LAKOS®
FILTRATION SOLUTIONS

Installation and Operators Manual

Model: PROII, SST, and SST125
Media Filtration System

FRESNO, CALIFORNIA, USA

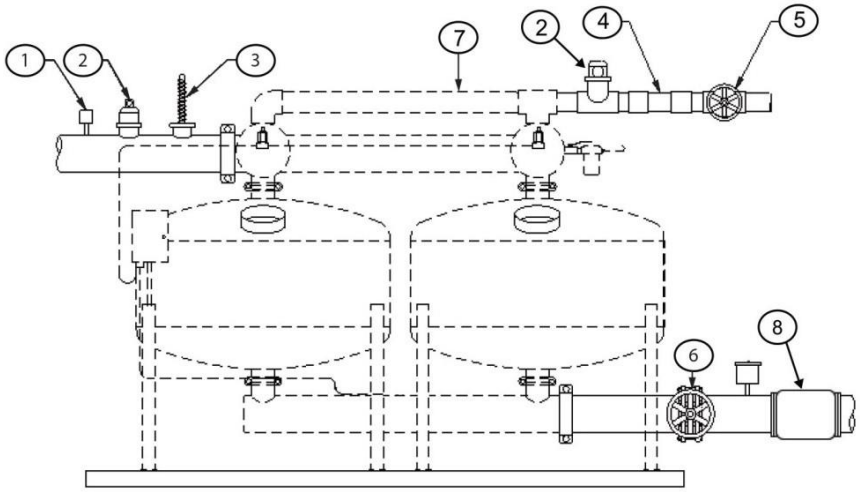
LS-906E (Rev. 2/20)

Before You Begin…

CAUTION: Water sources vary and may contain impurities that can adversely affect a filter system. Minerals, biological microbes and other impurities must be identified and addressed by each user on a case-by-case basis. Adhere to seasonal shutdown recommendations to minimize problems. Contact your irrigation system dealer for additional information and further recommendations.

CAUTION: It is common to inject chemicals and/or liquid fertilizers into a drip/micro irrigation system. Such injection is recommended after the filter system to minimize potential deterioration and/or damage to the filter tanks and/or other filter system components.

Recommended Accessories



The following items are **NOT INCLUDED** with your LAKOS PROII or SST Filter System. Consider your need, and use your judgement when adding to your system.

1. **High Pressure Shut-Off Switch** - Installed on inlet, pre-set at maximum operating pressure of the filter system.

2. **Air Vents** - A continuous air relief valve is recommended on the inlet and backwash manifolds at the highest points to bleed trapped air from the system.

3. **Pressure Relief Vents** - Quick acting relief valves are recommended in high pressure applications. These will protect the filter system from excess spikes in pressure or water hammer.

4. **Backwash Sight-Glass/View-Tube** - Provides visual verification that a backwash is in progress.

5. **Backwash Line Throttling Valve -** Helps ensure the proper flow is maintained. See Start-Up Procedures, pg. 11.

6. **Pressure Sustaining Valve** - Helps ensure adequate backflow during backwash. Restricts downstream flow to direct necessary flow/pressure for backwashing.

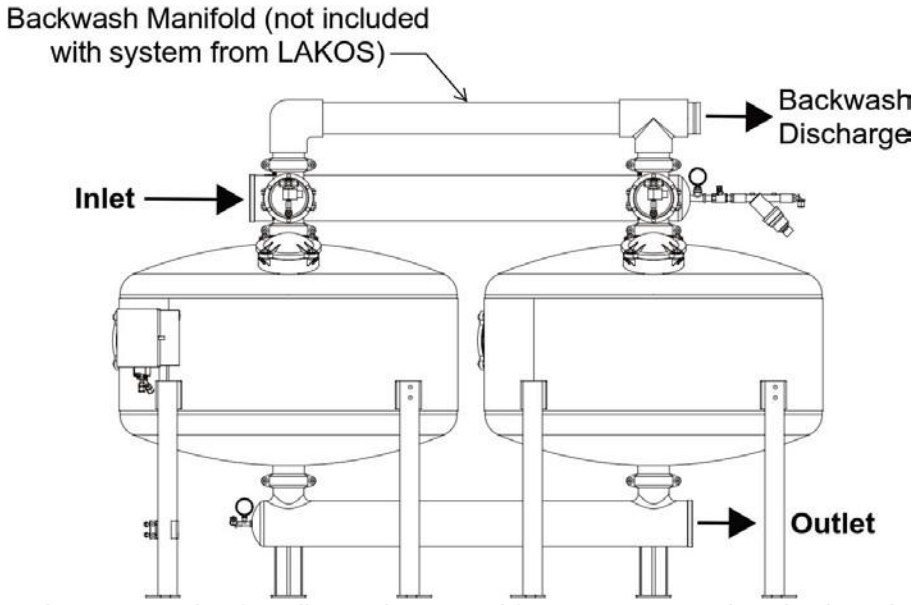
7. **Backwash Manifold** - Directs backwash flow to desired waste discharge. Typically made of PVC.

8. **Flow Meter** - Used to monitor flow rate of the system.

Introduction

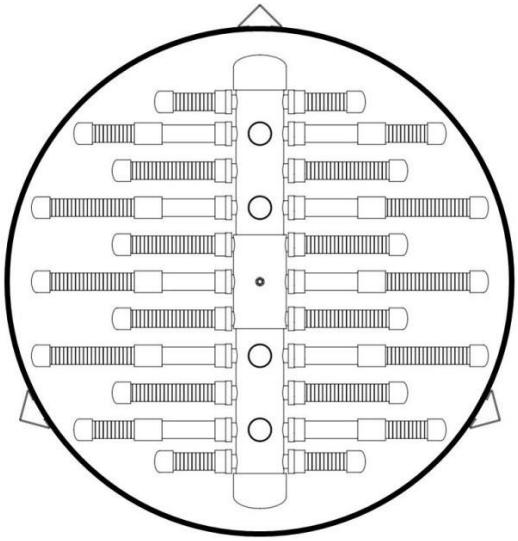
LAKOS systems are the industry standard for operating performance and efficiency. Please read this manual carefully to ensure the best performance possible for your system. This manual contains information regarding assembly, start-up, seasonal shut-down, maintenance and troubleshooting. Keep this document for future use and reference. Should you have any questions or concerns, contact your LAKOS representative for further assistance.

LAKOS Sand Media Filtration Systems are designed for use with drip/micro irrigation systems to keep unwanted particle matter out of the irrigation system. Media filtration is recommended when the contaminants are lightweight in nature, such as algae, organics, silt, etc. For heavy sand particles, which may not backwash during normal operation, consider a LAKOS centrifugal separator as a pre-filter to prevent excess accumulation of sand particles on the sand media (e.g. IHB Separator or BRS, to name two options).

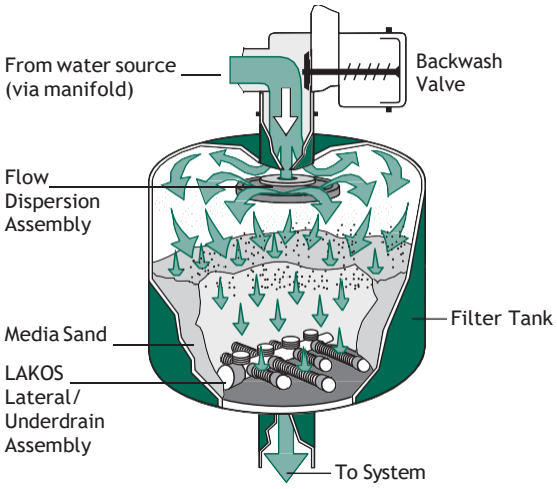


The exclusive LAKOS underdrain only requires one grade of media sand. No need for a coarse gravel pack, since the LAKOS underdrain is a full-coverage pattern. This enables backwash water to immediately flow upward from the underdrain to uniformly and completely flush the entire media bed depth and surface area.

