
2. Arrows point toward each other in the bypass position.

Since the handles can be pulled off, they could be accidentally reinstalled 180° from their correct orientation. To install the red arrow handles correctly, keep the handles pointed in the same direction as the arrows engraved on the control valve body while tightening the bypass valve caps.

INSTALLATION INSTRUCTIONS

(All electrical & plumbing should be done in accordance to all local codes)



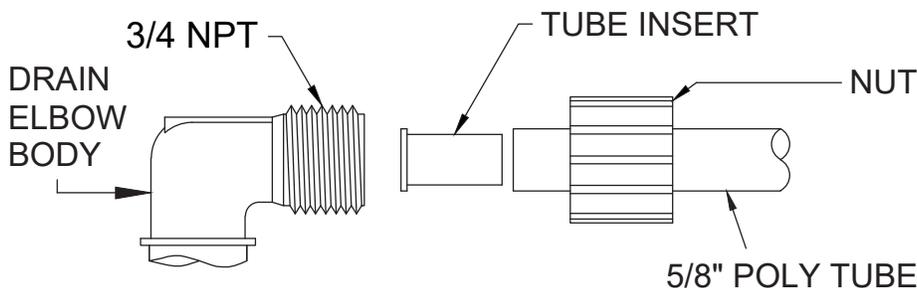
1. Place the nitrate conditioner where you want to install it, making sure it is on a clean, level and firm base.

2. Do all necessary plumbing (inlet to inlet, outlet to outlet, and drain line to drain). The control valve, 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.

3. 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 joint 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.

4. A jumper ground wire should be installed between the inlet and outlet pipe whenever the metallic continuity of a water distribution piping system is interrupted. Install grounding strap on metal pipes.

System must be installed with an ASSE 1087 compliant backflow prevention device on the incoming water supply when required by plumbing code.



DRAIN LINE FITTING CONNECTION

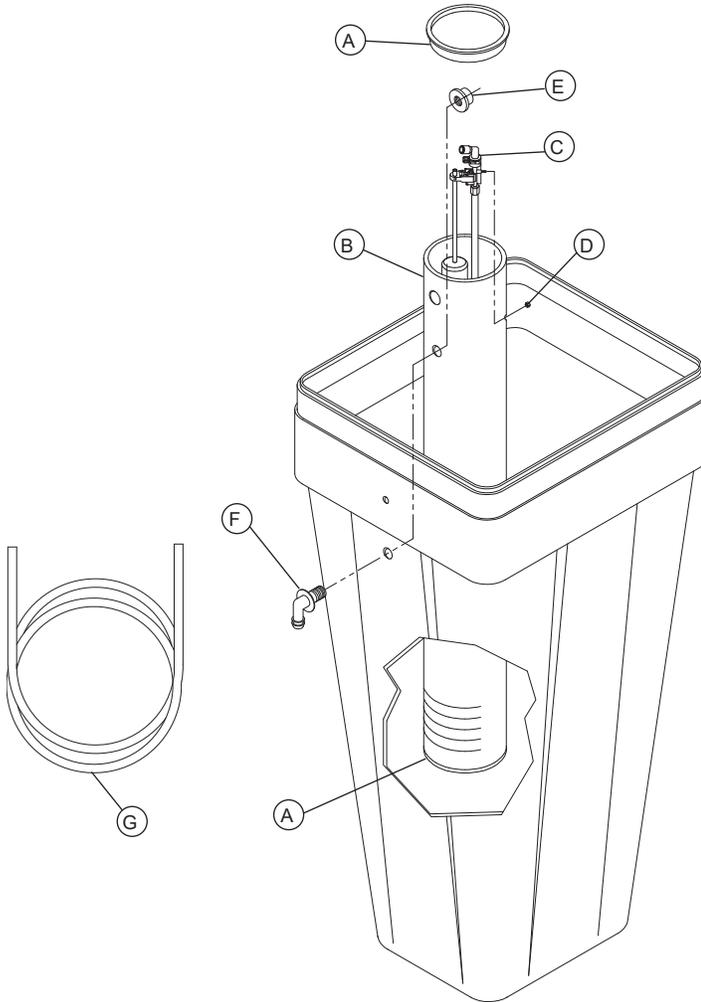
5. The drain connection may be made using either 5/8" polytube (see above) or a 3/4" female adapter. The polytube insert is shipped attached to the drain line elbow's locking clip. Press the insert into the drain line tubing (tubing not provided). Loosen the nut of the drain line elbow. Press the 5/8" polytube with insert into the drain line elbow until it seats on the back of the fitting. Tighten the nut. If soldering, 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. Never insert a drain line into a drain, sewer line, or trap. Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into the nitrate conditioner.

Increase the drain line size to minimum 3/4" if...

- Backwash rate exceeds 4.2 GPM (the nitrate conditioner models specified in this manual do not exceed 4.2 GPM backwash)
- Overhead drain line is used and exceeds 5 ft. above connection on control valve.
- Drain line exceeds 20 ft. in length

INSTALLATION INSTRUCTIONS CONT'D

(All electrical & plumbing should be done in accordance to all local codes)



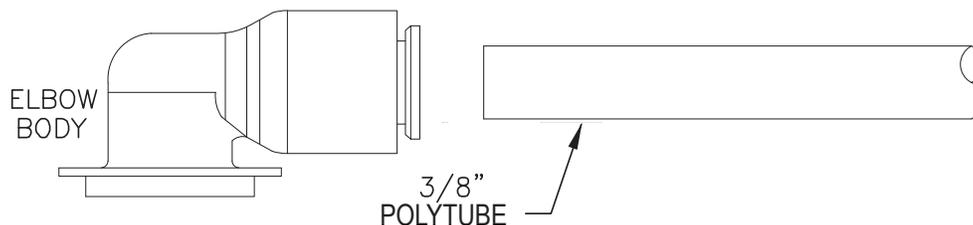
6. Assemble the brine tank. Place brine grid (if included) into the bottom of the brine tank with its four legs downward. Install a brine well cap (Item A) on the bottom of the brine well (Item B). Remove the brine valve assembly (Item C) from the brine well by removing the nut (Item D). Place the brine well into the brine tank (and brine grid hole if included) and attach the brine well to the brine tank with the two-piece overflow (Items E & F) using the lower holes in both pieces, as shown. Reinstall the brine valve assembly. Push brine line polytube (Item G) through the upper holes in the brine tank and brine well and press the polytube into the elbow fitting.



BRINE GRID

7. The brine refill flow control assembly is installed in an easy to access refill elbow located on top of the control valve. The refill flow control assembly is attached to the control valve with a locking clip. The locking clip allows the elbow to rotate 270 degrees so the outlet can be oriented towards the brine tank.

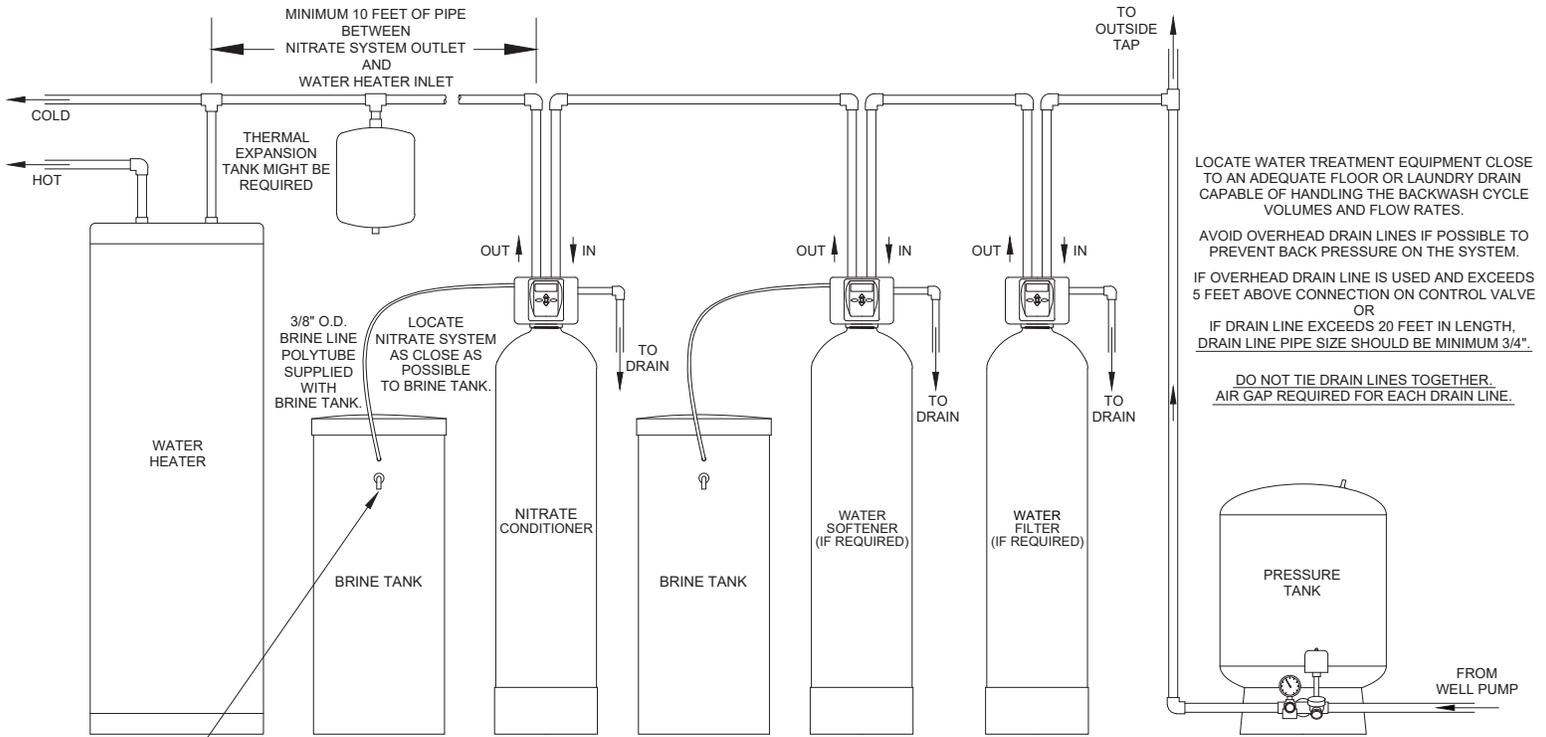
8. Connect the brine line polytubing found with the brine tank to the brine connection on the control valve. The control valve has a standard refill elbow to which a 3/8" flexible tube can be connected, see below. Press the polytube into the brine elbow fitting. Make sure the floor is clean beneath the brine tank and that it is level and smooth.



