



Installation
and Operation
Instruction
Manual

INSMAN101

Sand Media Filters

SM-200 // SM-300 // SM-350 // SM-400

IRRIGATION SYSTEMS | SAND MEDIA FILTERS

TABLE OF CONTENTS

Safety Guidelines	3
Installation Quick Start Overview	4
Yardney Sand Media Systems	5
SECTION I – INTRODUCTION	5
SECTION II – SYSTEM ASSEMBLY	6
SECTION III – FILTER MEDIA INSTALLATION	7
Yardney Sand Media Backwash Controls	9
SECTION I - AUTOMATIC SYSTEMS	9
STANDARD and HIGH-PRESSURE WATER-STACK LAYOUTS	10
WATER-STACK AND SYSTEM MANIFOLD CONFIGURATIONS	11
SECTION II - ELECTRICAL CONNECTIONS AND WIRING FOR AUTOMATIC SYSTEMS	13
12VDC/24VAC Continuous Solenoids	14
12VDC Latching Solenoids	15
SECTION III - SEMI-AUTOMATIC SYSTEMS	16
Sand Media System Start-Up	17
SECTION I – AUTOMATIC SYSTEMS WITH CONTINUOUS OR LATCHING SOLENOIDS	17
SECTION II – SEMI AUTOMATIC SYSTEMS with three-WAY BALL VALVES	18
Backwash Restrictor Valve Adjustment	19
SECTION I- SETTING THE RESTRICTOR VALVE	19
Recommended Backflush Flow Rates	20
Preventative Maintenance	21
SECTION I – PREVENTATIVE MAINTENANCE SCHEDULE	21
SECTION II - OPERATORS TROUBLESHOOTING GUIDE	22
POOR FILTRATION	22
CONSTANT HIGH PRESSURE-DIFFERENTIAL	22
SAND MEDIA APPEARS DOWNSTREAM	22
BACKWASH VALVE LEAKAGE CAUSE	23
AIR HAMMER	23
FREQUENCY OF BACKFLUSH INCREASING	23
AUTOMATIC BACKWASH FAILS TO CYCLE	23
FILTER UNDERDRAIN OBSTRUCTION OR BLOCKAGE	24
SECTION III - CHLORINE SHOCK TREATMENT FOR SAND MEDIA FILTERS	24

SAFETY GUIDELINES

Please read the entire manual before beginning any procedure.

ON-SITE HANDLING: Take care when offloading the filter equipment. A filter tank should only be lifted from under the tank or by strapping around the legs where they join the tank and lifting vertically. **NEVER LIFT A FILTER TANK BY THE VALVE!**

1. Only properly trained personnel should operate and service the equipment.
2. Always wear proper safety gear when servicing equipment.
3. Before installing the system, ensure that the system falls within the designed operating parameters.
4. Know the safe operating limits of the system and any equipment directly connected to or affected by it.
5. Be sure that the system is depressurized before performing maintenance, removing components, or opening the vessels.
6. Be sure to reexamine the system before putting it back into service.
7. Be sure to maintain all equipment and to continuously check the system for leaks or damage. Fixing problems as they occur can prolong the life of the system.

PROVISIONS FOR BACKWASH WATER DISCHARGE

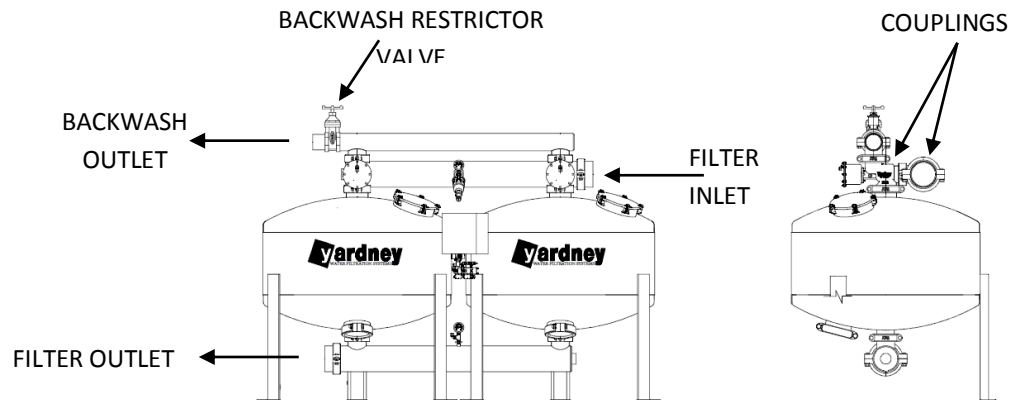
Provisions must be made to drain away, store or otherwise dispose of dirty backwash water. The amount of water required to backwash the filter bed is small compared to the amount filtered, but it discharges at a high rate for a short period. The backwash line should *not be connected* to a pressure line and must discharge to atmosphere after the backwash throttling valve. When returning backwash water to a reservoir, the discharge point must be as far from the pump intake as possible.

For proper backwash flow adjustment, the backwash water flow must discharge to atmosphere above the water, not underwater.

FILTER COUPLINGS

Grooved type couplings are standard for all piping supplied with the filters. These couplings mechanically lock the filters together, while allowing some line flexibility. The backwash discharge ports have grooved type couplings with slip PVC adapters to facilitate PVC backwash manifold installation. The backwash discharge line should be the same size pipe as the PVC adapter supplied on the unit. If the backwash discharge line is excessively long or runs on a downhill slope, install a vacuum breaker on the backwash line **after** the backwash flow restrictor valve.

NOTE: The installer or dealer supplies the backwash manifold and backwash restrictor valve. (See Figure 1 below.)



