**Troubleshooting Return Flow v3**

Return flow (through the 1 ½” septic tank return backflush line) should only occur when the filters are backwashing and during a Zone Return cycle. If you are experiencing flow through the septic tank return backflush line at any other point in time, the following are steps to troubleshooting what may be going on.

1. **The Zone Return Valve:** This valve is activated only during an automatic Field Flush Flow Cycle (FFF). This function occurs every 25 times that the system turns on (doses a zone). During this cycle, water is discharged into the tubing, the tubing is “cleaned/scoured” by the flow and velocity of the water, and the water is returned through the Zone Return Valve to the head of the treatment tank via the 1 ½” septic tank return line. During the FFF Cycle, and during the back-flushing of the disc filters, are the only times when water is suppose to be traveling through the 1 ½” backflush line (septic tank return). The Field Flush Flow Cycle is necessary to prevent bacteria re-growth from occurring in the drip tubing. This process utilizes a normally closed Zone Return Solenoid Valve that opens when activated to allow a forward field flush. The solenoid coil on older systems (before 2014) is Normally Open (typical model # S-390-3-R). The solenoid coil on newer systems (2014-present) is Normally Closed (typical model # S-390-2-R).
	1. ***Zone Return Solenoid***: The solenoid needs 22-28 volts AC to function in hand or automatic modes. Solenoids are rated at 24VAC.
		1. When a solenoid is bad, the most common thing we see is a blown 24 volt fuse in the control panel caused by an electrically shorted solenoid coil.
		2. Troubleshooting the Solenoid:
			1. Do we have the proper volts at the solenoid in hand and auto modes? 22-28VAC. An automatic cycle must be initiated to test for auto voltage.
			2. Is the piston stuck in the closed position due to corrosion? The piston should move freely (if so, the solenoid should be replaced)
			3. Remove the piston and check the spring that releases the piston, upon de-activation of the solenoid, for damage or missing. Note: DO NOT REMOVE THE SPRING FROM THE NEWER NORMALLY CLOSED MODEL S-390-2-R COILS. Removing the spring on this coil damages the spring by stretching it and renders it useless.
			4. Is the piston dirty and needs to be cleaned?
			5. Is the black rubber tip on the piston damaged?
2. Solenoid Base: This is the black component between solenoid coil and valve with a small, white, manual switch that allows the valve to be manually opened and closed.
	* 1. Verify that the manual switch is in the auto position (facing the coil)
3. ***Zone Return Diaphragm***: This is the black circular valve that the solenoid is attached to on the Hydraulic Unit.
	* 1. Use a metric 28mm socket to remove the top of this valve (old style). Remove the spring and pull the diaphragm out of the housing. NOTE: (New Style) valve tops are held to the valve body with 6 stainless screws
		2. Inspect the housing for stones, sand, grit or damage. These items will prevent the diaphragm from properly seating in the housing and will allow water to pass through this valve when the valve should be closed.
		3. Inspect the diaphragm itself of damage. Any pin-holes or tears in the material mean that it must be replaced. Most hydraulic units that you encounter will have the “old style” (discontinued) valve and therefore, you cannot replace the diaphragm rather, the entire valve will need to be replaced with a (new style) current production valve.
4. **The Blue Valve**: There are two blue valves located on every hydraulic unit. They are “black” in color (formerly blue) and are located on the right and left of the hydraulic unit beside each disc filter. The blue valves are opened by the filter diaphragm valves via water pressure through a 6mm black hydraulic hose. When they are opened, they allow water to flow back to the head of the treatment plant via the Septic Tank Return line. This should only occur during the 2-filter backflush cycle. If there is a problem with one of the blue valves and it sticks open, flow through the backflush line can occur at any time.
	1. ***Troubleshooting the Blue Valve (with pump in ‘H’ position)***:
		1. Remove the 6mm hydraulic hose from the blue valve to determine if there is water pressure on the hydraulic line. This needs to be done while running the pump in hand.
		2. If there is no water pressure, and the blue valve remains open, the valve needs to either be cleaned or replaced.
		3. To clean the blue valve properly, the valve should be removed from the unit. Remove all 6 bolts and completely remove the top of the valve. Remove the spring from the inside and move the steel piston up and down in order to loosen any debris around the diaphragm.
		4. If the blue valve does close on its own but there is pressure on the 6mm hydraulic hose, the blue valve is functioning properly but the filter diaphragm Valve needs to be investigated.
5. **The Filter Diaphragm Valve**: This valve allows water pressure, generated by the pump, to normally pass through the diaphragm. This water pressure then stops, “dead heads” at the closed Zone Diaphragm Valves. A Normally Closed solenoid (typically model S-390-3-D) is used to CLOSE the filter diaphragm valve while simultaneously allowing water pressure to pass through the 6mm hydraulic line to the blue valve, opening the blue valve and allowing the disc filter to be backflushed.
	1. ***Normally Closed Solenoid***: The solenoid needs 22-28 volts AC to function in hand or automatic modes. Solenoids are rated at 24VAC.
		1. When a solenoid is bad, the most common thing we see is a blown 24 volt fuse in the control panel.
		2. Troubleshooting the Solenoid:
			1. Do we have the proper volts at the solenoid in hand and auto modes? 22-28VAC. An automatic cycle must be initiated to test for auto voltage.
			2. Is the piston stuck in the closed position due to corrosion? The piston should move freely (if so, the solenoid should be replaced)
			3. Remove the piston and check the spring that releases the piston, upon de-activation of the solenoid, for damage or missing.
			4. Is the piston dirty and needs to be cleaned?
			5. Is the black rubber tip on the piston damaged?
	2. ***Filter Diaphragm***:
		1. Use a metric 28mm socket to remove the top of this valve (old style). Remove the spring and pull the diaphragm out of the housing. NOTE: (New Style) valve tops are held to the valve body with 6 stainless screws
		2. Inspect the housing for stones, sand, grit or damage. These items will prevent the diaphragm from properly seating in the housing and will allow water to pass through this valve when the valve should be closed.
		3. Inspect the diaphragm itself of damage. Any pin-holes or tears in the material mean that it must be replaced. Most hydraulic units that you encounter will have the “old style” (discontinued) valve and therefore, you cannot replace the diaphragm rather, the entire valve will need to be replaced with a (new style) current production valve.