BRINE LINE FITTING CONNECTIONS

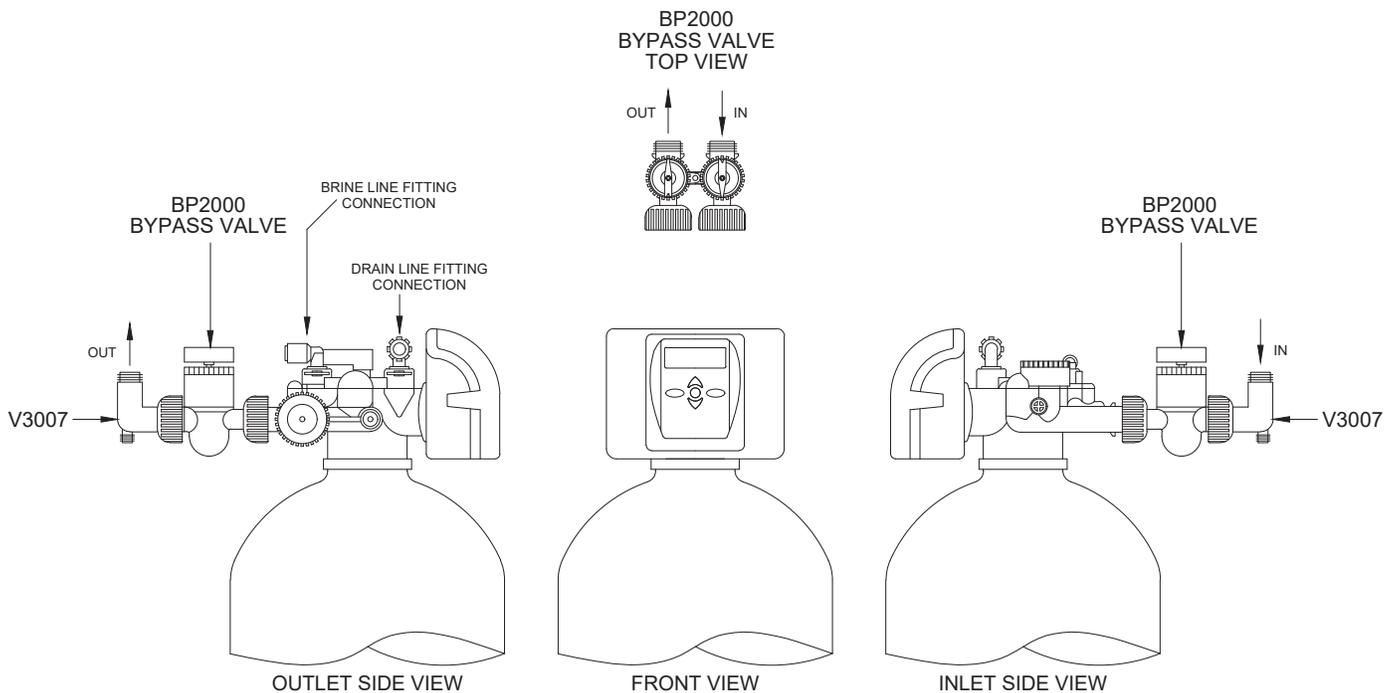
9. A 1/2" (inside diameter, not provided) gravity drain line should be connected to the overflow fitting on the side of the brine tank. This overflow is in case of a malfunction in the brine shut off. If the unit is installed where water may flow in the event of an overflow and cause water damage, connect a length of flexible tubing and run to a drain below the level of the overflow. **(Do not connect the gravity drain tubing to the drain line on the control valve. Do not run gravity drain tubing above the overflow height at any point.)**

NITRATE CONDITIONER INSTALLATION



OVERFLOW GRAVITY DRAIN - ONLY USED IN CASE OF MALFUNCTION IN THE BRINE SHUTOFF. DO NOT CONNECT TO CONTROL VALVE DRAIN LINE. IF UNIT IS INSTALLED WHERE OVERFLOW COULD CAUSE WATER DAMAGE, CONNECT TUBING AND RUN TO FLOOR DRAIN. DO NOT RUN TUBING ABOVE OVERFLOW HEIGHT.

NITRATE CONDITIONER ENLARGED VIEWS



PLACING UNIT INTO SERVICE

Do not add salt to the brine tank yet. Do not plug the transformer into the receptacle yet. Place bypass in the bypass position. Turn on main water supply. Open a cold water faucet. This will clear the line of any debris (solder, pipe dope, etc.) that may be in the line. Let water run at faucet for a couple minutes, or until clear. Turn off faucet. Manually add 1 ½ gallons of water to the brine tank. Now plug the transformer into a 120 volt receptacle (be certain the receptacle is uninterrupted). Within 5 seconds the control display and buttons will illuminate and the time of day screen will appear.

- Press and hold the **REGEN** button for approximately 5 seconds until the motor starts.
- Wait until green display reads **BACKWASH** and numbers start counting down.
- Momentarily press **REGEN** again. Valve is now in the **REGENERANT DRAW DN** position.
- Momentarily press **REGEN** again. Valve is now in the second **BACKWASH** position.
- **SLOWLY** turn bypass valve to **DIAGNOSTIC** position (See figure 3 on page 6) to allow water to slowly enter Nitrate Conditioner.

When water is flowing steadily to drain without the presence of air, momentarily press **REGEN** again. The green display will read **RINSE**. Place bypass to **NORMAL OPERATION MODE** (see figure 1 on page 6). Allow control to finish the **RINSE** cycle. Allow the control to automatically advance to the **FILL** position. The brine tank will now automatically fill with the proper volume of water for the first regeneration. Allow the control to automatically advance to the **SOFTENING** (nitrate reduction) position. The display will change from green to blue. Load the brine tank with salt. Solar Salt is recommended. The brine tank salt level should be checked every couple of weeks to determine salt usage. Keeping the brine tank salt level at least 1/2 full is recommended.

SANITIZING: Use 2 oz. of 5 ¼% unscented household chlorine bleach for each cubic foot of resin. Pour bleach directly into the 4" diameter white brine well located inside the brine tank. Press and hold the **REGEN** for 5 - 6 seconds until the motor starts running. Allow system to complete the regeneration automatically. Check for other local and state codes which may also specify sanitation methods.

GENERAL OPERATION

Note: As an energy saving feature, the control will automatically turn off all **SOLID BLUE** or **SOLID GREEN** display illumination and keypad illumination after about 5 minutes of the last keypad button push. Any further keypad touch will cause the re-illumination of the display and keypad, and re-activate keypad control.

User Displays

When the system is in normal service mode, one of up to four available User Displays will be shown. Pressing **NEXT** will alternate between the following displays:

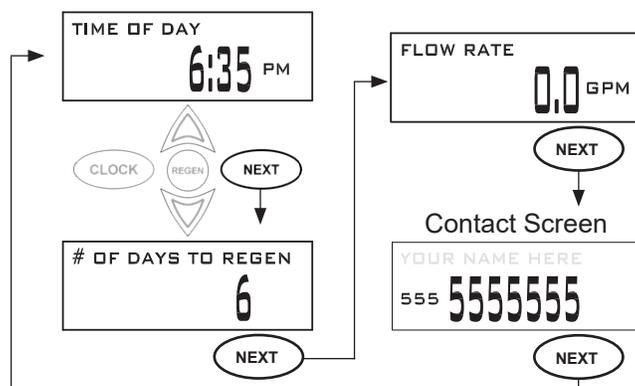
- Current time of day
- Remaining days to regeneration
- Treated water flow rate (see Note below)
- Service contact name and phone number (if installer entered)

Pressing the **▼** button while in the Days Remaining user display will decrease the days remaining in one day increments. This days remaining decrease is only applicable for the next regeneration and cannot be cancelled or increased. Future regenerations will be based on the installer Day Override setting.

To clear a flashing yellow display Service Call reminder (if installer entered), press the **▲** and **▼** buttons simultaneously while the number and banner text screen is displayed.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words **REGEN TODAY** will alternate with the header on the display.

NOTE: THE CONTROL VALVE'S WATER METER HAS BEEN INTENTIONALLY REMOVED BY THE FACTORY BECAUSE IT SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS. As a result, the treated water flow rate display will always read 0.0 GPM. The control valve is programmed to regenerate based on the passage of a particular number of days.



SET TIME OF DAY

Current time of day needs to be entered during initial installation, and adjusted when daylight saving time begins or ends. If an extended power outage occurs and depletes the on-board non-rechargeable coin cell battery, when power resumes the time of day should be reset and battery replaced.

STEP 1

STEP 2

STEP 3

RETURN TO NORMAL MODE

STEP 1 – Press **CLOCK**

STEP 2 - Current Time (hour): Set the hour of the day using or buttons. AM/PM toggles after 12. Press **NEXT** to go to Step 3.

STEP 3 - Current Time (minutes): Set the minutes of the day using or buttons. Press **NEXT** to exit Set Time of Day. Press **REGEN** to return to previous step.

ADJUST DAYS BETWEEN REGENERATIONS, OR TIME OF REGENERATION

STEP 1

STEP 2

STEP 3

STEP 4

RETURN TO NORMAL MODE

STEP 1 - Press **NEXT** and simultaneously for 3+ seconds to access Installer Display Settings.

STEP 2 – Day Override: Set the maximum number of days between regenerations (allowable range from 1 to 28). Set Day Override using or buttons:

- Refer to Days Override Selection Charts on pages 12 and 13.

Press **NEXT** to go to step 3. Press **REGEN** to return to previous step.

STEP 3 – Next Regeneration Time (hour): Set the hour of day for regeneration using or buttons. AM/PM toggles after 12. The default time is 2:00 AM. Press **NEXT** to go to Step 4. Press **REGEN** to return to previous step.

STEP 4 – Next Regeneration Time (minutes): Set the minutes of day for regeneration using or buttons. Press **NEXT** to exit Installer Display settings, returning to User Displays, normal operation. Press **REGEN** to return to previous step.

Model Number: 7-LX-100NB

		Number of Days Between Regenerations (Days Override)									
Number of People	10	11	5	3	2	2	1	1	1	700	Gallons per Day Water Usage
	9	12	6	4	3	2	2	1	1	630	
	8	14	7	4	3	2	2	2	1	560	
	7	16	8	5	4	3	2	2	2	490	
	6	18	9	6	4	3	3	2	2	420	
	5	22	11	7	5	4	3	3	2	350	
	4	28	14	9	7	5	4	4	3	280	
	3	28	18	12	9	7	6	5	4	210	
	2	28	28	18	14	11	9	8	7	140	
	1	28	28	28	28	22	18	16	14	70	
		5	10	15	20	25	30	35	40		
Nitrate (measured as Nitrogen) NO3-N mg/L											

Model Number: 7-LX-150NB

		Number of Days Between Regenerations (Days Override)									
Number of People	10	16	8	5	4	3	2	2	2	700	Gallons per Day Water Usage
	9	18	9	6	4	3	3	2	2	630	
	8	21	10	7	5	4	3	3	2	560	
	7	24	12	8	6	4	4	3	3	490	
	6	28	14	9	7	5	4	4	3	420	
	5	28	16	11	8	6	5	4	4	350	
	4	28	21	14	10	8	7	6	5	280	
	3	28	28	18	14	11	9	8	7	210	
	2	28	28	28	21	16	14	12	10	140	
	1	28	28	28	28	28	28	24	21	70	
		5	10	15	20	25	30	35	40		
Nitrate (measured as Nitrogen) NO3-N mg/L											

Important: Regularly monitor nitrate levels before and after system. Nitrate levels can change over time. Use a home test kit to monitor levels monthly as well as having your water professionally tested for nitrate quarterly or at least annually.

- Note 1: Nitrates are often measured by laboratories as Nitrogen.
- Note 2: These charts are based on 70 gallons per person per day water use.
- Note 3: These charts represent an approximation of the number of days between regenerations based on 8,241 grains/cu. ft. as CaCO₃ operating capacity of A4103 Nitrate Selective Anion Exchange Resin at 10 pounds of NaCl per cu. ft. with an influent concentration of 600 mg/L TDS (sulfate concentration of 265 mg/L).
- Note 4: Days Override Feature: 1 - 28 days available.