(FIGURE 1: SAND MEDIA SYSTEM BASICS)

INSTALLATION QUICK START OVERVIEW

1. Place filter tanks on firm, level ground with two legs facing front, and one towards the rear. Position the filters on centers of tank diameter +4 inches.
2. Install the outlet manifold. **Only partially** tighten the couplings.
3. Install the backwash valves with actuators to the front. Then install inlet manifold.
4. Install the backwash discharge manifold and the backwash throttling valve. These are **installer or dealer** supplied items.
5. Tighten all loose couplings on the filter system.
6. Next, load the media bed. Begin by washing the gravel. If filling tanks from the top, fill with clean water till above the underdrain to cushion the gravel as it falls to avoid damaging the underdrain. Add filtration media to levels indicated on tanks.
7. Install the water-stack assembly on the inlet manifold.
8. Poly tube the low-pressure outlet on the discharge manifold to the low-pressure port on the three-way valve on the water-stack.
9. Next, install the solenoid valves on the automatic valve actuator:
 - **12VDC/24AC Continuous Solenoids:** Connect Port #1 to valve actuator port and connect Port #2 to water supply from water-stack. The arrow on the bottom of the solenoid valve should point toward the backwash valve. Poly tube remaining ports to drain.
 - **12VDC Latching Solenoids:** Connect port #2 to valve actuator port. Connect Port #1 to water supply from the water-stack. Poly tube remaining ports to drain.
 - **Semi-Automatic Systems:** See Installation of Backwash Controls, Section II, step 13.

10. Install control box stand and mount controller.
11. Install PD switch onto the controller and set the set-point to 13 PSID. Then tube the PD high and low ports to the water-stack.
12. Next, wire the solenoids and pressure-differential switch into the controller—lead wires are red; common wires are black.
13. Gradually introduce water to the system. Once the system is pressurized, conduct a manual backwash to purge air from the system. Open the backwash throttling valve to about 25% or until a slight amount of media is visible in the backwash stream. Slightly close the valve until only trace amounts of media are detectable.
14. Set the delay time on the controller by timing how long it takes the valve to go from the backwash position to the filter position. Set the delay time to the next available interval shorter than the valve travel time.
15. Set the backwash frequency by monitoring the time it takes the system to build a pressure-differential of 8 PSI higher than the clean system pressure-differential. Set the periodic flush to this time or the next shorter interval. The "time" function is the primary backwash control function.
16. Set the backwash duration after the initial clean up. Set the duration for the time it takes clear water to discharge from the backwash line or a minimum of 90 seconds.

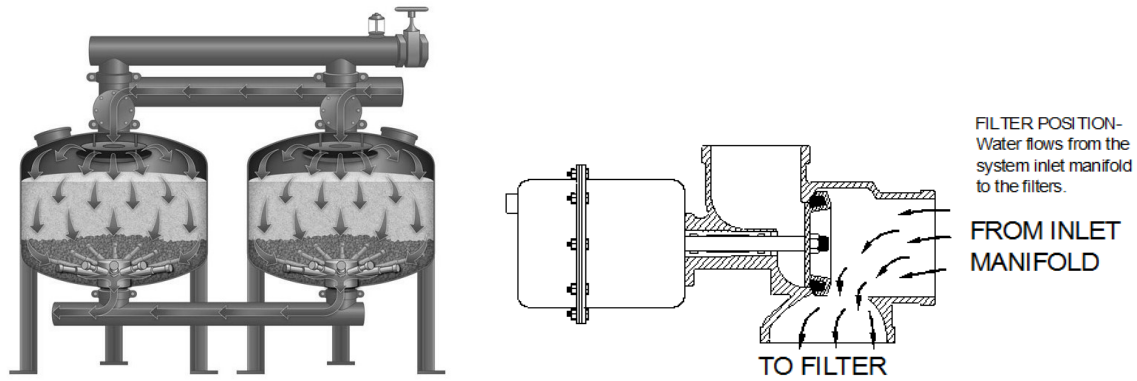
Quick set up is now complete. Refer to the complete manual for more detailed instructions and a troubleshooting guide.

YARDNEY SAND MEDIA SYSTEMS

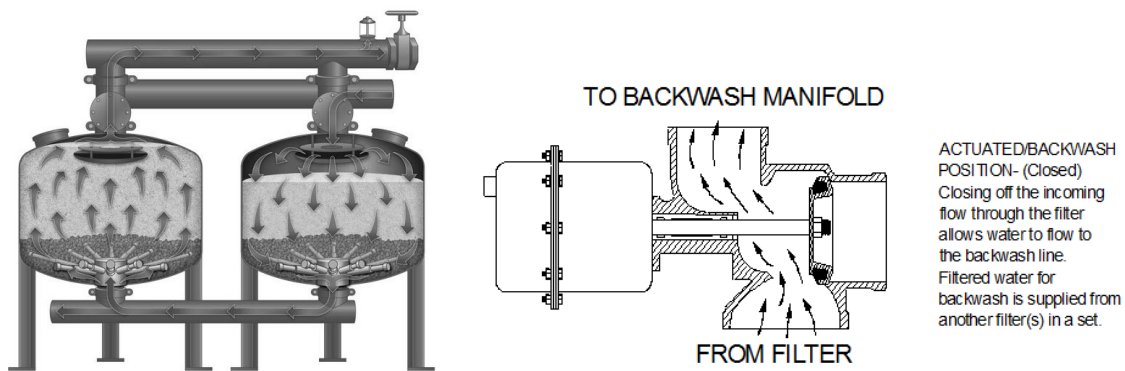
SECTION I – INTRODUCTION

The Yardney **Sand Media Filtration Systems** are designed to remove suspended solids from water efficiently and economically. Water flows, under pressure, through the inlet port of the three-way valve, into the filter vessel and through the deflector assembly and distributes over the filter media bed. The filter media removes suspended solids, and the clean water passes through the underdrain to the vessel outlet. The minimum suggested operating pressure of the filter system is 30 PSI.

Filtration mode continues until sufficient solids are collected to create a 10-pound pressure-drop across the filter bed, triggering the filters to automatically backwash. During the backwash mode, the three-way valve changes flow direction, shutting off the inlet water to the backwashing filter. Clean filtered water from the remaining filter(s) is then processed in the opposite flow direction creating the backwash condition. The water flows in the upward direction, lifting and expanding the media, to release the collected contaminants. The contaminants are then carried away with this backwash water.



(FIGURE 2: AUTOMATIC VALVE - FILTER POSITION)



(FIGURE 3: AUTOMATIC VALVE - BACKWASH POSITION)

SECTION II – SYSTEM ASSEMBLY

1. **Position the tanks** on a concrete pad with two legs facing front, and one towards the rear. Position tanks on centers of tank diameter +4 inches. Once the tanks have been placed and aligned, connect the **outlet manifold**. Locate the corresponding grooved coupling that matches the outlet spud size and remove the gasket. Lubricate the coupling gasket with soapy water and slide the gasket onto the outlet connection on the filters. Lift the outlet manifold into position so that the tank and manifold connections are touching. Use a floor jack or blocks to help hold the manifold in place. Slide the gasket down until it is in the center of the two grooves. Install the grooved coupling and bolts; tighten partially (enough to keep manifold in place). Using the above procedure, install the remaining couplings for each tank. **DO NOT** fully tighten couplings. Final tightening is in a later step.