LAKOS UNDERDRAIN

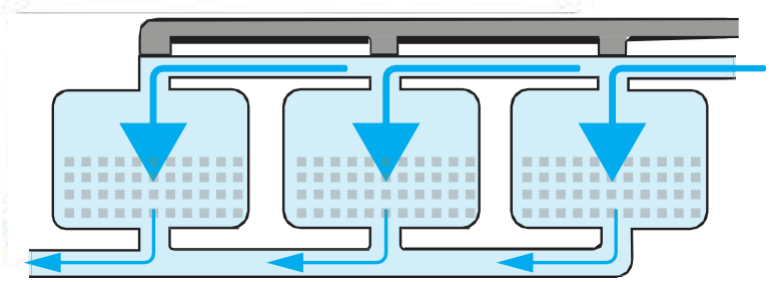


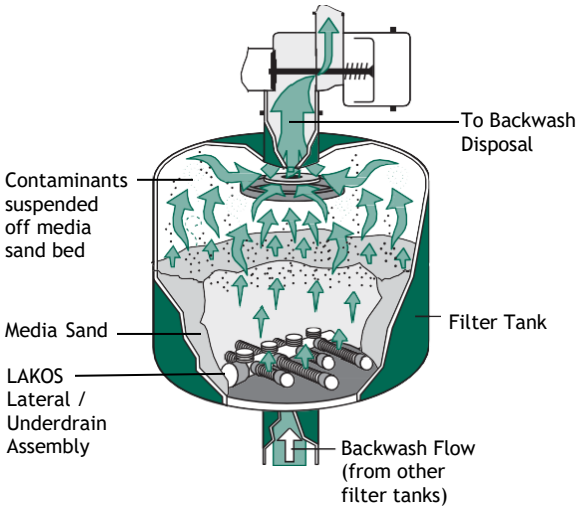
Basics of Operation



The Filtering Process

The filtering process engages the use of a specified sand media to trap foreign matter on the surface layer, allowing filtered water to percolate through the sand media and LAKOS internal v-slotted lateral assembly, discharging at the bottom of each tank to the outlet manifold.



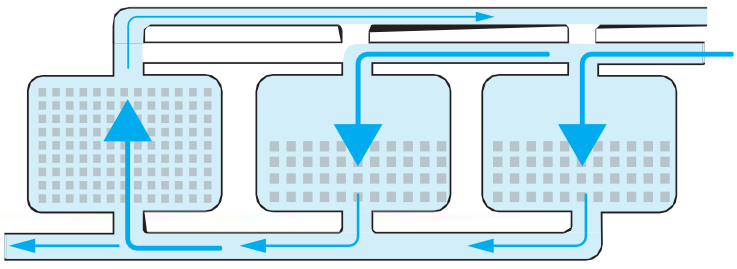


The Backwash Cycle

The backwash cycle flushes trapped debris from the sand media and out of the filter tanks. Each tank in a LAKOS System is flushed individually for maximum agitation of the sand media. Triggered by pressure differential, by elapsed time or manually, each tank's backwash valve is alternately activated into the backwash mode, which simultaneously interrupts inlet flow to that particular tank. Overall system pressure then directs partial system flow back into and through the tank's lateral assembly.

Flow continues for a prescribed period of time (typically one minute), suspending the foreign matter and carrying it out through the tank's top port (normal inlet) and out through the backwash valve and piping. The backwash valve then returns to its original position and restores the now "clean" filter tank to normal service.

NOTE: The LAKOS automatic controller provides a time delay between stations to avoid overlapping backwash cycles and maximize backwash efficiency.



PROII & SST General Specifications

Model	Flow Range*		System Manifold Inlet/Outlet Grooved Connections	System Filtration Area		System Media Sand Requirement	Minimum Backwash Line Size	Recommended Minimum Backwash Flow Rate Per Tank	
	U.S. gpm	m^3/hr	inches	ft^2	m^2		inches	U.S. gpm	m^3/hr
SST/SST125-1803-2	55-90	12-20	3	3.6	0.3	**See sand media table on page 13**	3	27	6
SST/SST125-2403-2	95-155	22-35	3	6.2	0.6		3	47	11
SST/SST125-3004-2	150-250	34-57	4	10.0	0.9		3	75	17
SST/SST125-3004-3	225-375	51-85	4	15.0	1.4		3	75	17
SST/SST125-3604-2	210-350	48-79	4	14.0	1.3		3	105	24
SST/SST125-3606-3	315-525	72-119	6	21.0	2.0		3	105	24
SST/SST125-3606-4	420-700	95-159	6	28.0	2.6		3	105	24
PROII-2104-2	75-120	17-27	4	4.8	0.4		3	36	8
PROII-2104-3	110-180	25-41	4	7.2	0.7		3	36	8
PROII-3204-2	165-270	37-61	4	10.8	1.0		3	81	18
PROII-3204-3	245-405	56-92	4	16.2	1.5		3	81	18
SST/PROII/SST125-4806-2	380-625	86-142	6	25.1	2.3		4	188	43
SST/PROII/SST125-4806-3	565-940	128-213	6	37.7	3.5		4	188	43
SST/PROII/SST125-4808-4	755-1255	171-285	8	50.2	4.7		4	188	43
SST/PROII/SST125-4810-5	945-1565	215-355	10	62.8	5.8		4	188	43
SST/PROII/SST125-4810-6	1130-1880	257-427	10	75.3	7.0		4	188	43
SST/PROII/SST125-4810-7	1320-2195	300-499	10	87.9	8.2		4	188	43
SST/PROII/SST125-4810-8	1510-2510	343-570	10	100.4	9.3		4	188	43
SST/PROII/SST125-4812-9	1695-2820	385-640	12	113.0	10.5		4	188	43
SST/PROII/SST125-4812-10	1885-3135	428-712	12	125.5	11.7		4	188	43
SST/PROII/SST125-4812-11	2075-3450	471-784	12	138.1	12.8		4	188	43
SST/PROII/SST125-4812-12	2260-3765	513-855	12	150.6	14.0		4	188	43

*All stated flow ranges are based on a filtration range of 15-25 gpm/ft^2 (37-61 m^3/hr/m^2). Select larger model if the water has an above-average quantity of particulate or organics. Recommended flows in manifolds to not exceed 7 ft/sec (2 m/sec).
NOTE: Minimum recommended operating pressure range for proper actuation of LAKOS Backwash Valve is 20 psi (1.4 bar).

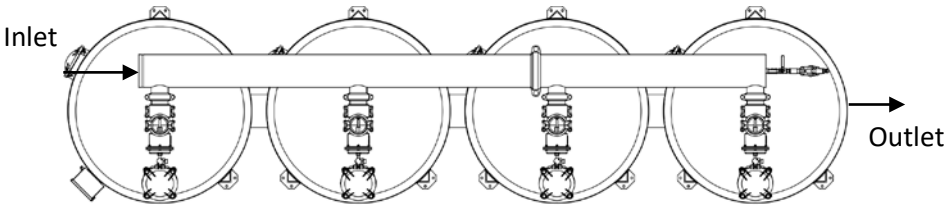
Explanation of Model Numbers: PRO-II-4810-6A/H

- Tank Type
- Tank Size
- Inlet/Outlet System Connection Size
- Number of Tanks in System
- Automatic (A) / Manual (M)
- System Configuration

System Configuration Illustrations

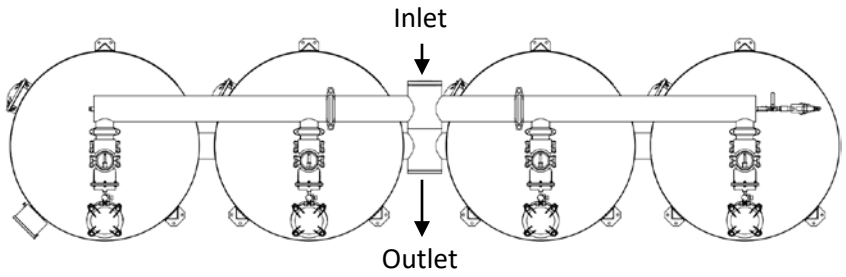
(Top-View Examples)

Inline or End Feed (I)