Model Number: 7-LX-200NB

		Number of Days Between Regenerations (Days Override)									Gallons per Day Water Usage
Number of People	10	22	11	7	5	4	3	3	2	700	
	9	24	12	8	6	4	4	3	3	630	
	8	28	14	9	7	5	4	4	3	560	
	7	28	16	10	8	6	5	4	4	490	
	6	28	18	12	9	7	6	5	4	420	
	5	28	22	14	11	8	7	6	5	350	
	4	28	28	18	14	11	9	8	7	280	
	3	28	28	24	18	14	12	10	9	210	
	2	28	28	28	28	22	18	16	14	140	
	1	28	28	28	28	28	28	28	28	70	
		5	10	15	20	25	30	35	40		
Nitrate (measured as Nitrogen) NO ₃ -N mg/L											

Model Number: 7-LX-300NB

		Number of Days Between Regenerations (Days Override)									Gallons per Day Water Usage
Number of People	10	28	16	11	8	6	5	4	4	700	
	9	28	18	12	9	7	6	5	4	630	
	8	28	21	14	10	8	7	6	5	560	
	7	28	24	16	12	9	8	6	6	490	
	6	28	28	18	14	11	9	8	7	420	
	5	28	28	22	16	13	11	9	8	350	
	4	28	28	28	21	16	14	12	10	280	
	3	28	28	28	28	22	18	16	14	210	
	2	28	28	28	28	28	28	24	21	140	
	1	28	28	28	28	28	28	28	28	70	
		5	10	15	20	25	30	35	40		
Nitrate (measured as Nitrogen) NO ₃ -N mg/L											

Important: Regularly monitor nitrate levels before and after system. Nitrate levels can change over time. Use a home test kit to monitor levels monthly as well as having your water professionally tested for nitrate quarterly or at least annually.

- Note 1: Nitrates are often measured by laboratories as Nitrogen.
- Note 2: These charts are based on 70 gallons per person per day water use.
- Note 3: These charts represent an approximation of the number of days between regenerations based on 8,241 grains/cu. ft. as CaCO₃ operating capacity of A4103 Nitrate Selective Anion Exchange Resin at 10 pounds of NaCl per cu. ft. with an influent concentration of 600 mg/L TDS (sulfate concentration of 265 mg/L).
- Note 4: Days Override Feature: 1 - 28 days available.

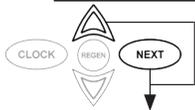
LOW BATTERY

A non-rechargeable 3 volt lithium coin cell battery type 2032 is located on the circuit board (see diagram on page 19), used only to maintain the time of day during power outages (all other information will be stored in memory no matter how long the power outage). The screen displays LOW BATTERY when the battery needs to be replaced. The screen will remain illuminated solid blue when LOW BATTERY is displayed. Initially LOW BATTERY display will alternate with the User display, finally displaying only LOW BATTERY. User displays are still accessible by pressing **NEXT**.

To replace with new battery, unplug the control valve transformer from the 120 volt receptacle first. Install new battery and then plug transformer back into the receptacle to restore power. **It is important to replace the battery with the control valve unplugged to prevent the possibility of causing a short and damaging the PC Board.**

CONTACT SCREEN PROGRAMMING

STEP 1

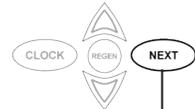


STEP 1 - Press **NEXT** and  simultaneously for 3+ seconds to access Installer Display Settings.

STEP 2



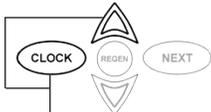
STEP 2 - Press **NEXT** to go to step 3.



STEP 3



STEP 3 - While hour is flashing, simultaneously press and hold both the **CLOCK** and  button to change phone number and banner text.

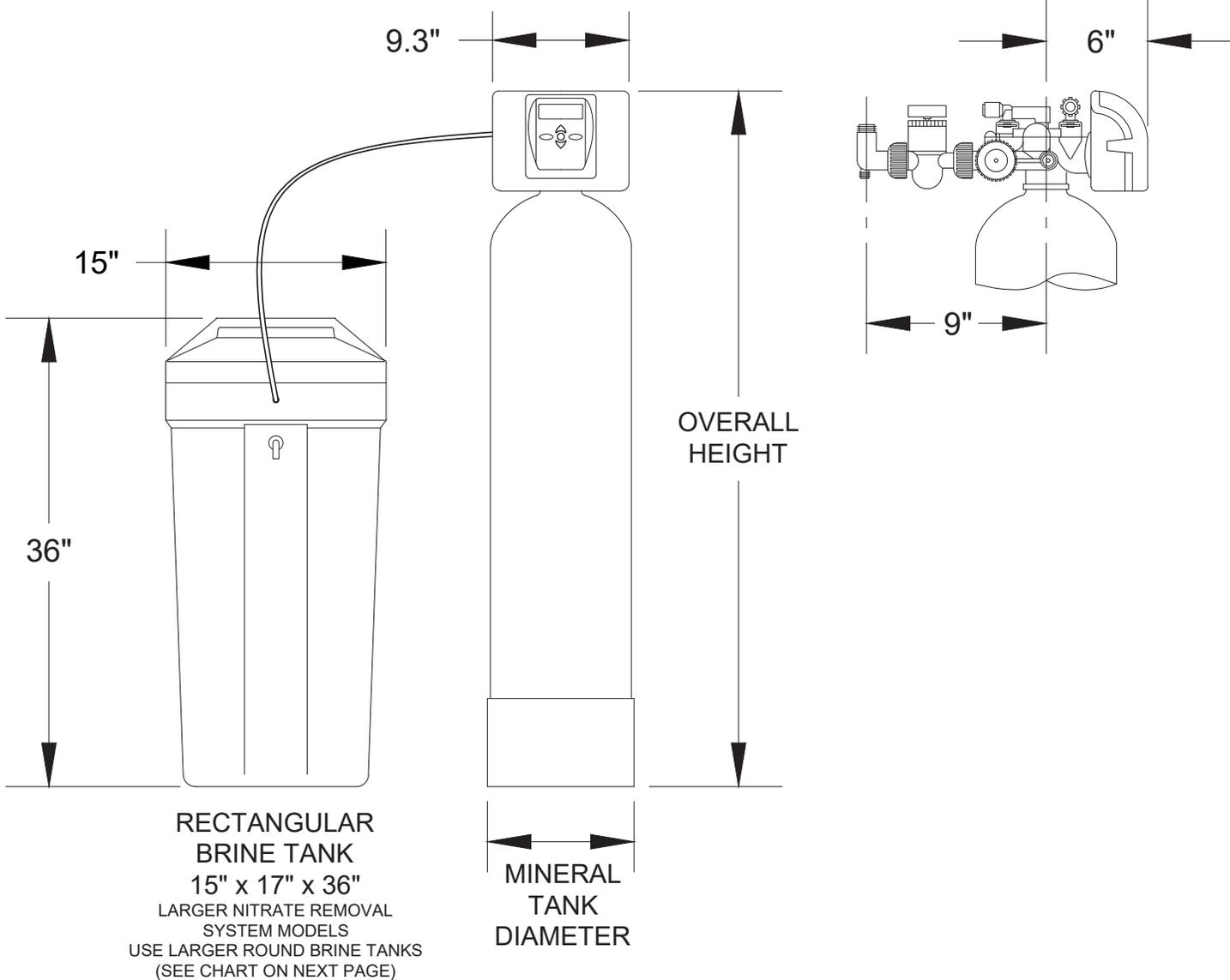


Phone Number - Set phone number using the  or  arrow. Press **NEXT** to forward to the next digit. Press **REGEN** to return to previous digit.



Banner Text - Set the banner text up to a maximum of 44 characters. Use the  or  to select letters of the alphabet, numbers, ampersand (&), or a space in the banner text. Press **NEXT** to forward to the next character or to exit the Installer Display Settings.

OUTLET SIDE VIEW
SHOWN WITH BYPASS
AND 1.0 MNPT ELBOW
ASSEMBLY



LX-NB PROGRAM CYCLES*	NITRATE CONDITIONER							
	7-LX-100NB		7-LX-150NB		7-LX-200NB		7-LX-300NB	
Model Number	Minutes	Gallons	Minutes	Gallons	Minutes	Gallons	Minutes	Gallons
Units:								
Cycle 1: Backwash	10	10	10	10	10	13	10	22
Cycle 2: Regenerant Draw DN & Slow Rinse	50	18.5	50	18.5	50	26	50	36
Cycle 3: Backwash	10	10	10	10	10	13	10	22
Cycle 4: Rinse	5	5	5	5	5	6.5	5	11
Cycle 5: Fill - Treated Water into Brine Tank	6.67	3.33	10.00	5.00	13.33	6.67	20.00	10.00
Salt Setting - Salt Usage Per Regen (LBS NaCl)	10 LBS		15 LBS		20 LBS		30 LBS	
Total Gallons to Drain**	46.8		48.5		65.2		101.0	
Total Regeneration Time (Minutes)	81.7		85.0		88.3		95.0	

*Downflow Regenerant, Post-fill Factory Program Settings

**Based on 50 PSI Inlet Pressure

Gallons to Drain = (Backwash Min. x DLFC GPM) + (Fast Rinse Min. x DLFC GPM) + (Regenerant Draw DN Min. x Slow Rinse GPM) + (LBS NaCl x 1 Gal./3 LBS NaCl)

Note: Slow Rinse GPM is obtained from injector charts for each color injector at various pressures.

LX-NB SPECIFICATIONS	NITRATE CONDITIONER			
	7-LX-100NB	7-LX-150NB	7-LX-200NB	7-LX-300NB
Model Number	7-LX-100NB	7-LX-150NB	7-LX-200NB	7-LX-300NB
Inlet/Outlet Fitting Options (Inches) ¹	0.75 - 1.0 ¹ - 1.25 - 1.5	0.75 - 1.0 ¹ - 1.25 - 1.5	0.75 - 1.0 ¹ - 1.25 - 1.5	0.75 - 1.0 ¹ - 1.25 - 1.5
Built-In Meter Included	No	No	No	No
Bypass Valve Included	Yes	Yes	Yes	Yes
No Hard Water Bypass (NHWBP) Valve Included	No	No	No	No
Drain Fit. Elb. NPT or OD Poly Tube Size (Inches)	3/4 NPT or 5/8 Tube	3/4 NPT or 5/8 Tube	3/4 NPT or 5/8 Tube	3/4 NPT or 5/8 Tube
Water Pressure Range (PSI)	20 - 100	20 - 100	20 - 100	20 - 100
Water Operating Temperature Range (°F)	35 - 100	35 - 100	35 - 100	35 - 100
Influent Water Hardness (GPG)	≤ 4	≤ 4	≤ 4	≤ 4
Influent Iron (PPM)	< 0.3	< 0.3	< 0.3	< 0.3
Influent Manganese (PPM)	< 0.05	< 0.05	< 0.05	< 0.05
Plug-In Power Adapter Input (VAC - Hz - A)	120V AC - 60Hz - 0.35A	120V AC - 60Hz - 0.35A	120V AC - 60Hz - 0.35A	120V AC - 60Hz - 0.35A
Plug-In Power Adapter Output (VDC - A)	15V DC - 0.5A	15V DC - 0.5A	15V DC - 0.5A	15V DC - 0.5A
Plug-In Power Adapter Cord Length	15 FT	15 FT	15 FT	15 FT
PC Board Relay Terminal Block DC Output (V)	12V DC	12V DC	12V DC	12V DC
3 Volt Lithium Coin Cell Battery (Type)	CR2032	CR2032	CR2032	CR2032
Suggested Service Flow Rate Range (GPM) ²	1.00 - 3.74	1.50 - 5.61	2.00 - 7.48	3.00 - 11.22
Overall Height (Inches) ³	47.60	61.40	55.50	72.73
Mineral Tank Size: Diameter x Height (Inches)	10 x 40	10 x 54	12 x 48	14 x 65
Bottom Distributor Type	Plate	Plate	Plate	Plate
Top Basket Distributor	Yes	Yes	Yes	Yes
Underbed Layer (Support Bedding)	No	No	No	No
Cubic Feet of A4103 Resin (LBS)	1.0 (44 LBS)	1.5 (66 LBS)	2.0 (88 LBS)	3.0 (132 LBS)
Brine Tank Size (Inches)	15 x 17 x 36 ³	15 x 17 x 36 ³ (Salt Grid)	15 x 17 x 36 ³ (Salt Grid)	18 D x 40 H (Salt Grid)
Brine Tank Capacity (LBS NaCl)	275	275	275	450
DLFC - Drain Line Flow Control (GPM) ⁴	1.0	1.0	1.3	2.2
RFC - Brine Line (Re-Fill) Flow Control (GPM)	0.5	0.5	0.5	0.5
Injector (Color)	1E - White	1E - White	1F - Blue	1H - Green
Grains Capacity (Grains @ LBS NaCl) ⁵	8,000 @ 10.0	12,000 @ 15.0	16,000 @ 20.0	24,500 @ 30.0
Water to Drain at 50 PSI Inlet Pressure (Gallons)	47	49	65	101