2. **Install the backwash valve** on each tank using the corresponding grooved couplings. Remove the gasket from the coupling, apply the soapy water, and slide the gasket onto the tank inlet connection. Locate the backwash valve and place on the top connection and slide the gasket into the middle of the two grooves. Install the grooved coupling and bolts, and tighten partially. The automatic actuator or manual operator must face the front of the filter. Repeat the above steps for each tank.
3. **Install the inlet manifold** to the backwash valves using the corresponding grooved couplings. Using soapy water, slide the gaskets onto the inlet manifold. Move the manifold into position so that the valve and manifold connections are touching. Slide the gasket down until it is in the center of the two grooves. Install the grooved coupling and bolts, and tighten partially (enough to keep manifold in place). Using the above procedure, install the remaining couplings for each tank then check the alignment of the manifolds and valves.
4. **Install the backwash manifold** using the corresponding grooved couplings. PVC grooved adapters are provided with the system; however, the backwash manifold is installer/dealer provided. Using soapy water, slide the gaskets onto the PVC backwash manifold. Move the manifold into position so that the valve and manifold connections are touching. Slide the gasket down until it is in the center of the two grooves. Install the grooved coupling and bolts, and tighten partially (enough to keep manifold in place). Using the above procedure, install the remaining couplings for each tank then check the alignment of the manifolds and valves. Install a backwash restrictor valve within five feet of the last backwash valve for proper system operation.
5. **Tighten all grooved couplings** on the system alternately until the coupling faces are touching.
6. **Connect the incoming water supply** to the top inlet manifold.
7. **Connect the bottom outlet manifold** to the field side of the irrigation system.

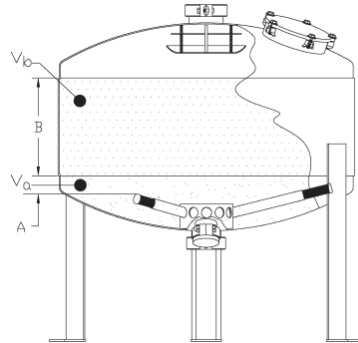
NOTE: The backwash restrictor valve is essential for the correct operation of a sand media filter. Any gate, globe or butterfly valve is satisfactory if, after adjustment, the valve stem can be locked in place to protect against accidental or inadvertent adjustment.

SECTION III – FILTER MEDIA INSTALLATION

Yardney Sand Media Filters require the use of a gravel pack for optimum performance. Before filling with media, inspect the inside of the filters for any foreign material, and remove if necessary. The amount of **1/2" to 3/4" crushed rock** and filtration media required to fill each filter is listed in Table 1 below:

1. The gravel pack must be thoroughly washed to remove dirt and other foreign material that could plug the filter underdrain. The crushed rock must cover the wedgewire underdrain by two inches.
2. Remove the manway cover and pour in the recommended amount of gravel. When filling tanks from the top, first fill tanks with water to just above laterals to cushion the crushed rock as it falls and avoid damaging the underdrain.
3. Add filtration media to levels indicated on tanks.

4. Clean and replace the manway lid. Tighten bolts following the diagram on the lid. **DO NOT OVERTIGHTEN.** Do not exceed 25 ft-lbs of torque as overtightening can cut the gasket. **NEVER TIGHTEN OR LOOSEN MANWAY BOLTS WHEN TANK IS UNDER PRESSURE!**



Recommended gravel pack and media fill levels

Model	1/2" to 3/4" Rock		Quantity of Bags (7/8 cu. ft. / bag)	Media		Quantity of Bags (1 cu. ft. / bag)
	A	Va (cu. ft.)		B	Vb (cu. ft.)	
1416	2.0"	0.5	0.5	13.0"	1.0	1
1816	2.0"	1.0	1	13.0"	2.0	2
2416	2.0"	1.5	1.5	13.0"	3.5	4
3016	2.0"	2.5	3	13.0"	5.5	6
3616	2.0"	3.5	4	13.0"	7.5	8
4816	2.0"	7.0	8	13.0"	13.0	13

(TABLE 1: MEDIA FILL LEVELS)

* 1 CUBIC FOOT PER BAG, EACH BAG WEIGHS 100 LBS

YARDNEY SAND MEDIA BACKWASH CONTROLS

Filter systems include either automatic or semi-automatic backwash controls. The procedure listed below should be followed to assure the correct installation of the automatic backwash controls. **See Section III** for systems with **semi-automatic** controls.

NOTE: Use pipe sealant on all threaded connections. Some fittings may include a factory applied sealant. Apply additional sealant to these connections as well.