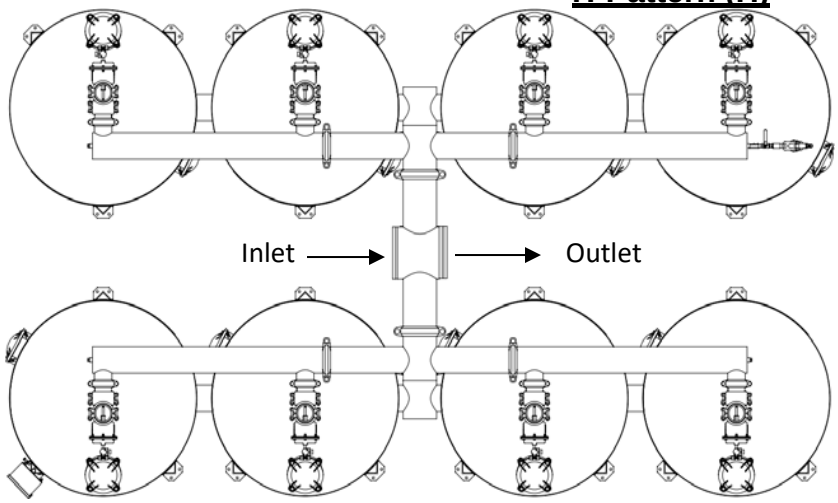
Inline / End Feed Footprint Dimensions				
	Overall Length		End-View Width	
Tank Qty.	in	cm	in	cm
18-inch SST Tanks				
2-Tank	45	114	23	58
21-inch PROII Tanks				
2-Tank	61.5	156	24.5	62
3-Tank	97.5	248	24.5	62
24-inch SST Tanks				
2-Tank	55.5	141	28.5	72
30-inch SST Tanks				
2-Tank	62.5	159	33	84
3-Tank	98.5	250	33	84
32-inch PROII Tanks				
2-Tank	70.5	179	35	89
3-Tank	106.5	271	35	89
36-inch SST Tanks				
2-Tank	77	196	39	99
3-Tank	116	295	39	99
4-Tank	155	394	39	99
48-inch SST and PROII Tanks				
2-Tank	101.5	258	51.5	131
3-Tank	153.5	390	51.5	131
4-Tank	205.5	522	51.5	131

Center Feed (C)



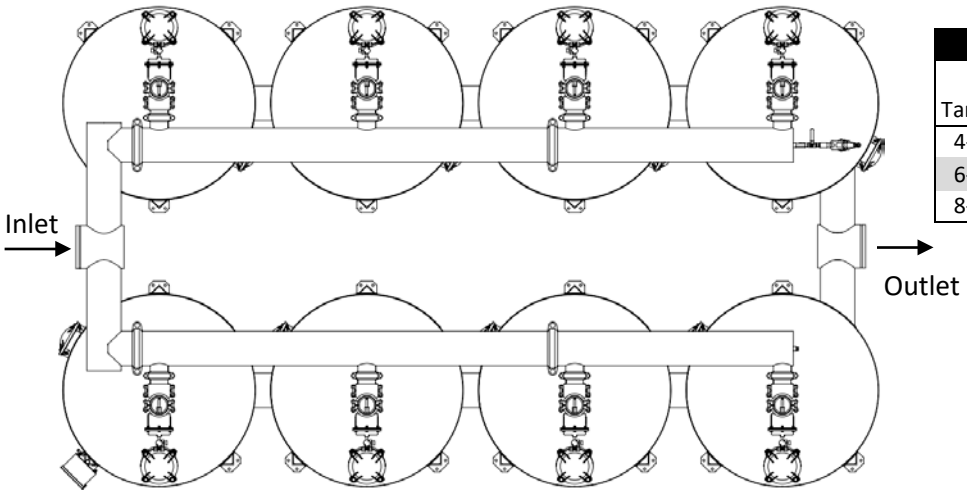
48" Center Feed Footprint Dimensions				
	Overall Length		End-View Width	
Tank Qty.	in	cm	in	cm
4-Tank	212.5	540	51.5	131
5-Tank	264.5	672	51.5	131
6-Tank	316.5	804	51.5	131
7-Tank	368.5	936	51.5	131
8-Tank	420.5	1068	51.5	131

H-Pattern (H)



48" H-Pattern Footprint Dimensions				
	Overall Length		End-View Width	
Tank Qty.	in	cm	in	cm
4-Tank	108.5	269	120	305
5-Tank	160.5	408	120	305
6-Tank	160.5	408	120	305
7-Tank	212.5	540	120	305
8-Tank	212.5	540	120	305
9-Tank	264.5	672	120	305
10-Tank	264.5	672	120	305
11-Tank	316.5	804	120	305
12-Tank	316.5	804	120	305

Box-Pattern (BOX)

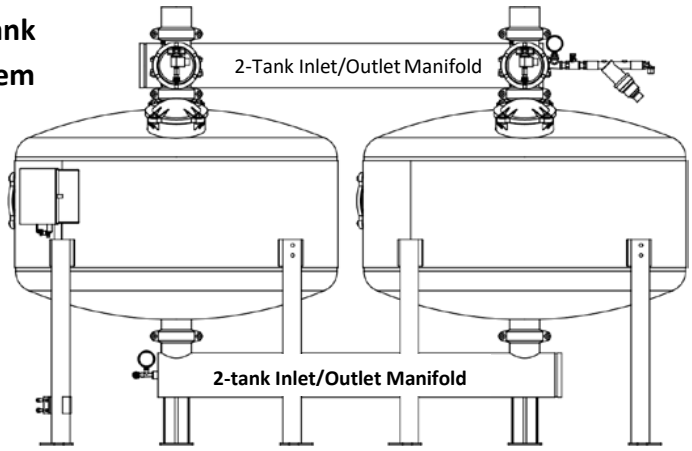


48" BOX-Pattern Footprint Dimensions				
	Overall Length		End-View Width	
Tank Qty.	in	cm	in	cm
4-Tank	101.5	258	120	305
6-Tank	153.5	390	120	305
8-Tank	205.5	522	120	305

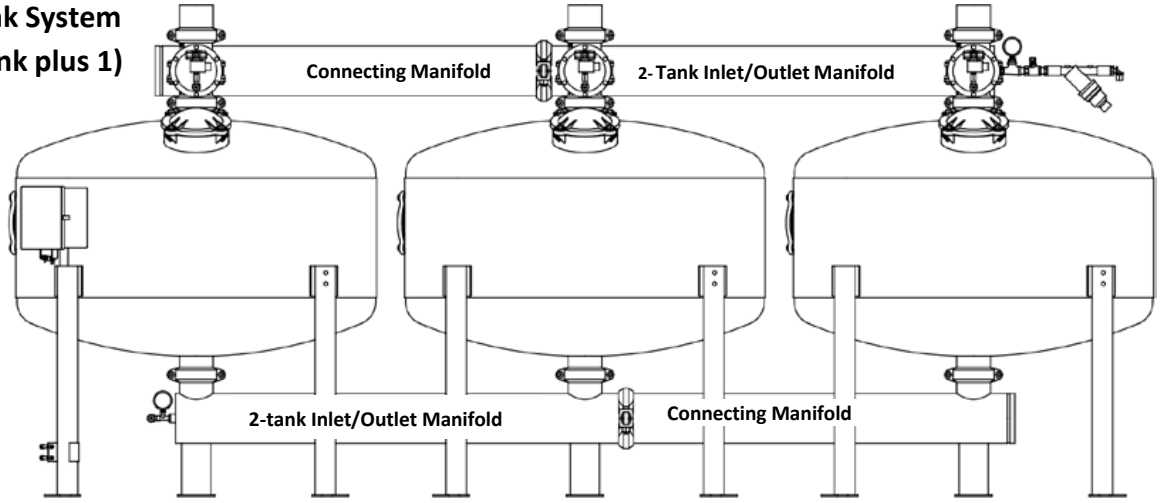
Add-On/Connecting Manifolds

When expanding on an existing system in order to handle higher flow rates, add-on or connecting manifolds will be necessary. If the flow rate is increasing significantly, larger diameter piping for the entire system may be required instead of just adding a connecting manifold of the same diameter. Use proper pipe-sizing judgement.