¹1.0 MNPT Elbow Standard - Options Available

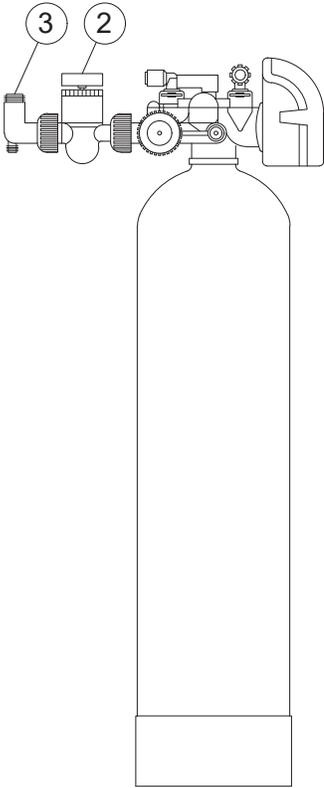
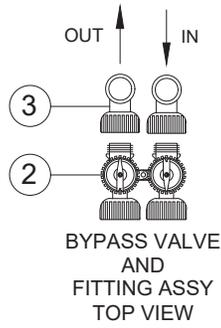
²Service flow rates based on A4103 Resin standard design conditions - service flow rate range 8 - 30 BV/h.

³See Diagram

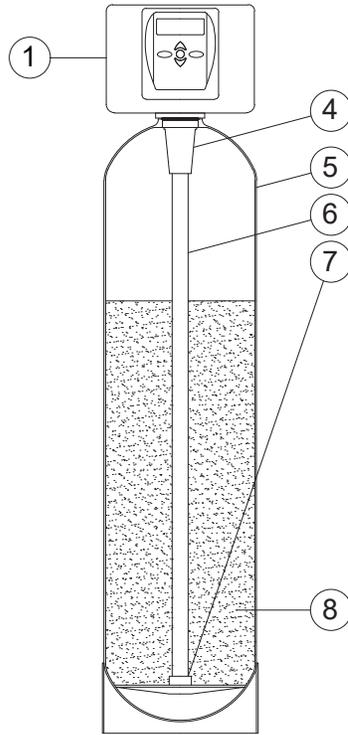
⁴DLFC sizes selected based on A4103 Resin standard design conditions - 50% backwash bed expansion at 4.5 m/h and 50°F.

⁵Grains Capacity is based on 8,241 grains per cubic foot as CaCO₃ operating capacity of A4103 Nitrate Selective Anion Exchange Resin at 10 pounds of NaCl per cubic foot with an influent concentration of 600 mg/L TDS (sulfate concentration of 265 mg/L). Programming grains capacity must be in increments of 500 grains.

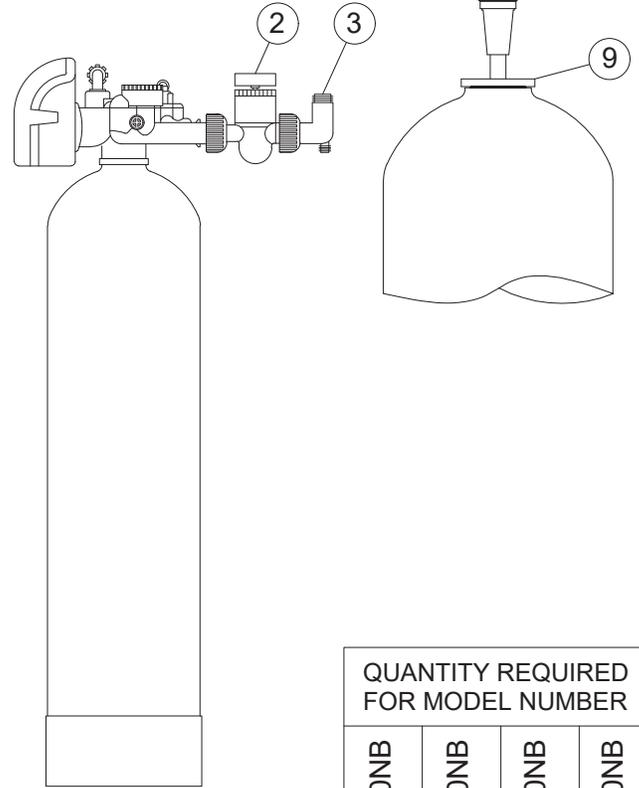
LANCASTER NITRATE CONDITIONER MODELS
7-LX-100NB, 7-LX-150NB, 7-LX-200NB, 7-LX-300NB



OUTLET SIDE VIEW



FRONT VIEW



INLET SIDE VIEW

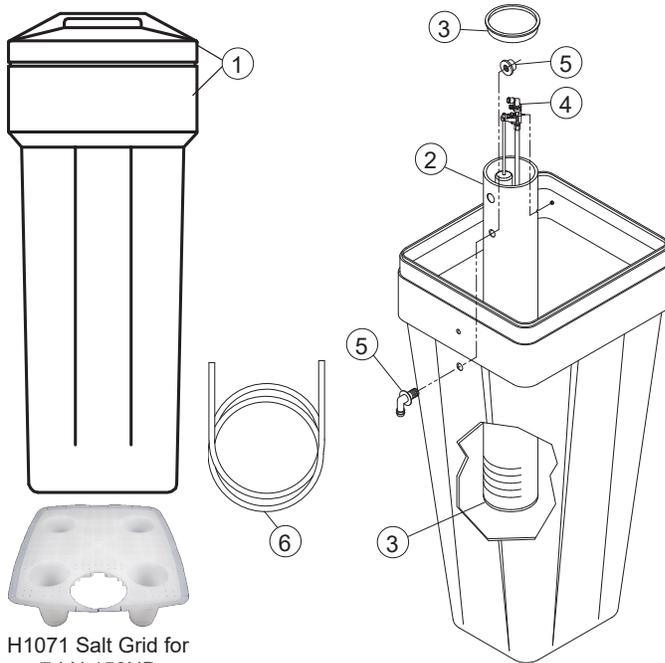
QUANTITY REQUIRED FOR MODEL NUMBER				
	7-LX-100NB	7-LX-150NB	7-LX-200NB	7-LX-300NB
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5,6,7	1	-	-	-
5,6,7	-	1	-	-
5,6,7	-	-	1	-
5,6,7	-	-	-	1
8	1 (44)	1.5 (66)	2 (88)	3 (132)
9	-	-	-	1

DWG. NO.	PART NUMBER AND DESCRIPTION
1	LXCV1 CONTROL VALVE (METER REMOVED) - DETAILED COMPONENTS SHOWN PGS 19-22
2	BP2000 BYPASS VALVE - DETAILED COMPONENTS SHOWN PG 23
3	V3007 FITTING 1" GFPP MNPT ELBOW (V3007 = 2 FITTING ASSEMBLIES) - DETAILED COMPONENTS SHOWN PG 22
4	D1203 TOP DISTRIBUTOR
5,6,7	TANK ASSY - FG1040VT TANK, D1130-12FT DISTRIBUTOR TUBE (CUT FOR 40"), RDIP1050 CONNECTOR
5,6,7	TANK ASSY - FG1054VT TANK, D1130-12FT DISTRIBUTOR TUBE (CUT FOR 54"), RDIP1050 CONNECTOR
5,6,7	TANK ASSY - FG1248VT TANK, D1130-12FT DISTRIBUTOR TUBE (CUT FOR 48"), RDIP1050 CONNECTOR
5,6,7	TANK ASSY - FG1465VT TANK, D1130-12FT DISTRIBUTOR TUBE (CUT FOR 65"), RDIP1050 CONNECTOR
8	A4103 NITRATE RESIN - QTY. SHOWN IN CU. FT. (LBS.)
9	C2015 TANK ADAPTER WITH O-RING SEAL, 4"-8 UN x 2.5"-8 UN

BRINE TANK ASSEMBLY

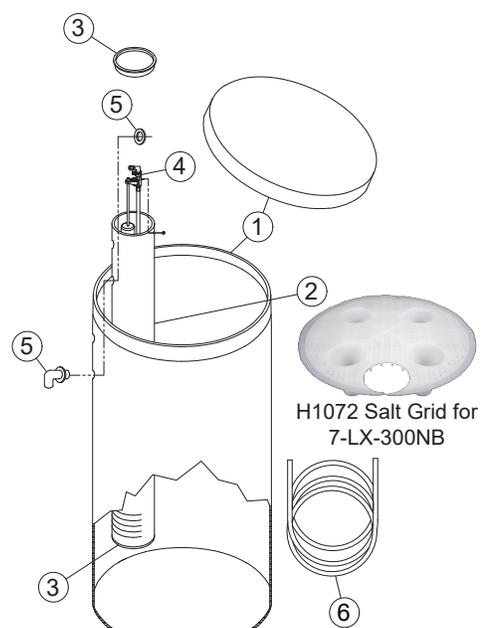
Dwg. No.	Order No.	Description	Qty
1	-	15x17x36 Brine Tank and Cover for J7952 Brine Tank Assembly (tank and cover not sold separately)	-
	G2136	18x40 Brine Tank with Cover for Model 7-LX-300NB	1
2	H1031	4x30 Slotted Brine Well for Model 7-LX-100NB, -150NB, -200NB	1
	H1036	4x36 Slotted Brine Well for Model 7-LX-300NB	1
3	H7016	4 inch Brine Well Cap	2
4	4740	3/8" Brine Valve Assembly (for Model 7-LX-100NB, -150NB, -200NB)	1
	4740-L	3/8" Brine Valve Assembly (for Model 7-LX-300NB)	1
5	H1018	Two Piece Overflow Set	1
6	H1023	3/8" O.D. x 6 Ft. Poly Tubing	1

J7952 15 x 17 x 36 Brine Tank Assy. for Models 7-LX-100NB, -150NB, -200NB



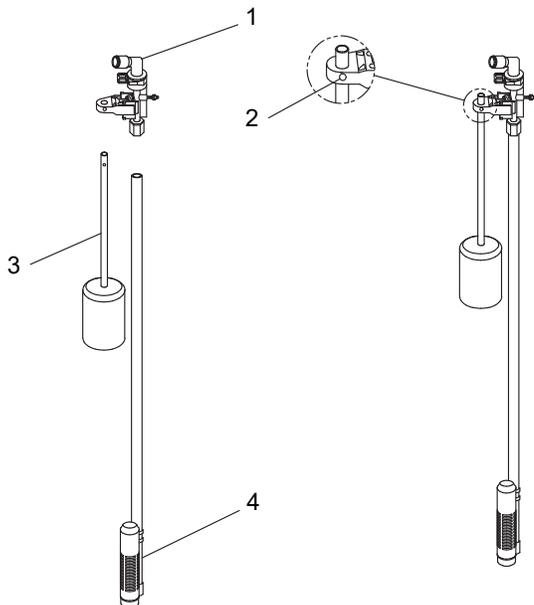
H1071 Salt Grid for 7-LX-150NB and -200NB