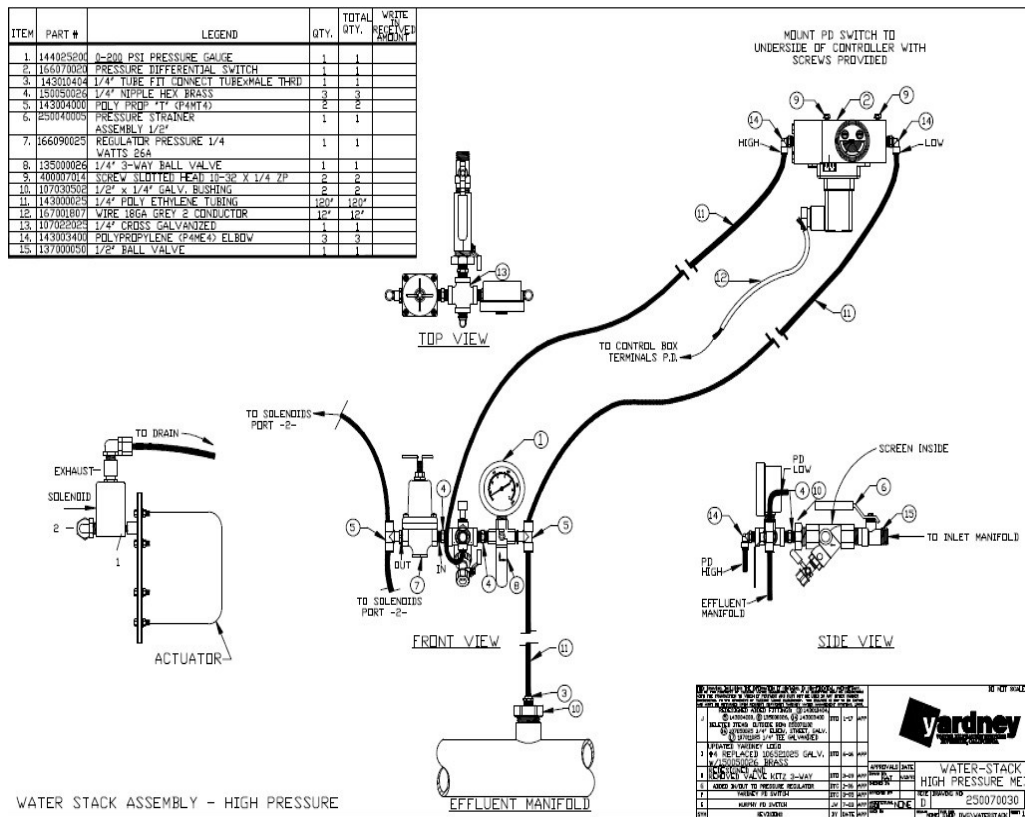
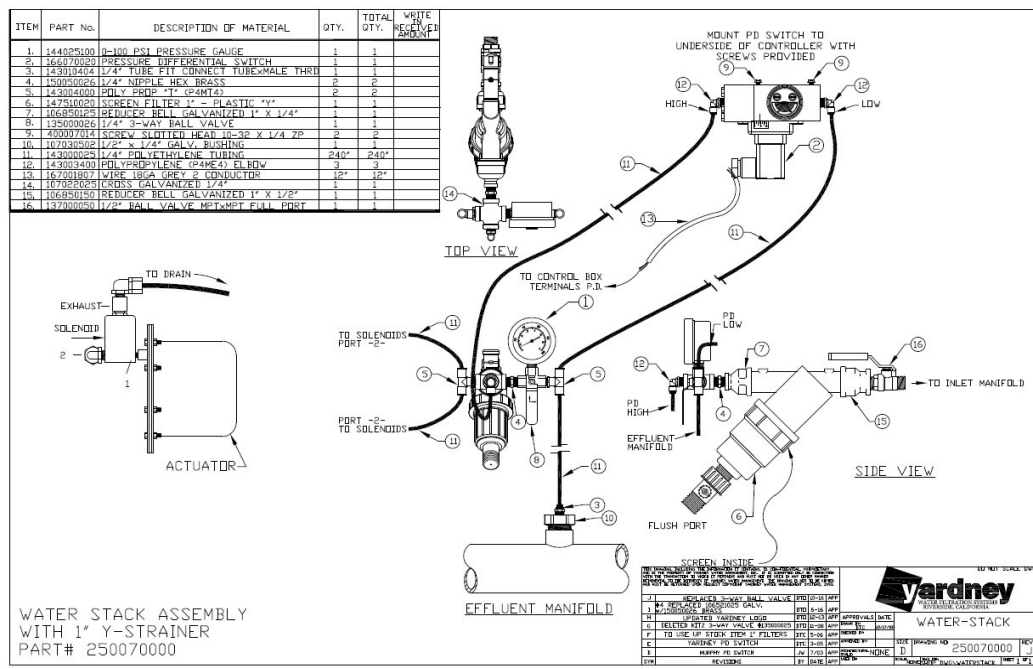
SECTION I - AUTOMATIC SYSTEMS

The water-stack is shipped fully assembled. Connect to the inlet manifold by screwing the 1/2" male ball valve into the 1/2" port on the inlet manifold. On systems operating at pressures above 100 PSI, use a high-pressure water-stack. (See figures 4 and 5 below)

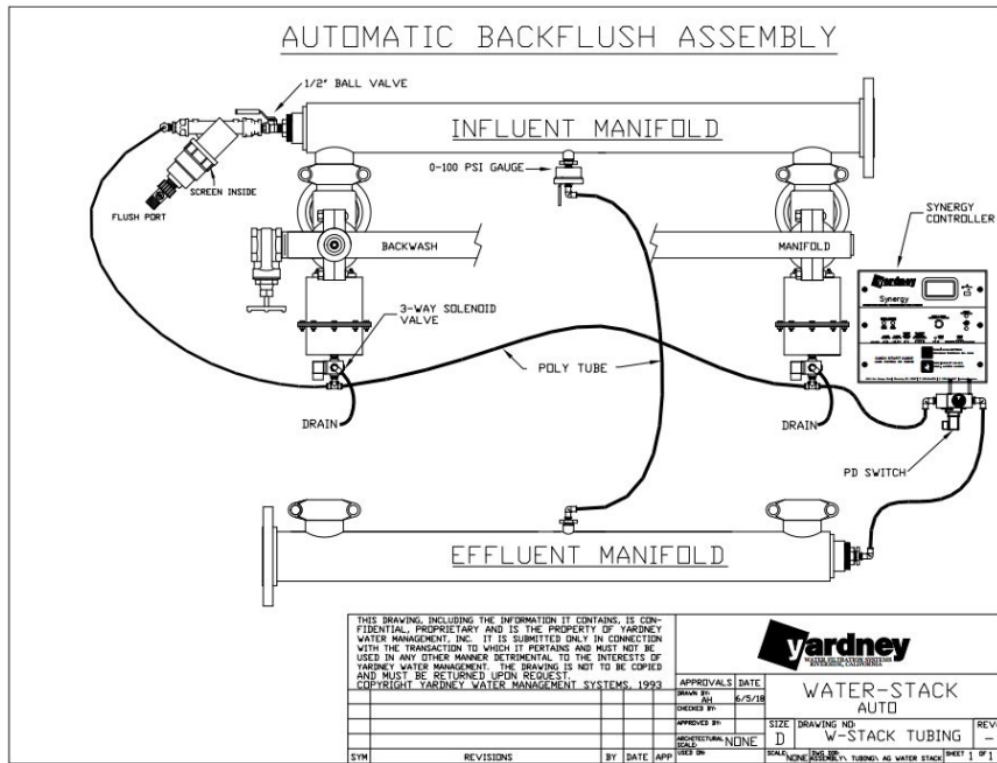
1. **On the discharge manifold**, install the 1/2" x 1/4" galvanized bushing and 1/4" straight fitting into the 1/2" port in the outlet manifold.
2. **Connect the poly tubing** to the poly connector on the outlet manifold. Connect the other end of the poly tubing to the poly tee (#5) on the 1/4" three-way valve (#8) on the water-stack assembly.
3. **Install the solenoid valves** to the valve actuators:
 - **12VDC/24AC Continuous Solenoids:** Connect Port #1 to the valve actuator port and connect Port #2 to the water supply from the water-stack. The arrow on the bottom of the solenoid valve should point toward the backwash valve. Poly tube the remaining ports to drain. (See Figure 4 below)
 - **12VDC Latching Solenoids:** Connect Port #2 to the valve actuator port. Connect Port #1 to the water supply from the water-stack. Poly tube remaining ports to drain. (See Section II, Figure 11)
4. **Install 1/8" x 3/8" poly elbows** on the remaining solenoid ports (drain ports) and connect a length of 3/8" poly tubing long enough to be inserted inside the leg of a tank. During regular filter operation, a small amount of water drains from this tubing to the ground.
5. **Mount the controller** to the controller stand provided. Refer to the manual provided with the automatic backwash controller for wiring and operational instructions.
6. **Install the PD switch** onto the controller and set the set-point to 13 PSID. Then tube the PD high and low ports to the water-stack (See below).