2-Tank System



3-Tank System (2-Tank plus 1)



DuroBlack PE Manifolds

For systems up to 4-Tank Inline, cross-linked polyethylene (XLPE) manifolds are available options as alternatives to the standard stainless steel manifolds. They are lightweight while being impact and chemical corrosion resistant.

Materials of Construction & Maximum Pressure Rating

Filter Tanks

- **PROII:** A36 carbon steel. Polyester powder coated inside and outside. Polyester powder coated steel bolt-on top and side inspection ports. PVC plastic plug for clean-out port.
  - 48" – 4mm dome thickness and 3mm wall thickness; 21" to 32" – 3mm dome/sidewall thickness
  - **PROII - 48" tank rated to 80psi; 32" Tank rated to 125psi; 21" Tank rated to 150psi**
- **SST:** 304L stainless steel. Polyester powder coated steel bolt-on top inspection port. PVC plastic plug for clean-out port.
  - 30" to 48" – 10 gauge dome thickness and 14 gauge sidewall thickness
  - 18" to 24" – 14 gauge dome/sidewall thickness
  - **SST - 48" Tank rated to 80psi; 18" to 36" Tanks rated to 100psi**
- **SST125:** 304L stainless steel. Polyester powder coated steel bolt-on top inspection port. PVC plastic plug for clean-out port.
  - 18" to 48" – 3.5mm dome thickness and 14 gauge sidewall thickness
  - **SST125 - Tanks 18" to 48" rated to 125psi**

Manifolds: 304L stainless steel available for all configurations. DuroBlack PE manifolds are available for select tank sizes in configurations up to 4-tank inline systems. Grooved couplings are ductile steel.

Backwash Valves: Cast ductile steel body with polyester powder coated internal/external surfaces. Rear-entry feature included for inspection/replacement of plunger diaphragm. Stainless steel shaft & guide bushing (3-inch valve: PVC guide bushing). Stainless steel disc with vulcanized rubber backing is used to seal the backwash port.

Controller: Alex-Tronix F or FM series controller available. Refer to Alex Tronix for Materials of Construction.

LAKOS Underdrain

- **SST 18" to 36" Tanks:** Material is schedule 40 PVC, with plastic wedge wire screen material as the open area component.
- **SST 48", SST125 48", and PROII 21" to 48" Tanks:** Material is schedule 40 uPVC, with injection molded PVC slotted screen as the open area component.

Open slotting of the underdrain is internally v-slotted (narrow on the exterior surface, wider on the interior surface) providing a nozzle effect to more effectively introduce water into the tank during backwashes. Open slot size for the wedge wire screen is 0.010 inches. Open slot size for the injection molded screen is 0.012 inches in the slotted screen. Overall, the open area of the LAKOS underdrain is approximately four times greater than the inlet/outlet size of the filter tank, providing negligible pressure loss through the filter (without sand).

Media Sand Options

When sand is added to the filter tanks, clean sand operating pressure losses of 1-2 psi is to be expected (assuming media sand sizes of #12, #16, and #20 crushed silica). Required media sand is not included with standard systems, but is available from LAKOS. Only one grade of sand media is necessary with any LAKOS system -- no coarse gravel base layer is required. The following sand grades are typically chosen for drip/micro irrigation purposes:

Sand Media Grade	Sand Media Size Range	Typical Filtration Capacity (@15-25 gpm/ft2)*
#12 Crushed Silica	12-16 mesh; 1680-1190 micron	130-140 mesh; 110 micron
#16 Crushed Silica	16-40 mesh; 1190-420 micron	150-200 mesh; 100-80 micron
#20 Crushed Silica	20-50 mesh; 841-297 micron	200-250 mesh; 80-60 micron
**Actual filtration achieved will depend upon the flow rate through the sand media tanks. Lower flow rates provide better filtration.*		

NOTE: LAKOS does not recommend using sand finer than #20 crushed silica, or else the sand media will pass through the underdrain slots.

Site Preparations

A level concrete pad is recommended for placement of the LAKOS SST or PROII Systems. Position the pad and the filter system for the most efficient placement of piping from the pump to the irrigation system and the backwash line. Minimize the number of elbows and changes in elevation to and from the filter system. All electrical work and components should meet all applicable codes. Protect all wires and electrical components from moisture.

Pre-Installation Checklist

☐ Inventory that all parts are included with the system. See Page 2 for Recommended Accessories.

☐ Check inside each filter tank to be sure no foreign objects or debris are present in the tanks. Verify that the underdrain is in place securely with no damage. Be sure the lower-dome clean-out port is securely tightened.

☐ Check all grooved-end connections for any damage that could hinder proper assembly.

Assembling The Components

For both **Automatic** and **Manual** systems, complete the following steps during the setup process:

1. Inspect all kits for completeness
2. Space tanks to line up with manifold connections
3. Connect the outlet manifold to the bottom of the tanks using the grooved couplings with proper lubricant
4. Connect the backwash valves to the tanks using the grooved couplings with proper lubricant
5. Connect the inlet manifold to the backwash valves using the grooved couplings with proper lubricant
6. If there are more than 3 tanks inline, add-on or connecting manifolds will be necessary
7. Install the water uptake kit, pressure gauges, and backwash solenoid/3-way ball valve kits with interconnecting polyethylene tubing
8. Install the recommended accessories mentioned on page 2

For **Automatic** systems only:

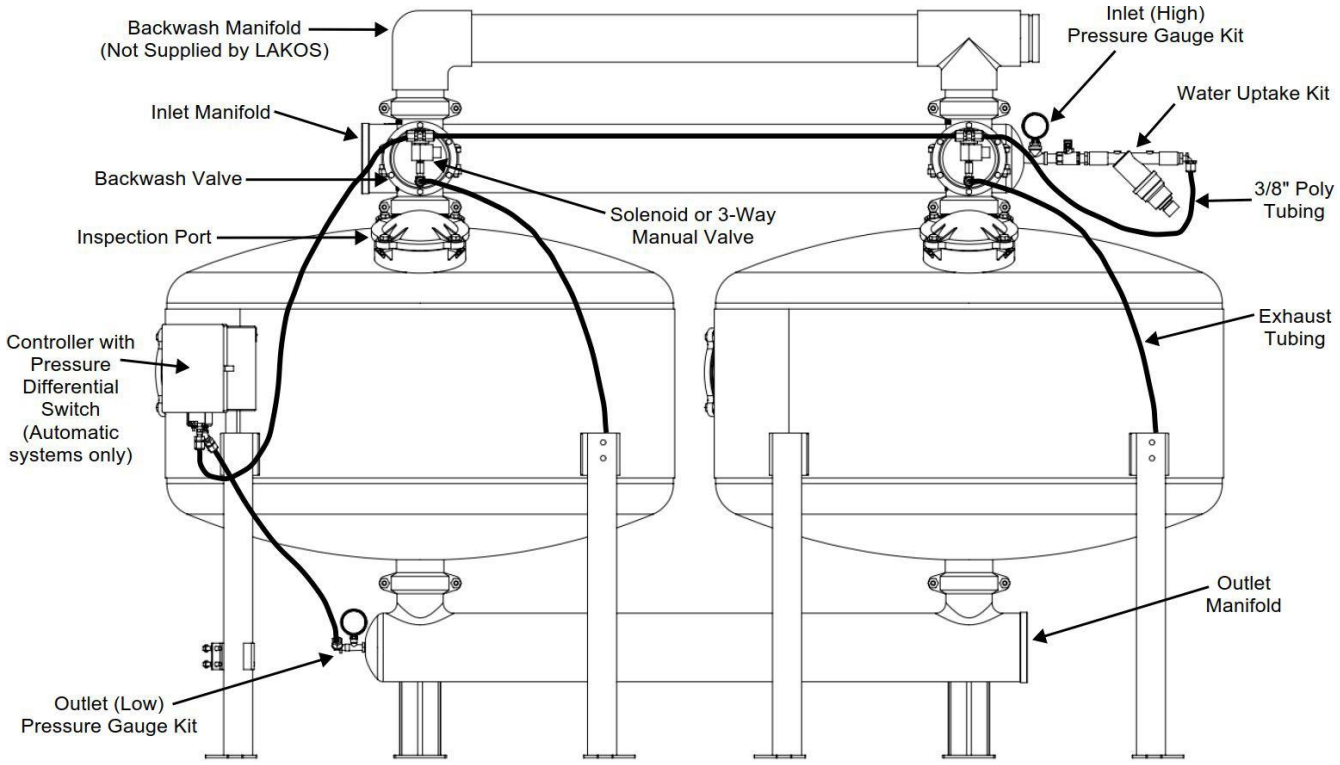
9. Mount the control box
10. Mount the backwash solenoid valves to the backwash valves
    - Port 1 – High pressure supply
    - Port 2 – Backwash valve connection
    - Port 3 – Exhaust
11. Wire the backwash solenoid valves to the control box
    - When using an Alex-Tronix controller, refer to the Alex-Tronix wiring diagram (included in box)
12. Plumb the high and low pressure tubing to the differential pressure switch in the control box
13. Plug any conduit holes on the control box that are not used to prevent moisture damage
14. Wire power source to the control box