L56-40A 18 x 40 Brine Tank Assy. for Model 7-LX-300NB



H1072 Salt Grid for 7-LX-300NB

4740 BRINE VALVE ASSEMBLY



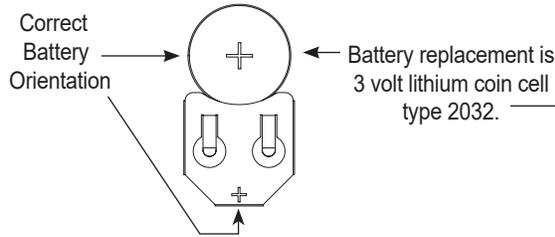
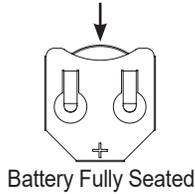
Dwg No.	Order No.	Description	Qty
1	H4600	3/8" Safety Brine Valve	1
2	10151	Pin	1
3	H4640-9.5	Float Assembly	1
4	H4500-48	Air Check Assembly (uncut length) Air Check 1/2" tube is factory cut to the proper length required for the specific model brine tank assembly.	1

X-FACTOR FRONT COVER AND DRIVE ASSEMBLY

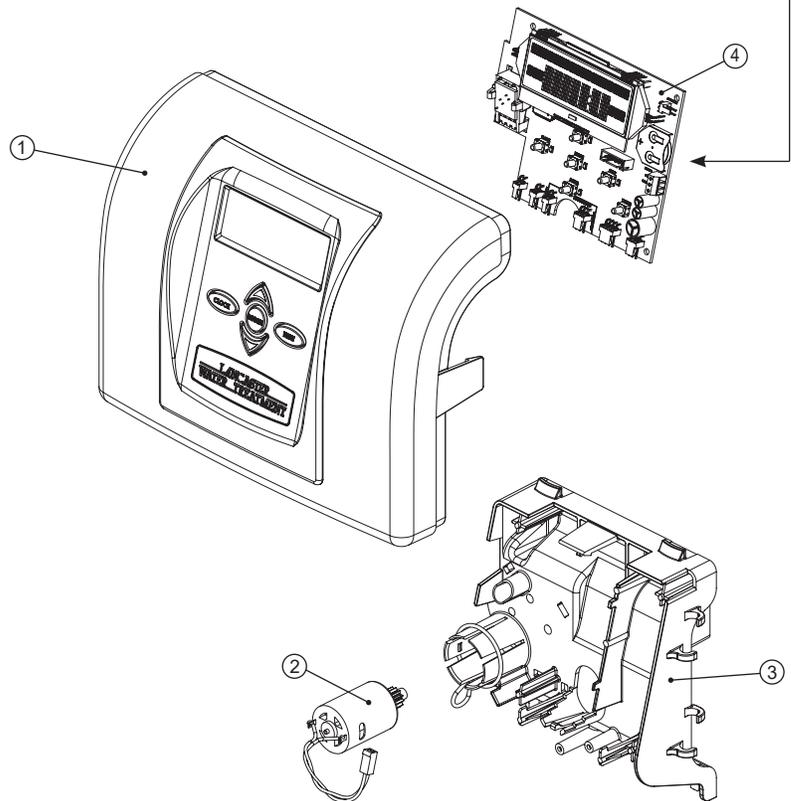
Drawing No.	Order No.	Description	Quantity
1	V3692-02LW	LP Front Cover Assembly	1
2	V3107-01	Motor	1
3	V3106-01	Drive Bracket (new design -no spring clip needed), with Drive Gear 12x36 and Drive Gear Cover attached.	1
4	V3757LP	PC Board	1

When replacing the battery, first unplug the control valve power adapter from the 120 volt receptacle. Install new battery properly (see below) and then plug the power adapter back into the receptacle to restore power. **It is important to replace the battery with the control valve unplugged to prevent the possibility of causing a short and damaging the PC Board.**

When replacing the battery, align positives and push down to fully seat.



AC Adapter	(Not shown)
Order No.	V3186
Supply Voltage	120V AC
Supply Frequency	60 Hz
Input Current	0.35 A
Output Voltage	15V DC
Output Current	0.5 A
No user serviceable parts are on the PC board, the motor, or the power adapter. The means of disconnection from the main power supply is by unplugging the power adapter from the wall.	



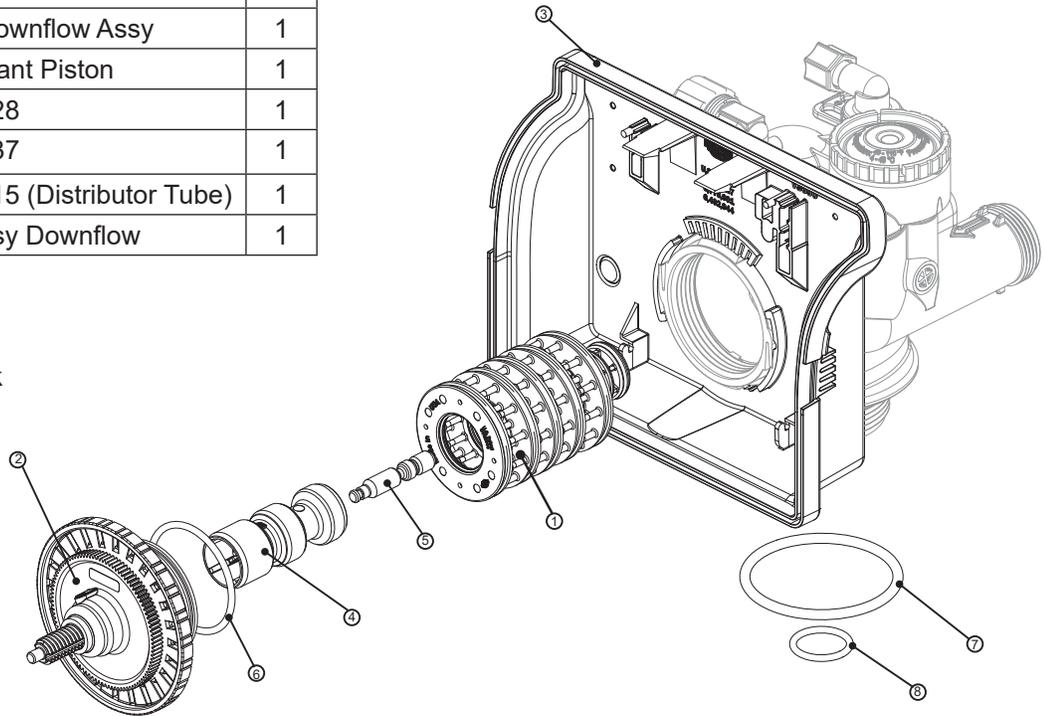
After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.

DRIVE CAP ASSEMBLY, DOWNFLOW PISTON, REGENERANT PISTON AND SPACER STACK ASSEMBLY

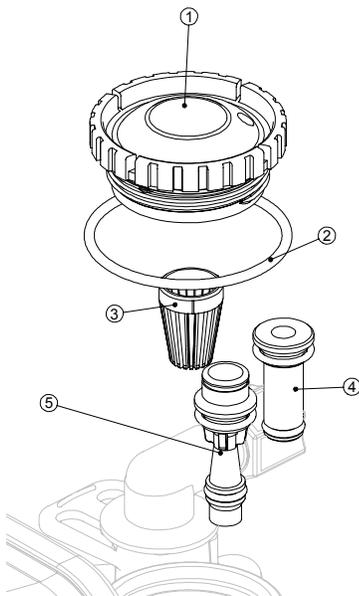
Drawing No.	Order No.	Description	Qty
1	V3005	Spacer Stack Assembly	1
2	V3004	Drive Cap Assy	1
3	V3178LP	Back Plate	1
4	V3011	Piston Downflow Assy	1
5	V3174	Regenerant Piston	1
6	V3135	O-ring 228	1
7	V3180	O-ring 337	1
8	V3105	O-ring 215 (Distributor Tube)	1
Not Shown	V3001	Body Assy Downflow	1

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary. **Avoid any type of lubricants, including silicone, on the clear lip seals.**

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash the software version and then reset the valve to the service position.



INJECTOR CAP, INJECTOR SCREEN, INJECTOR, PLUG AND O-RING



Drawing No.	Order No.	Description	Qty
1	V3176	INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V3177-01	INJECTOR SCREEN CAGE	1
4	V3010-1Z	INJECTOR ASSY Z PLUG	1
5	V3010-1A	INJECTOR ASSY A BLACK	1
	V3010-1B	INJECTOR ASSY B BROWN	
	V3010-1C	INJECTOR ASSY C VIOLET	
	V3010-1D	INJECTOR ASSY D RED	
	V3010-1E	INJECTOR ASSY E WHITE	
	V3010-1F	INJECTOR ASSY F BLUE	
	V3010-1G	INJECTOR ASSY G YELLOW	
	V3010-1H	INJECTOR ASSY H GREEN	
	V3010-1I	INJECTOR ASSY I ORANGE	
	V3010-1J	INJECTOR ASSY J LIGHT BLUE	
	V3010-1K	INJECTOR ASSY K LIGHT GREEN	
Not Shown	V3170	O-RING 011	*
Not Shown	V3171	O-RING 013	*

Refer to specifications page 16 for identifying which injector is used for each model nitrate conditioner.

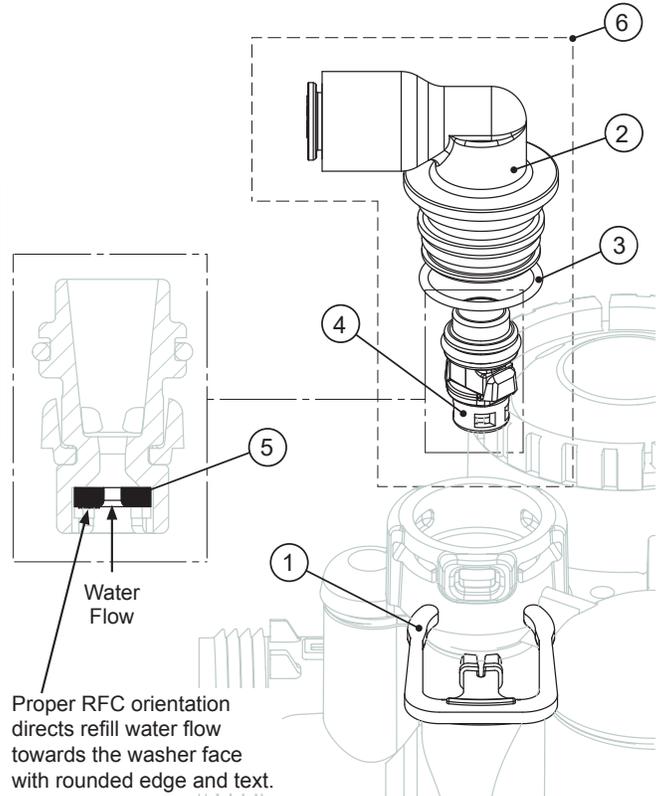
* The injector plug and the injector each contain one 011 (lower) and 013 (upper) o-ring.