Note: For larger filter systems (three or more tanks) use poly elbows or poly tees to connect the poly tubing from one solenoid valve to the next. **NOTE:** There are many water-stack configurations possible. Yardney supplies enough parts and fittings for all configurations, which may result in left-over parts. Please refer to figures 4 through 7 below for more details.

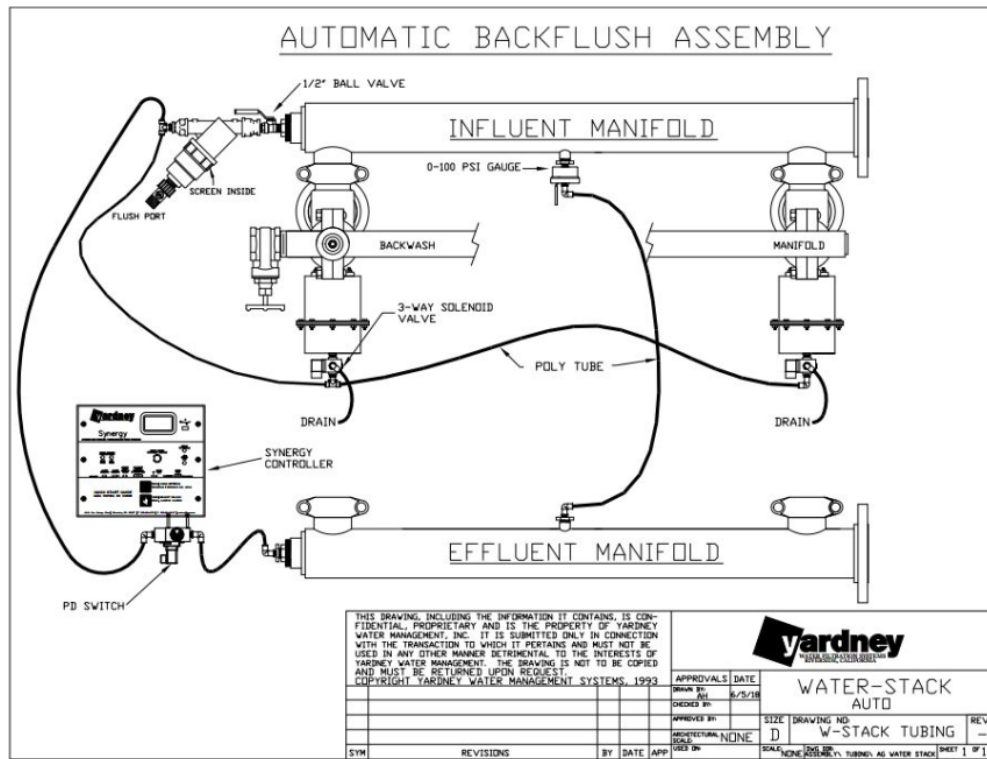
STANDARD and HIGH-PRESSURE WATER-STACK LAYOUTS



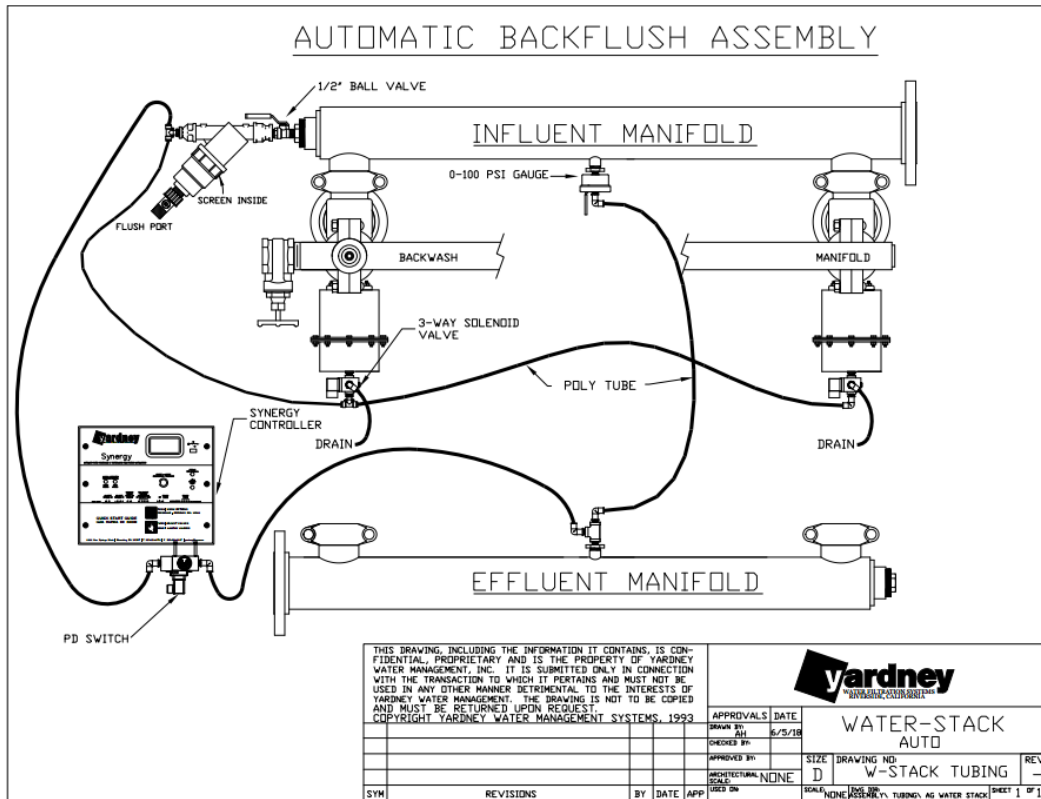
WATER-STACK AND SYSTEM MANIFOLD CONFIGURATIONS