NOTE: BACKWASH LINE IS NOT PROVIDED BY LAKOS.

IMPORTANT: The common practice of injecting fertilizers or chemicals should be piped into the system line *downstream of the filter system*. Some chemicals can be aggressive and harm or compromise the components of your filter system, reducing the life of your filter system. Using the top access port, add the proper volume of media sand to each tank. It is recommended that media sand be added slowly and with some water in the tank to better insure that the sand properly beds both below and around the underdrain. Proper volume of sand will fill each tank to about 3” to 4” below the upper dome weld seam. See page 13 under “Start-Up Procedures” for amount of sand required.

Complete LAKOS Media Filter System

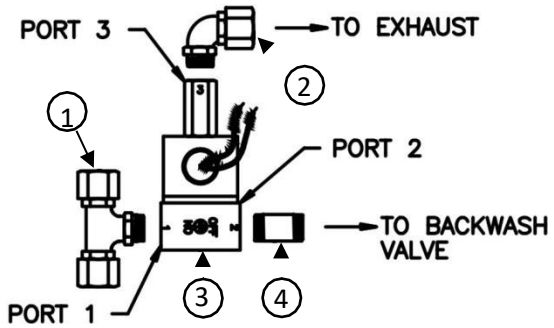
(Before Installation of Recommended Accessories)



**Wiring from controller to solenoids not shown*

AUTOMATIC SYSTEM

Parker Solenoid Valve Kit



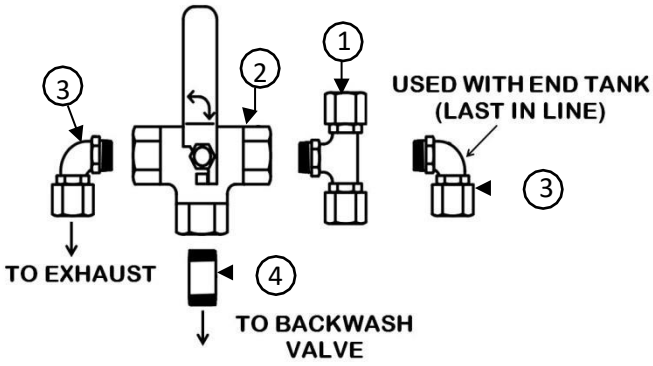
ITEM	DESCRIPTION	QTY	12V DC PART #	12V DCL* PART #	24V AC** PART #
1	TEE, 1/4" x 3/8", POLY	1	107914	107914	107914
2	ELBOW, 1/4" x 3/8", POLY	1	111063	111063	111063
3	VALVE, SOLENOID	1	108131	101823	101671
4	NIPPLE, 1/4" STD x 1-1/2", SS	1	106600	106600	106600
AUTOMATIC SOLENOID VALVE KIT PART #			106434	112105	101944

* Used with solar panel applications

** Compatible only with Alex-Tronix controllers

MANUAL SYSTEM

3-Way Ball Valve Kit

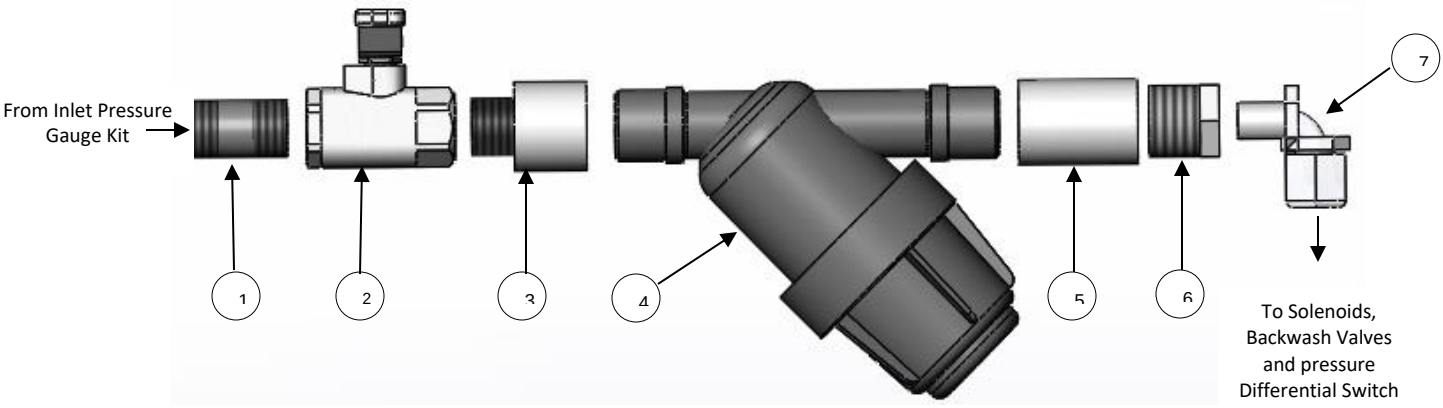


ITEM	DESCRIPTION	QTY	PART #
1	TEE, 1/4" x 3/8", POLY	1	107914
2	VALVE, BALL, 1/4" 3-WAY, BRASS	1	108031
3	ELBOW, 1/4" x 3/8", POLY	1	111063
4	NIPPLE, 1/4" STD x 1-1/2", SS	1	106600
MANUAL VALVE KIT PART #			106438

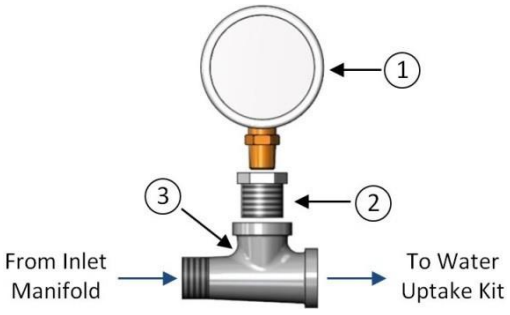
Master Media Kit

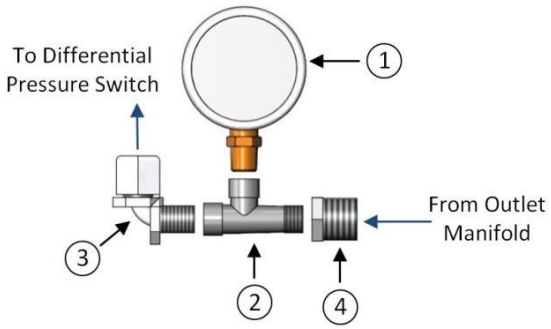
Includes: Water Uptake Kit, Inlet/Outlet Pressure Gauge Kits, and Pressure Differential Adapter Kit