The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench (see page 23). If necessary a 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 slots on caps and/or tap with a hammer.

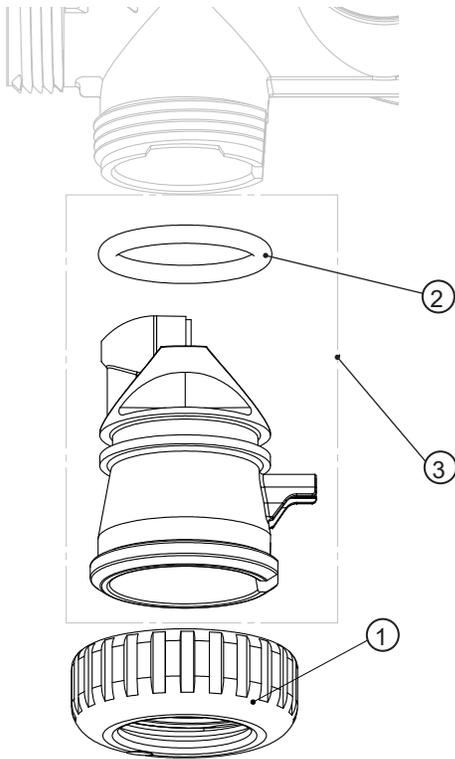
REFILL FLOW CONTROL ASSEMBLY

Drawing No.	Order No.	Description	Qty
1	H4615	Elbow Locking Clip	1
2	H4628	Elbow 3/8" Liquifit	1
3	V3163	O-ring 019	1
4	V3165-01*	RFC Retainer Assy (0.5 gpm)	1
5	V3182	RFC	1
6	V4144-01	Elbow 3/8 Liquifit Assy w/RFC	1

*Assembly includes V3182 RFC.



METER PLUG

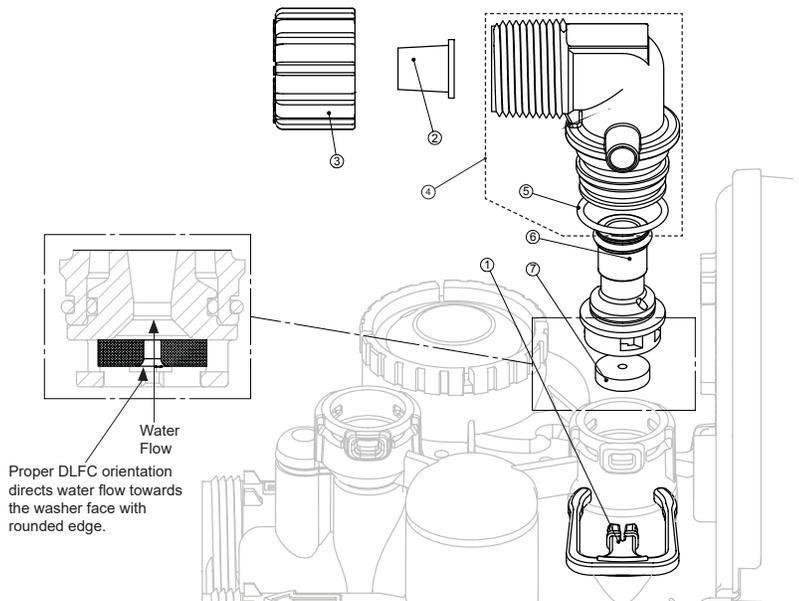


Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" QC	1
2	V3105	O-Ring 215	1
3	V3003-01	Meter Plug Assembly	1

DRAIN LINE - 3/4"

Dwg No.	Order No.	Description	Qty
1	H4615	Elbow Locking Clip	1
2	V3194	Polytube insert 5/8	Option
3	V3192	Nut 3/4 Drain Elbow	Option
4*	V3158	Drain Elbow 3/4 Male	1
5	V3163	O-ring 019	1
6*	V3159	DLFC Retainer Assy	1
7	V3162-007	DLFC 0.7 gpm for 3/4	One DLFC must be used if 3/4 fitting is used
	V3162-010	DLFC 1.0 gpm for 3/4	
	V3162-013	DLFC 1.3 gpm for 3/4	
	V3162-017	DLFC 1.7 gpm for 3/4	
	V3162-022	DLFC 2.2 gpm for 3/4	
	V3162-027	DLFC 2.7 gpm for 3/4	
	V3162-032	DLFC 3.2 gpm for 3/4	
	V3162-042	DLFC 4.2 gpm for 3/4	
	V3162-053	DLFC 5.3 gpm for 3/4	
	V3162-065	DLFC 6.5 gpm for 3/4	
V3162-075	DLFC 7.5 gpm for 3/4		
V3162-090	DLFC 9.0 gpm for 3/4		
V3162-100	DLFC 10.0 gpm for 3/4		

*4 and 6 can be ordered as a complete assembly - V3331 Drain Elbow and Retainer Assy



Refer to specifications on page 16 to identify which DLFC is used for each model nitrate conditioner.

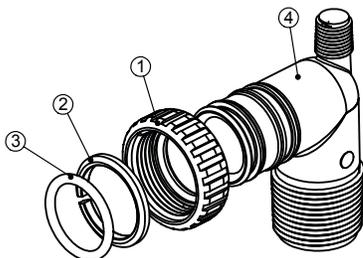
Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of 3/4" NPT connection (unless using 5/8" polytubing).

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

INSTALLATION FITTING ASSEMBLIES

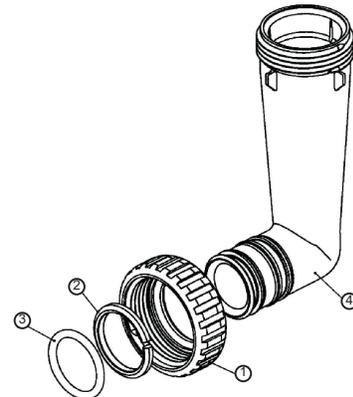
Order No: **V3007** (Standard)
Description: **Fitting 1" GFPP Male NPT Elbow Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3149	Fitting 1 GFPP Male NPT Elbow	2



Order No. **V3191-01** (Optional)
Description: **Fitting Vertical Adapter Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3191	Vertical Adapter	2



Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of 1" NPT connection. Teflon tape is not necessary on the nut connection nor caps because of o-ring seals.

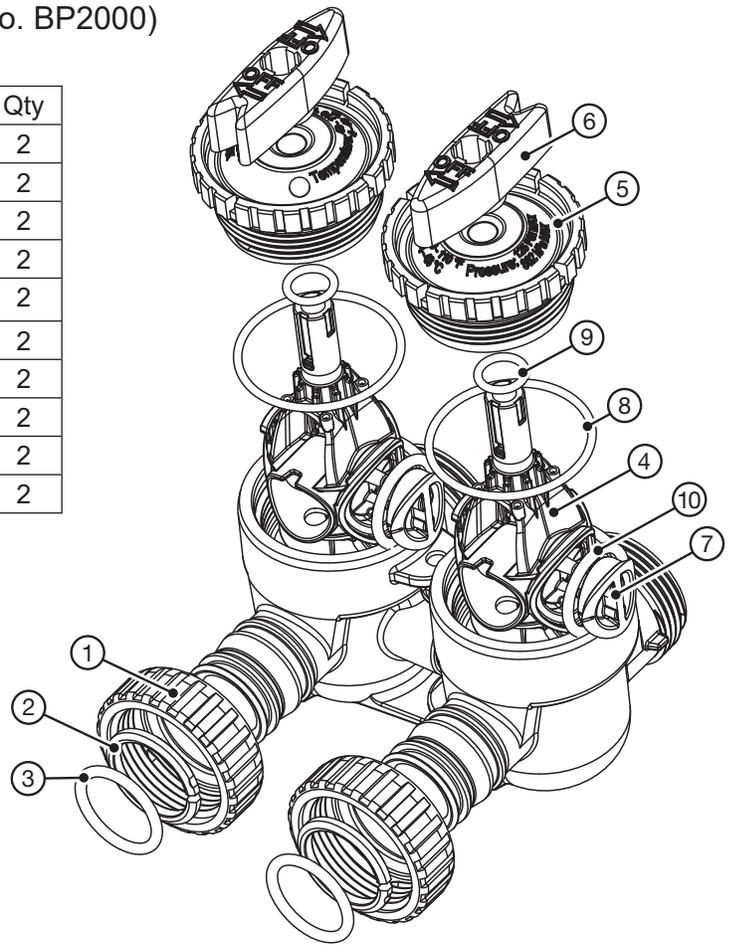
The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in slots on caps and/or tap with a hammer.

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

BYPASS VALVE

(Order No. BP2000)

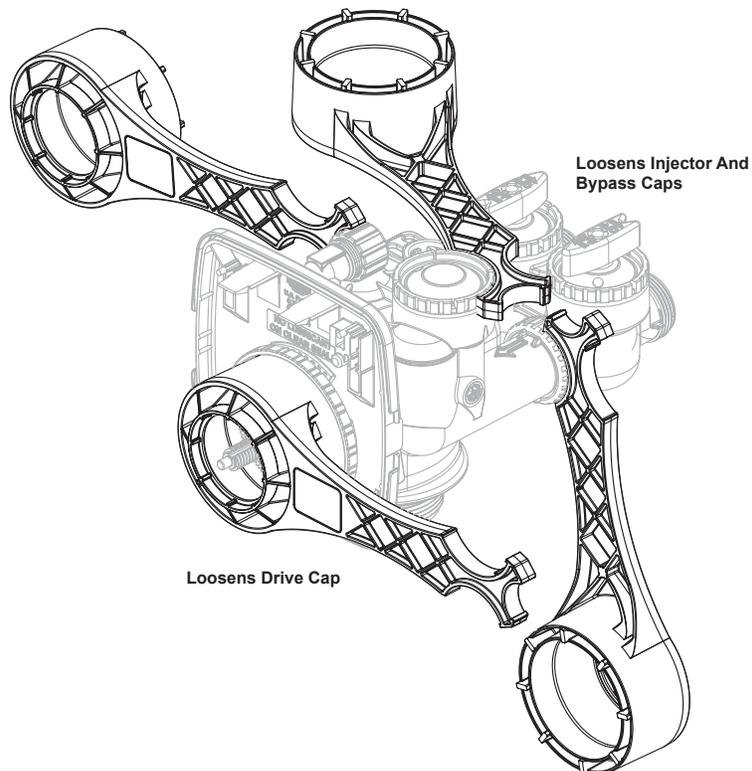
Drawing No.	Order No.	Description	Qty
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	Bypass 1" Rotor	2
5	V3146	Bypass Cap	2
6	V3147	Bypass Handle	2
7	V3148	Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2



SERVICE SPANNER WRENCH

(Order No. V3193)

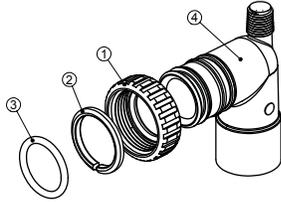
Although no tools are necessary to assemble or disassemble the valve, the wrench (shown in various positions on the valve) may be purchased to aid in assembly or disassembly.