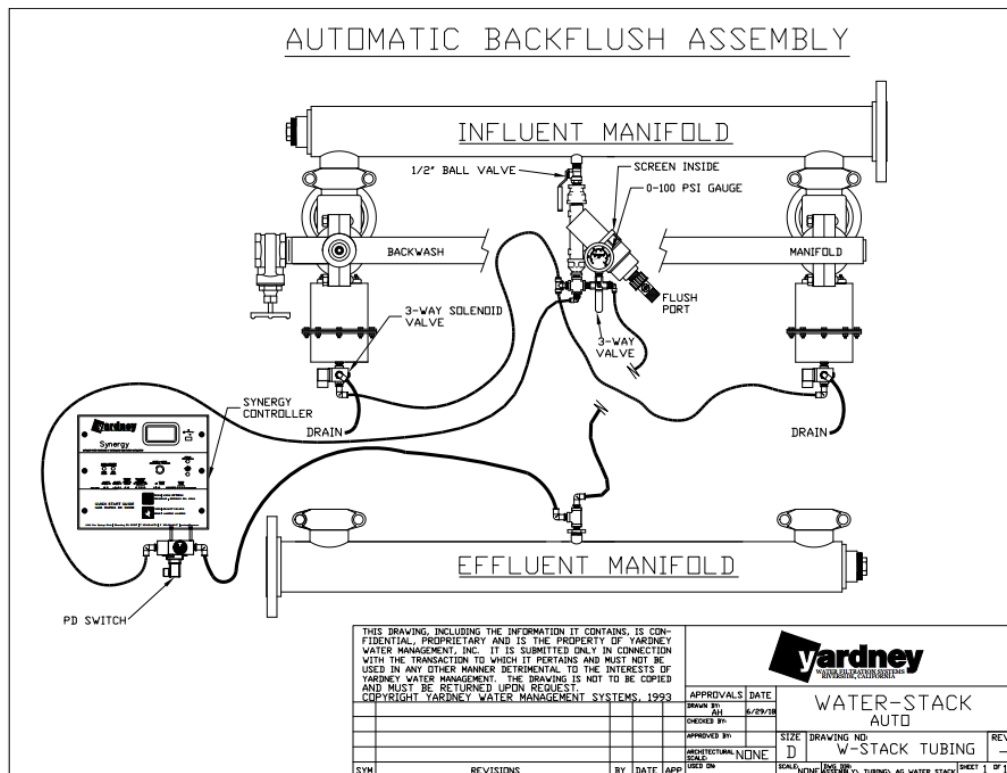
(FIGURE 6: CONFIGURATION A)



(FIGURE 7: CONFIGURATION B)



(FIGURE 8: CONFIGURATION C)

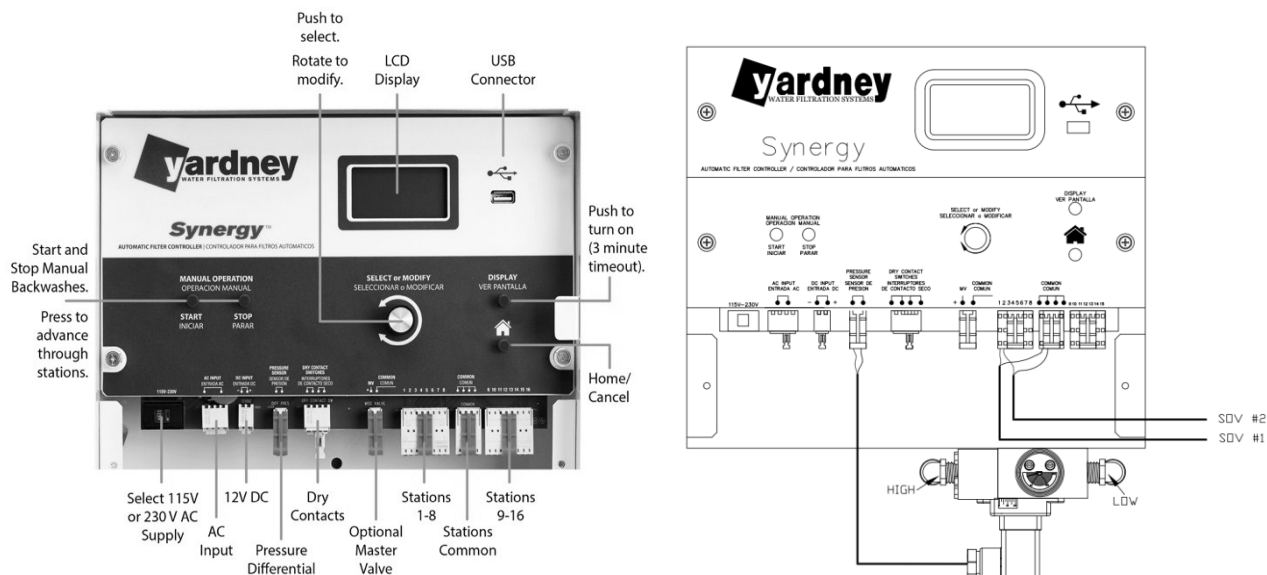


(FIGURE 9: CONFIGURATION D)