Part # 128409



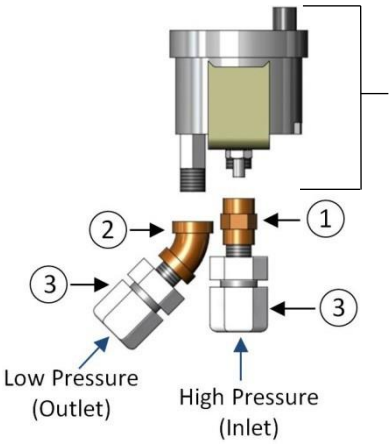
ITEM	DESCRIPTION	QTY	PART #
1	NIPPLE, NPT, 1/2 STD x 1-1/2 TBE , A-53 GR B ERW GALV	1	106608
2	VALVE, 1/2 150# FPT FULLPORT , BRASS	1	108032
3	ADAPTER, MNPT x FNPT, 1/2 x 3/4 S/40 446-074 , PVC TYPE 1 ASTM D 1785	1	115649
4	FILTER, Y-STRAINER, 3/4 120 MESH 150PSI ACETAL , AMIAD	1	191050
5	COUPLING, NPT FULL, 3/4 S/40 430-007 , PVC TYPE 1 ASTM D 1785	1	123246
6	BUSHING, REDUCER NPT, 3/4 x 1/4 S/40 439-098 , PVC TYPE 1 ASTM D 1785	1	119434
7	ELBOW, TUBE x MPT, 3/8 x 1/4 (P6ME4) , POLYPROPYLENE BLACK	1	111063
WATER UPTAKE KIT PART #			**123247**





ITEM	DESCRIPTION	QTY	PART #
1	PRESSURE GAUGE, 0-100ps i	1	106262
2	BUSHING, REDUCER NPT, 1/2" x 1/4" S/40 PVC	1	105556
3	TEE, STREET NPT, 1/2", GALVANIZED STEEL	1	115216
INLET PRESSURE GAUGE KIT (MANUAL/AUTO) PART #			**103311**

ITEM	DESCRIPTION	QTY	PART #
1	PRESSURE GAUGE, 0-100ps i	1	106262
2	TEE, STREET NPT, 1/4", GALVANIZED STEEL	1	117582
3	ELBOW, 90°, 3/8" x 1/4", TUBE x MPT POLY	1	111063
4	BUSHING, REDUCER NPT, 1/2" x 1/4" S/40 PVC	1	105556
OUTLET PRESSURE GAUGE KIT (AUTO) PART #			**128411**



ITEM	DESCRIPTION	QTY	PART #
1	COUPLING, 1/8" STD HEX, BRASS	1	108027
2	ELBOW, 1/8" 45°, BRASS	1	105882
3	CONNECTOR, 1/8" x 3/8", TUBE x MPT POLY	2	105024
PRESSURE DIFFERENTIAL ADAPTER KIT (AUTO) PART #			**103417**

Automatic Controller Configuration

For specific information and wiring diagrams, refer to the Alex-Tronix website to access your corresponding controller's I&O Manual when using an Alex-Tronix controller. https://www.alextronix.com/installation-and-owners-manuals

Follow all instructions for proper installation and set-up. Note that the following settings must be verified before operating the controller. Each of these settings can be found on the backside of the inner control panel.

Output Voltage - Match wiring configuration from controller with the type of solenoids being used. Do not mix the type of solenoids in your system. All solenoids must be the same type.

- 12V DC
- 12V DCL - Used with latching solenoids for solar or battery applications
- 24V AC

Number of Tanks in Operation - Attaching solenoid wiring to the terminal block signifies the number of tanks operating in the system.

Pre-Dwell Time - Duration of time between when the backwash cycle is initiated and the first tank begins flushing. This allows time for a master/control valve to be energized.

- Alex-Tronix Controller - Adjustable setting

Dwell Time - Duration of time between backwashing each tank in the system.

- Alex-Tronix Controller - Adjustable setting

Periodic Flush Time - Ensures that the filter system will experience a backwash cycle as set, regardless of the pressure differential. If the contaminant build-up on the filter media does not cause a backwash cycle before this setting, the periodic timer will initiate a full backwash cycle of all tanks. The recommended maximum periodic setting is 24 hours, but should be more frequent when dealing with a higher concentration of contaminants.

- Adjustable setting for both Alex-Tronix F and FM series controllers

Pressure Differential Switch (F) / Sensor (FM) - The automatic controller includes a pressure differential switch (located inside the control box of your F series controller) that must be set for proper operation. A SPD (Sensor Pressure Differnetial) is included with the FM series controller (excluding Fm-2DCL). This device measures the line pressure difference between the inlet and outlet manifolds on your media filter system. When the pre-set pressure differential is reached and sustained for 30 seconds, the Pressure Differentital switch will automatically initiate a full backwash cycle of all filter tanks, one tank at a time. Access this switch by opening the inner panel of the controller. Your LAKOS filter system operates effectively with a pressure differential setting of 6-7 psi. Other settings could result in excessive backwashing or inadequate backwashing, either wasting water or clogging your media sand with too much contaminant material.

NOTE: When pressure differential triggers a backwash sequence, the Periodic Flush Time (see above) is reset.

- Adjustable setting for both Alex-Tronix F and FM series controllers

Start-Up Procedures

1. Start the system pump or open the system valve that supplies water through the filter system. Allow time for water to fill the filter tanks and air to bleed out of the system. A minimum of 20 psi is required for system pressure in order to actuate backwash valves.

2. Media sand will require at least one initial backwash cycle (or more) before actual operation. Initiate the manual backwash of each filter tank, one tank at a time. To do so, turn the manual button on the automatic solenoid (or move the manual 3-way valve on the back of the backwash valve). Give the valve about 10-15 seconds to fully activate. The throttling valve on the backwash manifold (see Recommended Accessories, page 2) should be fully open at this time.

Sand Media Requirement Per Tank			
Model	Tank Diameter	lbs	kg
PROII	21	300	136
	32	700	318
	48	1300	590
SST	18	200	91
	24	350	159
	30	500	227
	36	900	408
	48	1300	590
SST125	18	200	91
	24	350	159
	30	500	227
	36	900	408
	48	1500	680

3. Once the flow through the backwash manifold becomes constant, the backwash water should be fairly dirty in appearance; this is especially true when starting-up a new system or new media sand has been added. At this time, slowly close the throttling valve to reduce backwash flow until only a trace of media sand is present in the backwash flow (about a small handful of media sand in the palm of your hand during a 2-minute backwash cycle is about right). Set the throttling valve to this position. Allow about two minutes for this initial backwash cycle. Manually adjust the solenoid (or move the 3-way valve for manual systems) to stop the backwash cycle for that filter tank.

NOTE: The manual adjustment for each solenoid should be OFF for normal automatic operation. ON is the manual override.

4. Initiate a backwash cycle for each of the remaining filter tanks in the filter system, as noted above. No need to adjust the throttling valve again. If backwash water is not running fairly clear after this initial backwashing, repeat the backwashing cycle for all filter tanks. It is not unusual to run through three or more backwash cycles to initially clean new media sand.

5. During this initial operation and backwashing cycling, inspect the filter system and connections for any leaks. Adjust the throttling valve only if the system flow or pressure changes. If inadequate backwash flow is observed, it may be necessary to install a valve on the system flow line downstream of the filter system to help divert the necessary flow to the backwash cycle. For an automatic system, this downstream valve will need to be adjusted electronically to coincide with each backwash cycle.

6. Check that air/pressure relief valves are correctly set and are operating properly.

Periodic/Mid-Season Maintenance

During an operating season, inspection should be performed regularly. How often you inspect and maintain your filter system will determine how long your filter system will last.

1. Shut off the system pump and disconnect power to the automatic controller. Open the upper inspection ports of each filter tank and inspect media sand for quantity and quality. Loss of sand suggests excessive backwashing or damaged underdrain system. The presence of contaminants or slime suggests inadequate backwashing. Refer to Start-Up Procedures, above, for backwash adjustments. Broken or damaged underdrain components will pass sand downstream. An inline strainer downstream of the system outlet will verify sand being discharged.

2. Via the automatic controller, initiate a manual backwash cycle. Each filter tank should backwash as programmed. Note the dwell time and backwash duration.