OPTIONAL INSTALLATION FITTING ASSEMBLIES

Order No: **V3007-01**
Description: **Fitting 3/4" & 1" PVC Solvent 90° Assembly**

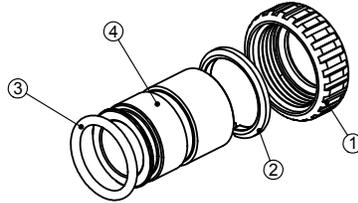
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3189	Fitting 3/4" & 1" PVC Solvent 90	2



Order No: **V3007-02**
Description: **Fitting 1" Brass Sweat Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3188	Fitting 1 Brass Sweat Assembly	2

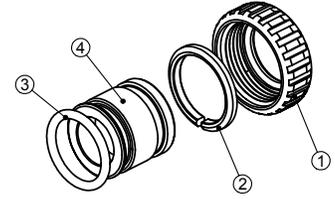
Do not install in California.



Order No: **V3007-03**
Description: **Fitting 3/4" Brass Sweat Assembly**

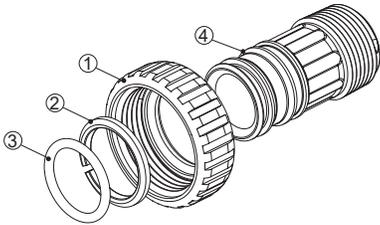
Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3188-01	Fitting 3/4 Brass Sweat	2

Do not install in California.



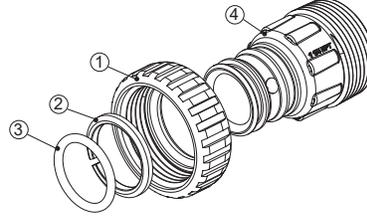
Order No: **V3007-04**
Description: **Fitting 1" Plastic Male NPT Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3164	Fitting 1" Plastic Male NPT	2



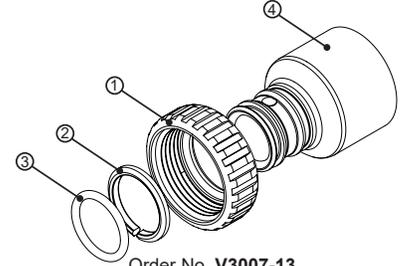
Order No: **V3007-05**
Description: **Fitting 1-1/4" Plastic Male NPT Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3317	Fitting 1-1/4" Plastic Male NPT	2



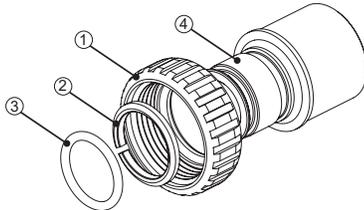
Order No: **V3007-07**
Description: **Fitting 1 1/4" & 1 1/2" PVC Solvent Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3352	Fitting 1 1/4" & 1 1/2" PVC Solvent	2



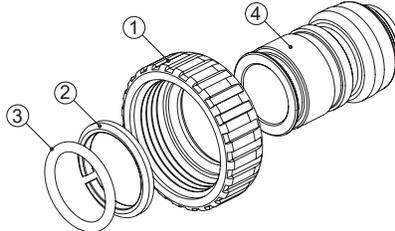
Order No: **V3007-09**
Description: **Fitting 1 1/4" & 1 1/2" Brass Sweat Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3375	Fitting 1 1/4" & 1 1/2" Brass Sweat	2



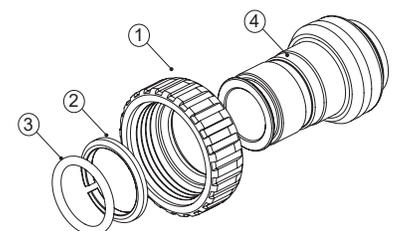
Order No: **V3007-12**
Description: **Fitting 3/4" Brass SharkBite Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3628	Ftg 3/4 Brass Shark-Bite	2



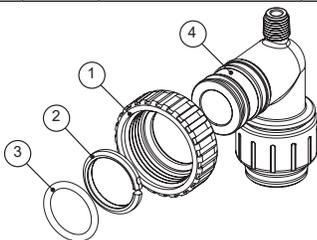
Order No: **V3007-13**
Description: **Fitting 1" Brass SharkBite Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3629	Ftg 1" Brass Shark-Bite	2



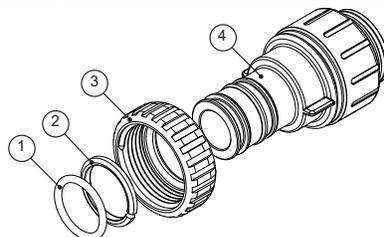
Order No: **V3007-15**
Description: **WS1 FTG 3/4 JG QC 90 Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3151	WS1 NUT 1 QC	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3790	WS1 ELBOW 3/4 QC W/STEM	2



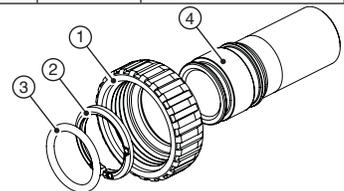
Order No: **V3007-17**
Description: **WS1 FTG 1" JG QC Assembly**

Drawing No.	Order No.	Description	Qty.
1	V3105	O-RING 215	2
2	V3150	WS1 SPLIT RING	2
3	V3151	WS1 NUT 1 QC	2
4	V4045	WS1 FTG 1 INCH QC	2



Order No: **V3007-22**
Description: **WS1 Fitting 1" Brass Press/Sweat Asy LF**

Drawing No.	Order No.	Description	Qty.
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V4318-LF	WS1 Fitting 1 Brass Press/Sweat LF	2



SERVICE INSTRUCTIONS



When servicing the valve, water may leak from the valve. Water from the valve may create a slip hazard. Clean up water spills.



Disconnect from electrical power prior to servicing the valve.

Nitrate Conditioners do not include the water meter. The water meter has been removed by the factory because it should not be used as the primary monitoring device for critical or health effect applications.

DRIVE ASSEMBLY:

Remove the valve cover to access the drive assembly.

Disconnect the power source plug (black wire) from the PC board prior to disconnecting the motor plug from the PC board. The power source plug connects to the four-pin jack. The motor plug connects to the two-pin jack on the left-hand side of the PC board.

The PC board can be removed separately from the drive bracket but it is not recommended. Do not attempt to remove the display panel from the PC board. Handle the board by the edges. To remove the PC board from the drive bracket, unplug the power and motor plugs from the PC board. Lift the middle latch along the top of the drive bracket while pulling outward on the top of the PC board. The drive bracket has two plastic pins that fit into the holes on the lower edge of the PC board. Once the PC board is tilted about 45° from the drive bracket it can be lifted off of these pins. To reinstall the PC board, position the lower edge of the PC board so that the holes in the PC board line up with the plastic pins. Push the top of the PC board towards the valve until it snaps under the middle latch, weave the power wire into the holders and reconnect the motor and power plugs.

The drive bracket must be removed to access the drive cap assembly and pistons or the drive gear cover. It is not necessary to remove the PC board from the drive bracket to remove the drive bracket. To remove the drive bracket start by removing the plug for the power source. Unweave the wire from the side holders. Two tabs on the top of the drive back plate hold the drive bracket in place. Simultaneously lift the two tabs and gently ease the top of the drive bracket forward. The lower edge of the drive bracket has two notches that rest on the drive back plate. Lift up and outward on the drive bracket to disengage the notches.

To reassemble, seat the bottom of the drive bracket so the notches are engaged at the bottom of the drive back plate. Push the top of the drive bracket toward the two latches. The drive bracket may have to be lifted slightly to let the threaded piston rod pass through the hole in the drive bracket. Maintain a slight engaging force on top of the drive bracket while deflecting the bracket slightly to the left by pressing on the side of the upper right corner. This helps the drive gears mesh with the drive cap assembly. The drive bracket is properly seated when it snaps under the latches on the drive back plate. If resistance is felt before latching, then notches are not fully engaged, the piston rod is not in hole, the wires are jammed between the drive bracket and drive back plate, or the gear is not engaging the drive cap assembly.

To inspect the drive gears, the drive gear cover needs to be removed. Before trying to remove the gear cover, the drive bracket must be removed from the drive back plate. (Refer to the instructions above regarding removing the drive bracket from the drive back plate. The drive gear cover can be removed from the drive bracket without removing the motor or the PC board.) The drive gear cover is held in place on the drive bracket by three clips. The largest of the three clips is always orientated to the bottom of the drive bracket. With the PC board facing up, push in and down on the large clip on the drive gear cover. Handle the cover and the gears carefully so that the gears do not fall off the pegs in the cover.

Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt or oils may interfere with pulse counting.

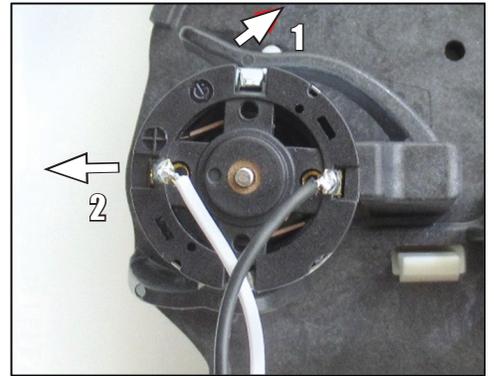
The drive gear cover only fits on one way, with the large clip orientated towards the bottom. If all three clips are outside of the gear shroud on the drive bracket the drive gear cover slips easily into place.

The drive bracket does not need to be removed from the drive plate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the jacks on the PC board. See the next page for instructions for removing and reinstalling the motor on the new drive bracket design (no spring clip needed). After the motor is reinstalled, reconnect the motor plug to the two-pronged jack on the lower left side of the PC Board. Reconnect the power plug.

Replace the valve cover. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons for 3 seconds.

This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.

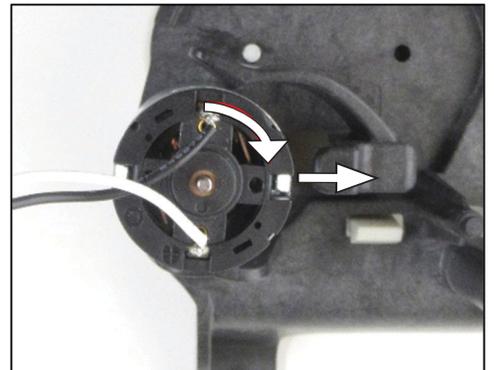
To remove the motor, pull the locking lever (1) away from the motor and pull the motor away (2) from the locking tab then straight out of the drive bracket.



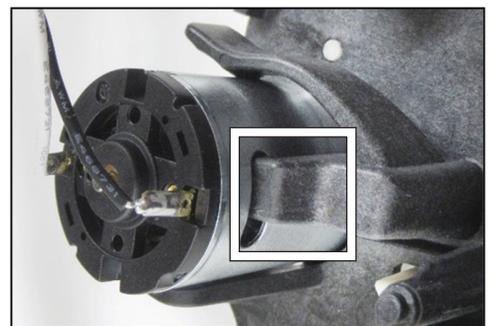
1. To reinstall motor place the motor gear side down into the end of the slot in the drive bracket furthest away from the locking tab (marked with an X in the photo to the right). Ensure the motor is flush with the drive bracket and the holes in the motor housing are a quarter-turn away from the locking tab before proceeding.



2. Gently rotate the motor clockwise (to the right) while pushing the motor towards the locking tab. The motor will engage the gears in the drive bracket while sliding into place.