SECTION II - ELECTRICAL CONNECTIONS AND WIRING FOR AUTOMATIC SYSTEMS

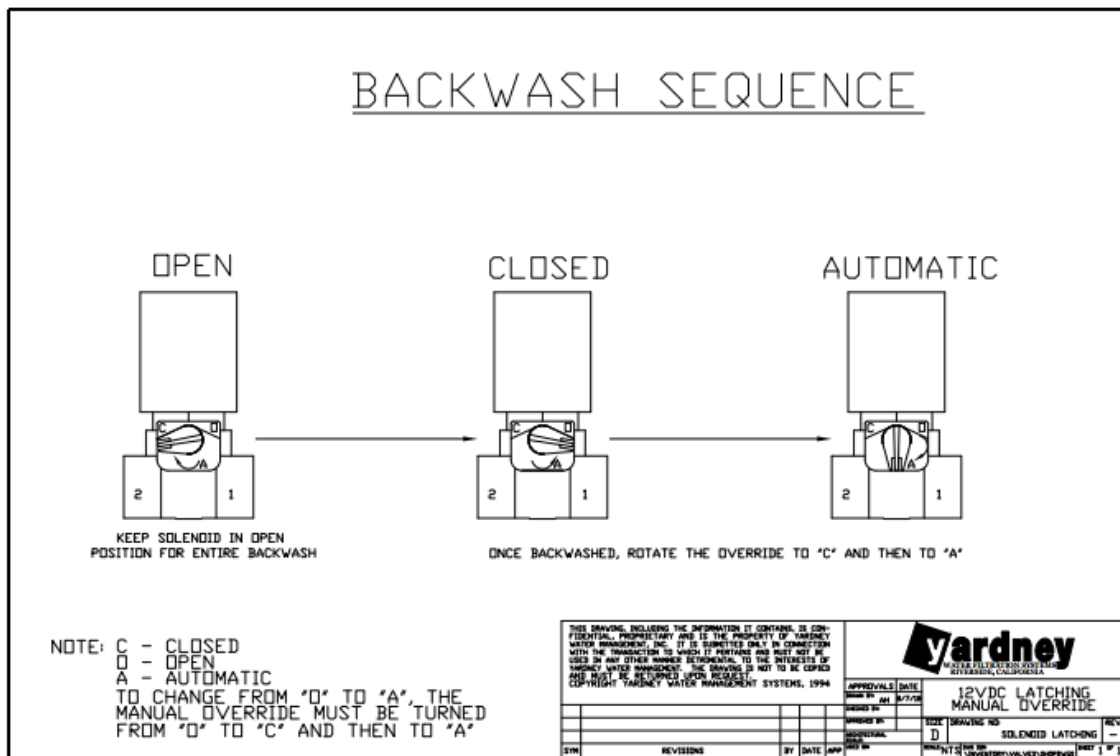
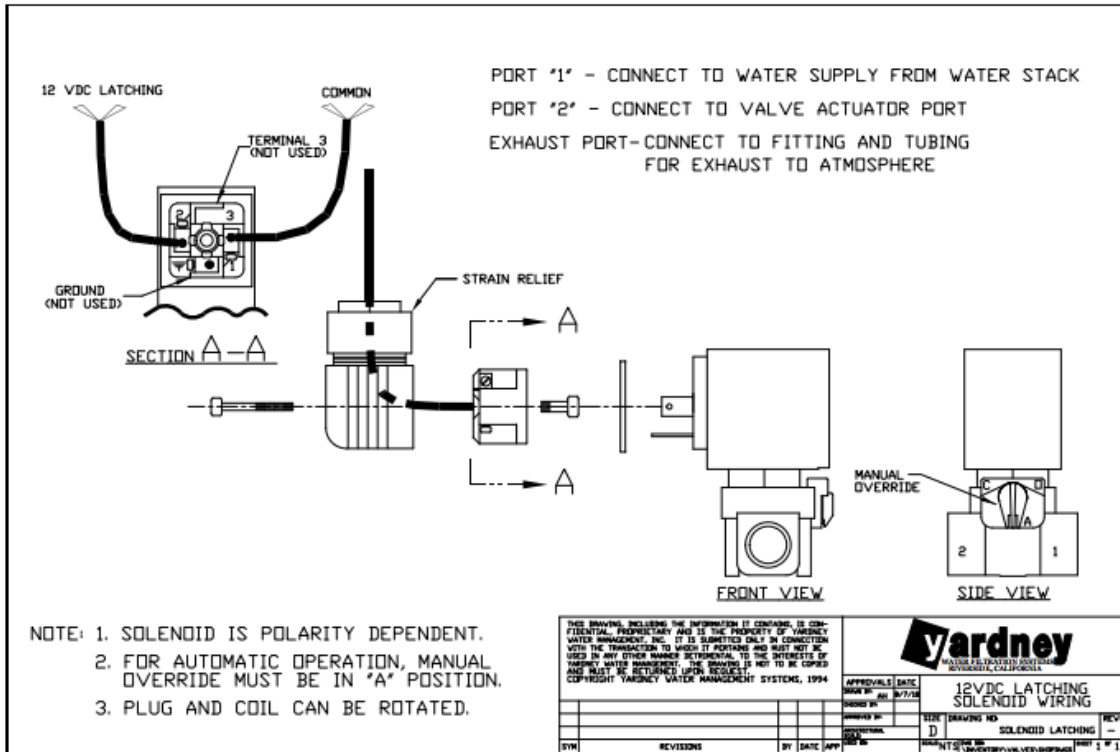
Once the controller and the PD switch is mounted, wire and configure the filter system.

1. **Using the figures below**, wire the PD switch as shown, red to Terminal 1, black (common) to Terminal 2. Reinstall the plug onto the coil and tighten. Wire into controller terminals. Ports are labeled.
2. **Use the same method** to wire all solenoid strain relief plugs. Reinstall and tighten onto the coil. Now wire the solenoids into wire terminals using the small pick tool provided to connect as many stations as your installation requires (up to 16). The valves controlling each station can be DC or AC valves. See the Synergy Controller User's Manual for details on continuous versus latching valves. All solenoids must be the same type, including the master valve, if used.
3. **Connect the power supply.** If using an AC power supply, **be sure the power supply SELECT switch is in the correct position before powering up the controller.** The two outer contacts of the four-contact AC connector use AC power. The two center contacts are unused. Any of the valve types listed above can use AC power.
4. If using a **DC** power supply, be sure it supplies between 10 and 15VDC and that the polarity is connected as indicated on the panel. **Only DC valves can use DC supply.**
5. **Program the Synergy Controller.** Refer to the Synergy Controller User's Manual for details. Use this manual to continue with installation and start-up.