3. Inspect all tubing & componentry for proper connections and any damage.

4. Check the spin-clean filter on the water uptake kit; clean internal screen if necessary.

5. Check the pressure gauges for expected readings.

6. Check that air/pressure relief valves are correctly set and are operating properly.

Seasonal Shutdown Procedures

LAKOS recommends that all SST, SST125 and PROII tanks be shut down when not in active use for long periods of time. To do this:

1. Perform a long and somewhat aggressive backwash cycle for all filter tanks in the system, backwashing each tank for at least two minutes and opening the backwash throttling valve a bit more than normal operation. **CAUTION**: If any chemicals are introduced to the irrigation system at shutdown, it should be downstream of the filter system. If upstream, flush clean water through the filter system before shutting down the filter system at season's end.

2. Stainless steel is susceptible to microbiological induced corrosion (MIC). In order to help prevent MIC from occurring, complete flushing and draining of all tanks should be done at the end of each irrigation season. Chemical treatment (i.e. chlorine) at the end of the season is recommended before draining the tanks. Remove the top lids to extract residual moisture, which facilitates MIC to occur along the heat-affected zones of welds in dormant tanks. Replace the top lids once the sand media bed has dried out. MIC is not covered in the manufacturer's warranty and will void any warranty still covered on the equipment.

3. Shut down the system pump and disconnect power to the automatic controller (if applicable). Open each tank and inspect for sand quantity and quality. If additional or new sand is needed, make note to add the necessary sand prior to start-up before next season.
   CAUTION: The presence of slime anywhere inside the tanks or excessive contaminants throughout the sand media suggests the need to replace all media sand. Remove all sand from the media tanks at this time, but do not introduce new sand until just prior to start-up for next season.

4. Drain the filter system completely of all water. It is best to open a coupling connection on outlet manifold of the filter system to ensure that all water is drained from the lowest point of the filter system.

5. All systems: Clean the y-strainer on the water uptake kit.

6. For optimum life expectancy, lubricate the internal shaft of each LAKOS backwash valve. Remove the solenoid (automatic systems only) or manual 3-way valve (manual systems only) from the back connection of the backwash valve body. Remove the system backwash line to gain access to the backwash outlet of the valves. Inject air into the back port of each backwash valve (about 20-25 psi) in order to push the internal shaft of the backwash valve into the backwashing position. This exposes the internal shaft to access via the backwash outlet. Maintain this position and apply lubricant onto the shaft. Release the air pressure and allow the lubricated shaft to recede into the body of the backwash valve, lubricating the internal o-rings. Re-attach the solenoids or 3-way valves and backwash line.

Backwash Valve Repair Procedure

Removing the Backwash Valve from the System:

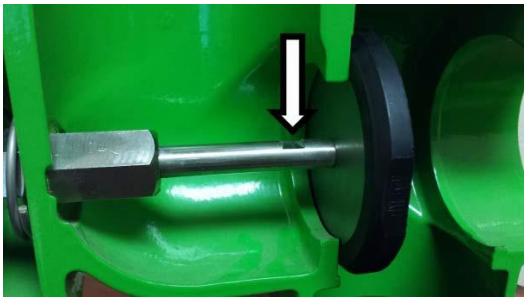
1. Begin by removing the back cover from the valve. This will eliminate the need to remove the solenoid, conduit & wiring.

2. Inspect the rubber diaphragm covering the piston. The “smooth and shiny” side of this diaphragm should be facing the back cover of the valve; the cloth-like rough surface should be wrapped around the piston. Check for tears, wear or any holes in this part. Replace if necessary.

3. Loosen and remove the three grooved couplings to release the valve body from the tank and inlet/backwash manifolds.

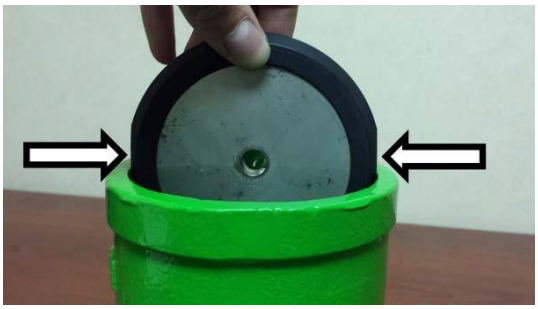
Inspecting and Replacing the Disc:

1. Locate (from the backwash opening of the valve body) the 3/8” machined portion of the backwash valve’s shaft. Secure that shaft with a wrench to prevent it from rotating.



2. Using a 9/16” socket wrench with extension, enter the valve body from the inlet opening and loosen the end nut.

3. Remove the disc via the valve’s outlet (to the filter tank). The disc will need to be oriented so that the flat sides are aligned with the sides of the outlet so that it will fit through this opening.



4. Inspect the rubber on the disc. If it is worn, torn or deformed, it should be replaced.

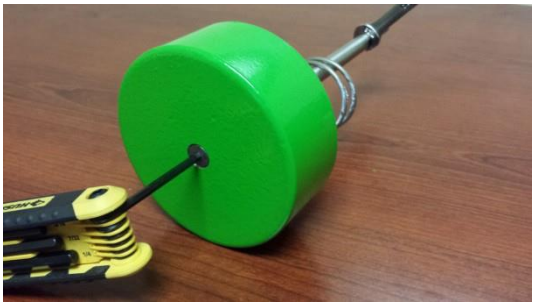
Removing the Shaft:

1. This procedure will likely damage the diaphragm. Be prepared to replace the diaphragm.

2. Grasp the piston and pull it straight out of the back of the valve body. The shaft will follow.

3. Inspect the piston for damage of the powder coating. If any nicks or scratches are noted, replace the piston to extend the life of the diaphragm.

4. To remove the shaft from the piston, first secure the center section of the shaft (where machined) with a 3/8” wrench to prevent rotation. Using a 5/32” Allen wrench, loosen and remove the pan-head screw located on the face of the piston.



5. Remove the spring. The spring should have a tension of approximately 60 to 70 foot-pounds of pressure. Normal life expectancy is 5 to 7 years. Replacement during maintenance may be more cost-effective than trying to over-extend the life of this part.

6. Remove the two O-rings on the shaft (these should be replaced whenever servicing the valve) and inspect the shaft for any rough surfaces. Replace if evident.

7. Wipe all re-usable components with a clean cloth.

Reassembling the Shaft:

1. Be sure that the shaft is clean and free of any debris in the groove. Carefully slide the O-ring onto the shaft and into the groove. Apply a small amount of petroleum jelly to lubricate the O-ring.

2. Attach the shaft to the piston, using a 5/32” Allen wrench.

3. Place the spring over the shaft, allowing it to rest on the inside of the piston.

4. Guide the threaded end of the shaft through the bushing, using extra care when the O-ring enters the bushing.

5. Clean the inside of the stainless steel bushing.

6. Test the movement of the shaft in the bushing. It should glide smoothly, not allowing the O-ring to slip out of its groove. If the O-ring does move, apply more petroleum jelly to the O-ring and shaft.

Reattaching the Disc:

1. Position the stainless steel insert and rubber guard plate against the flat surface inside the inlet of the valve body. Make sure to turn the disc to allow it to fit through the inlet’s opening.

2. Slide the shaft assembly from the backside of the valve body through the backwash outlet chamber and toward the backwash valve’s inlet. Attach the shaft to the disc by securing the shaft with a 3/8” wrench and tightening the lock nut onto the disc.

3. Apply pressure to the piston and again check the shaft for smooth travel through the bushing.

Reattaching the Diaphragm:

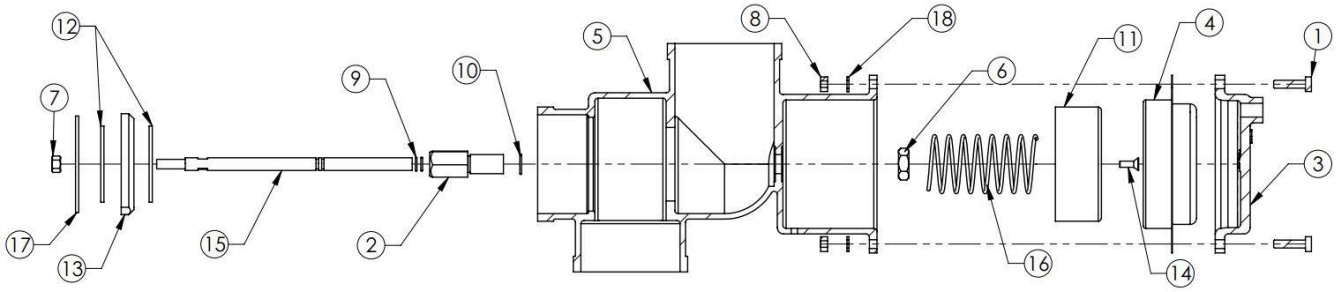
4. At this point, re-install the backwash valve onto the filter tank and manifolds, using the grooved-end couplings.