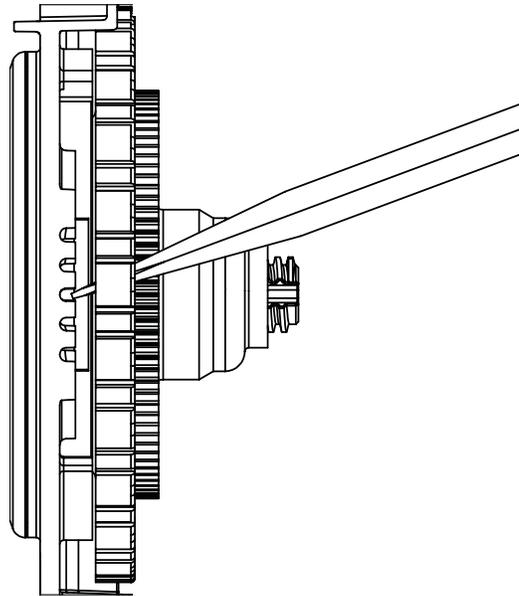


3. Ensure the locking tab on the drive bracket is fully inserted into one of the holes in the motor housing.



DRIVE CAP ASSEMBLY, MAIN PISTON AND REGENERANT PISTON:

The drive assembly must be removed to access the drive cap assembly. The drive cap assembly must be removed to access the piston(s). The drive cap assembly is threaded into the control valve body and seals with an o-ring. To remove the drive cap assembly use the special plastic wrench or insert a ¼" to ½" flat blade screwdriver into one of the slots around the top 2" of the drive cap assembly so it engages the notches molded into the drive back plate around the top 2" of the piston cavity. See below. The notches are visible through the holes. Lever the screwdriver so the drive cap assembly turns counter clockwise. Once loosened unscrew the drive cap assembly by hand and pull straight out.



The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod and various other parts that should not be disassembled in the field. The only replaceable part on the drive cap assembly is the o-ring. Attached to the drive cap assembly is the main piston and if a regenerant is used, a regenerant piston.

The regenerant piston (the small diameter one behind the main piston) is removed from the main piston by pressing sideways and unsnapping it from its latch. Chemically clean in dilute sodium bisulfite or vinegar, or replace the regenerant piston if needed. To remove the main piston fully extend the piston rod and then unsnap the main piston from its latch by pressing on the side with the number. Chemically clean in dilute sodium bisulfite or vinegar, or replace the main piston.

Reattach the main piston to the drive cap assembly. Reattach the regenerant piston (if needed) to the main piston. Reinsert the drive cap assembly and piston into the spacer stack assembly and hand tighten the drive cap assembly. Continue to tighten the drive cap assembly using a screwdriver as a ratchet until the black o-ring on the spacer stack assembly is no longer visible through the drain port. Excessive force can break the notches molded into the drive back plate. Make certain that the main drive gear still turns freely.

The exact position of the piston is not important as long as the main drive gear turns freely. Reattach the drive assembly to the control valve and connect all plugs. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons for 3 seconds.

This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.

REFILL FLOW CONTROL ASSEMBLY:

To clean or replace the refill flow control, pull out the elbow-locking clip and then pull straight up on the elbow. Replace the elbow locking clip in the slot so that it is not misplaced. Twist to remove the white flow control retainer. The flow control can be removed by prying upward through the side slots of the retainer with a small flat blade screwdriver.

Chemically clean the flow control or the white flow control retainer using dilute sodium bisulfite or vinegar. Do not use a wire brush. If necessary, replace the flow control, o-ring on the flow control retainer, or the o-ring on the elbow.

Reseat the flow control so the rounded end is visible in the flow control. Reseat the white flow control retainer by pushing the retainer into the elbow until the o-ring seats. Remove locking clip, push down on elbow to reseat and insert locking clip.

Do not use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicone lubricant may be used on the o-ring on the elbow or the white retainer.

SPACER STACK ASSEMBLY:

To access the spacer stack assembly remove the drive assembly, drive cap assembly and piston. The spacer stack assembly can be removed easily without tools by using thumb and forefinger. Inspect the black o-rings and clear lip seals for wear or damage. Replace the entire stack if necessary. Do not disassemble the stack.

The spacer stack assembly may be chemically cleaned (dilute sodium bisulfite or vinegar) or wiped with a soft cloth.

The spacer stack assembly can be pushed in to the control valve body bore by hand. Since the spacer stack assembly can be compressed it is easier to use a blunt object (5/8" to 1-1/8" in diameter) to push the center of the assembly into the control valve body. The assembly is properly seated when at least four threads are exposed (approximately 5/8"). Do not force the spacer stack assembly in. The control valve body bore interior can be lubricated with silicone to allow for easy insertion of the entire stack.

Reattach the drive cap assembly and piston(s) and the drive assembly.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons for 3 seconds.

This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.

INJECTOR CAP, SCREEN, INJECTOR PLUG AND INJECTOR:

Unscrew the injector cap and lift off. Loosen cap with special plastic wrench or pliers if necessary. Attached to the injector cap is a screen. Remove the screen and clean if fouled.

The plug and/or injector can be pried out with a small screwdriver. The plug can be wiped clean. If the plug leaks replace the entire plug. The injector consists of a throat and a nozzle. Chemically clean the injector with vinegar or sodium bisulfite. The holes can be blown out with air. Both pieces have small diameter holes that control the flow rates of water to insure that the proper concentration of regenerant is used. Sharp objects, which can score the plastic, should not be used to clean the injector. Scoring the injector or increasing the diameter of the hole could change the operating parameters of the injector.

Push the plug(s) and/or injectors firmly in place, replace the screen and hand tighten the injector cap.

TROUBLESHOOTING

Problem	Possible Cause	Solution
1. No Display on PC Board	a. No power at electric outlet	a. Repair outlet or use working outlet
	b. Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	b. Plug Power Adapter into outlet or connect power cord end to PC Board connection
	c. Improper power supply	c. Verify proper voltage is being delivered to PC Board
	d. Defective Power Adapter	d. Replace Power Adapter
	e. Defective PC Board	e. Replace PC Board
2. PC Board does not display correct time of day	a. Power Adapter plugged into electric outlet controlled by light switch	a. Use uninterrupted outlet
	b. Tripped breaker switch and/or tripped GFI	b. Reset breaker switch and/ or GFI switch
	c. Power outage	c. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	d. Defective PC Board	d. Replace PC Board
3. Control valve regenerates at wrong time of day	a. Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration set incorrectly	c. Reset regeneration time
4. Time of day flashes on and off	a. Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
5. Control valve does not regenerate automatically when the REGEN button is depressed and held	a. Broken drive gear or drive cap assembly	a. Replace drive gear or drive cap assembly
	b. Broken Piston Rod	b. Replace piston rod
	c. Defective PC Board	c. Defective PC Board
6. Control valve does not regenerate automatically but does when the REGEN button is depressed and held	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Defective PC Board	b. Replace PC Board
7. Untreated water is being delivered	a. Bypass valve is open or faulty	a. Fully close bypass valve or replace
	b. Media is exhausted due to high water usage	b. Check program settings
	c. Water quality fluctuation	c. Test water and adjust program values accordingly
	d. No regenerant or low level of regenerant in regenerant tank	d. Add proper regenerant to tank
	e. Control fails to draw in regenerant	e. Refer to Trouble Shooting Guide number 11
	f. Insufficient regenerant level in regenerant tank	f. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
	g. Damaged seal/stack assembly	g. Replace seal/stack assembly
	h. Control valve body type and piston type mix matched	h. Verify proper control valve body type and piston type match
	i. Fouled media bed	i. Replace media bed
8. Control valve uses too much regenerant	a. Improper refill setting	a. Check refill setting
	b. Improper program settings	b. Check program setting to make sure they are specific to the water quality and application needs
	c. Control valve regenerates frequently	c. Check for leaking fixtures that may be exhausting capacity or system is undersized

Problem	Possible Cause	Solution
9. Residual regenerant being delivered to service	a. Low water pressure	a. Check incoming water pressure – water pressure must remain at minimum of 25 psi
	b. Incorrect injector size	b. Replace injector with correct size for the application
	c. Restricted drain line	c. Check drain line for restrictions or debris and clean
10. Excessive water in regenerant tank	a. Improper program settings	a. Check refill setting
	b. Plugged injector	b. Remove injector and clean or replace
	c. Drive cap assembly not tightened in properly	c. Re-tighten the drive cap assembly
	d. Damaged seal/ stack assembly	d. Replace seal/ stack
	e. Restricted or kinked drain line	e. Check drain line for restrictions or debris and or un-kink drain line
	f. Plugged backwash flow controller	f. Remove backwash flow controller and clean or replace
	g. Missing refill flow controller	g. Replace refill flow controller
11. Control valve fails to draw in regenerant	a. Injector is plugged	a. Remove injector and clean or replace
	b. Faulty regenerant piston	b. Replace regenerant piston
	c. Regenerant line connection leak	c. Inspect regenerant line for air leak
	d. Drain line restriction or debris cause excess back pressure	d. Inspect drain line and clean to correct restriction
	e. Drain line too long or too high	e. Shorten length and or height
	f. Low water pressure	f. Check incoming water pressure – water pressure must remain at minimum of 25 psi
12. Water running to drain	a. Power outage during regeneration	a. Upon power being restored control will finish the remaining regeneration time. Reset time of day.
	b. Damaged seal/ stack assembly	b. Replace seal/ stack assembly
	c. Piston assembly failure	c. Replace piston assembly
	d. Drive cap assembly not tightened in properly	d. Re-tighten the drive cap assembly
13. Err – 101 = Control unable to sense motor movement	a. Motor not inserted full to engage pinion, motor wires broken or disconnected	a. Disconnect power, make sure motor is fully engaged, check for broken wires, make sure two pin connector on motor is connected to the two pin connection on the PC Board labeled MOTOR. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. PC Board not properly snapped into drive bracket	b. Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Missing reduction gears	c. Replace missing gears

Problem	Possible Cause	Solution
<p>14. Err – 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled</p>	<p>a. Foreign material is lodged in control valve</p>	<p>a. Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>b. Mechanical binding</p>	<p>b. Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>c. Main drive gear too tight</p>	<p>c. Loosen main drive gear. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>d. Improper voltage being delivered to PC Board</p>	<p>d. Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
<p>15. Err – 103 = Control valve motor ran too long and was unable to find the next cycle position</p>	<p>a. Motor failure during a regeneration</p>	<p>a. Check motor connections then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>b. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor</p>	<p>b. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>c. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface</p>	<p>c. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
<p>16. Err – 104 = Control valve motor ran too long and timed out trying to reach home position</p>	<p>a. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface</p>	<p>a. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>

Problem	Possible Cause	Solution
<p>17. Err – 106, Err - 116 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position</p> <p>Motorized Alternating Valve = MAV</p> <p>Separate Source = SEPS</p> <p>No Nitrate Water Bypass = NHBP</p> <p>Auxiliary MAV = AUX MAV</p>	<p>a. Control valve programmed for ALT A or b, nHbP, SEPS, or AUX MAV with out having a MAV or NHBP valve attached to operate that function</p>	<p>a. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. Then re-program valve to proper setting</p>
	<p>b. MAV/ NHBP motor wire not connected to PC Board</p>	<p>b. Connect MAV/ NHBP motor to PC Board two pin connection labeled DRIVE. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>c. MAV/ NHBP motor not fully engaged with reduction gears</p>	<p>c. Properly insert motor into casing, do not force into casing Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>d. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor</p>	<p>d. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
<p>18. Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position</p> <p>Motorized Alternating Valve = MAV</p> <p>Separate Source = SEPS</p> <p>No Nitrate Water Bypass = NHBP</p> <p>Auxiliary MAV = AUX MAV</p>	<p>a. Foreign material is lodged in MAV/ NHBP valve</p>	<p>a. Open up MAV/ NHBP valve and check piston and seal/ stack assembly for foreign material. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>b. Mechanical binding</p>	<p>b. Check piston and seal/ stack assembly, check reduction gears, drive gear interface, and check MAV/ NHBP black drive pinion on motor for being jammed into motor body. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>