5. The diaphragm is marked to identify the “pressure side”, which should be the side facing the rear of the valve (exposed to the solenoid). Fold part of the diaphragm within itself and press it onto the piston. Avoid wrinkling or pinching the diaphragm between the piston and the valve body.

6. Align the holes on the lip of the diaphragm with the holes on the backwash valve body.

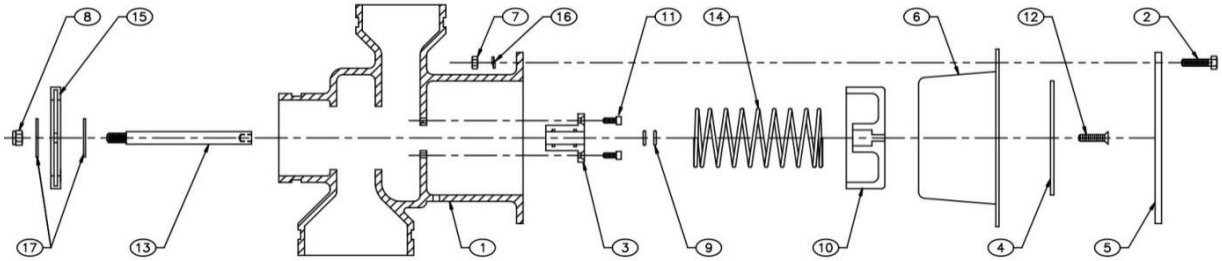
7. Place the backwash valve’s back cover into position, being careful to keep the lip of the diaphragm flat against the valve body (creating a gasket between the valve body and back cover). The solenoid should be in the top (12 o’clock) position.

8. Insert the bolts, slide on the lock-washers and secure the nuts to firmly re-attach the back cover to the backwash valve.



4" Backwash Valve - Part # 108030 (L-0801-B)

ITEM NO.	PART NO.	QTY	REPAIR KIT	DESCRIPTION
1	105383	6		BOLT, HEX 5/16 x 1-1/4", 316 SS
2	101108	1		BUSHING, GUIDE, 304 SS
3	105823	1		COVER WITH 1/4" TAP
4	105864	1	x	DIAPHRAGM, NEOPRENE
5	105370	1		BODY, CAST IRON, POWDER COAT GREEN
6	103300	1		NUT, JAM, 3/4", 316 SS
7	106791	1	x	NUT, HEX NYLOCK, 3/8", 316 SS
8	106769	6		NUT, HEX, 5/16", 316 SS
9	106823	2	x	O-RING, SHAFT, BUNA-N 70
10	138928	1		O-RING, BUSHING, BUNA-N 70
11	107170	1		PISTON
12	104820	2	x	DISC, PLUNGER BACKUP, 304L SS
13	108140	1	x	DISC, VULCANIZED, BLACK RUBBER SEAT
14	107399	1		SCREW, FLAT HEAD HEX SOCKET, 1/4" x 3/4"
15	107714	1	x	SHAFT, 302 SS
16	107800	1	x	SPRING
17	105361	1	x	DISC, PLUNGER, 304 SS
18	111169	6		WASHER, LOCK SPRING, 5/16"
Repair Kit	114558		x	KIT, REPAIR, L-0801-A TO L-0801-B



3" Backwash Valve - Part # 108029 (L-0500)

ITEM NO.	PART NO.	QTY	REPAIR KIT	DESCRIPTION
1	105369	1		BODY, CAST IRON, POWDER COAT GREEN
2	105377	8		BOLT, HEX, 1/4" x 1-1/2", 316 SS
3	105546	1	x	BUSHING, GUIDE, PVC
4	105361	1		DISC, PLUNGER, SS 304
5	105822	1		COVER WITH 1/4" TAP
6	105863	1	x	DIAPHRAGM, BUNA-N
7	106767	8		NUT, HEX, 1/4"
8	106791	1	x	NUT, HEX NYLOCK, 3/8", 316 SS
9	106825	2	x	O-RING, SHAFT, BUNA-N 70
10	107169	1		PISTON
11	107407	2		SCREW, FLAT HEAD HEX SOCKET, #10-32 x 3/4"
12	115808	1		SCREW, FLAT HEAD HEX SOCKET, 1/4"-20 x 1"
13	107712	1		SHAFT, 304 SS
14	107800	1	x	SPRING
15	108139	1	x	DISC, VULCANIZED, BLACK RUBBER SEAT
16	104018	8		WASHER, LOCK SPLIT, 1/4"
17	108149	1		WASHER, FLAT FENDER, 3/8" x 1-1/2"
Repair Kit	114562		x	KIT, REPAIR, L-0500

Troubleshooting

PROBLEM	POSSIBLE CAUSES	SOLUTIONS
Poor Filtration	**1.** Excessive flow through filters, causing "coning" of media sand and/or forcing contaminants through filter outlet. **2.** Air in tank(s) may cause disruption of the media sand bed. **3.** Incorrect media sand. **4.** Excessively high pressure differential before backwashing, which forces contaminants through filter bed. **5.** Insufficient volume of media in filter, which allows contaminants to pass through the system.	**1.** Reduce flow rate or add extra filter tank(s). See page 5 for flow recommendations. **2.** Bleed off trapped air in system. **3.** Replace with proper media sand. Consult your LAKOS representative. **4.** Backwash more often at lower differential pressure. **5.** Add proper sand media to tank(s) to specified level.
Consistently High Pressure Differential	**1.** Excessive contaminant load restricts flow through the filters and prevents sufficient flow for backwashing. **2.** Insufficient backwash flow. **3.** Inadequate media sand volume, which may minimize coverage of backwash flow across filter bed, creating dead spots of accumulated contaminants.	**1.** Drain tank(s) of water and remove handhole access ports. Carefully skim away any excess or caked contaminants from the media sand bed's surface. Return tank(s) to normal service and backwash system. **2.** Readjust backwash or partially close field valve. **3.** Follow step 1 and add sand media as necessary.
Automatic Backwash Fails to Cycle	**1.** Controller power may be off or circuit breaker tripped. **2.** Improper setting of differential switch. **3.** Solenoid(s) malfunctioning or incorrectly plumbed. **4.** Loss of sufficient pressure to actuate valve(s).	**1.** Be sure wiring is connected correctly. Reset circuit breaker. Turn on power. Controller may be faulty and need replacement. **2.** Adjust as necessary. Typical is 6-7 psi. **3.** Check connections, clean ports and check for the sound of the solenoid actuating. Replace solenoid if necessary. **4.** Check filter screen on water uptake kit and hydraulic lines for clogs or breaks/leaks. Replace as necessary.
Media Sand Appears Downstream	**1.** Incorrect media sand (i.e. too fine and too small). **2.** Broken, damaged, or missing underdrain lateral. **3.** Underdrain gasket failure	**1.** Replace media with proper sized media. **2.** Repair or replace laterals of the underdrain. **3.** Replace underdrain gasket
Backwash Valve Leaks	**1.** Obstruction in the valve seat. **2.** Rubber seating disc is worn or damaged. **3.** Diaphragm damaged (Leaking from bleed port hole located below the piston chamber).	**1.** Remove the obstruction. **2.** Replace seat disc. **3.** Replace diaphragm.
Water Hammer	**1.** Air in tanks. **2.** Long backwash line causing vacuum.	**1.** Bleed off trapped air in system. Air vent on system may be required. **2.** Install vacuum breaker on backwash line.

Installation Notes

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