(FIGURE 10: INTERFACE AND ELECTRICAL CONNECTIONS)

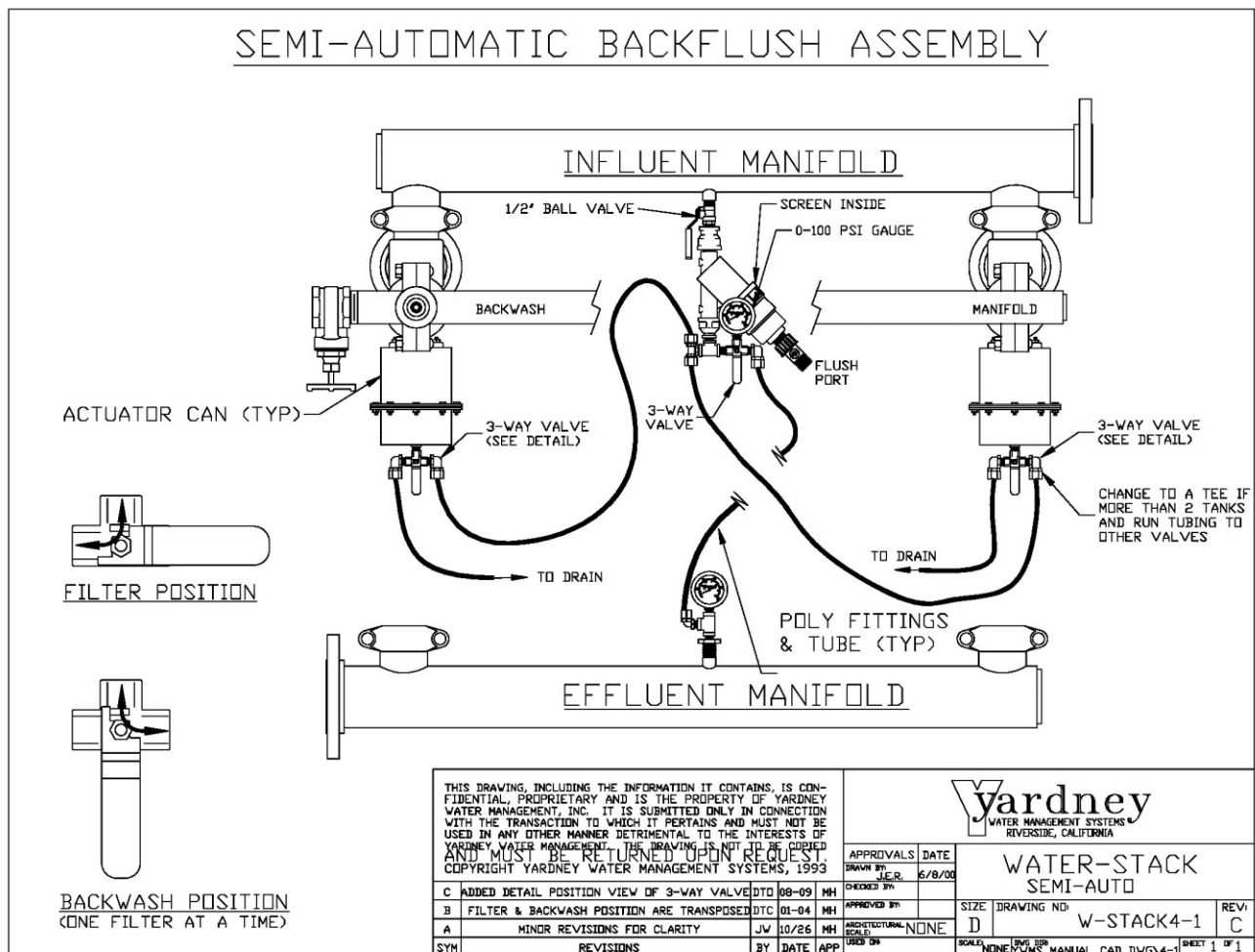
12VDC Latching Solenoids



(FIGURE 12: 12VDC LATCHING SOLENOID WIRING)

SECTION III - SEMI-AUTOMATIC SYSTEMS

1. **The water-stack** is shipped fully assembled. Connect the inlet manifold by screwing the 1/2" male ball valve into the 1/2" port on the inlet manifold.
2. **On the discharge manifold**, install the 1/2" x 1/4" galvanized bushing and 1/4" poly elbow into the 1/2" port in the outlet manifold.
3. **Connect the poly tubing** to the poly connector on the outlet manifold. Connect the other end of the poly tubing to the poly on the 1/4" three-way valve on the water-stack assembly.
4. **Install the three-way ball valves** to the valve actuators. Install tube elbows and connect pressure/drain tubing. (See figure below for valve orientation).



(FIGURE 13: SEMI-AUTOMATIC BACKFLUSH ASSEMBLY)

SAND MEDIA SYSTEM START-UP

The following sections provide start-up sequences for automatic and semi-automatic filter systems.

NOTE: Perform the first-time start-up with caution. Purge all air from lines and filters before start-up. Valves and pumps must be opened slowly to prevent damage to the filters and the irrigation system due to entrapped air. Please read the Synergy Quick Start Guide before system start-up.

SECTION I – AUTOMATIC SYSTEMS WITH CONTINUOUS OR LATCHING SOLENOIDS

1. Start the system manually with the controller in the System Disabled state by turning the dial to the System Menu, pressing the dial to select the menu and rotating the dial to Disabled and selecting. Open the backwash restriction valve 25% and introduce water into the filter system, filling lines and tanks slowly. The 1/2" ball valve on the water-stack should be in the open position.
2. **For Continuous Solenoids:** When operating pressure reaches approximately 10 PSI, purge entrapped air by turning the manual override knob on the solenoid on tank #1 to the ON position for one to two minutes. When complete, turn to OFF position and repeat the process on remaining tanks. (See Figure 11)
3. **For Latching Solenoids:** When operating pressure reaches approximately 10 PSI, purge entrapped air by turning the manual override selector on the solenoid on tank #1 to the OPEN position for one to two minutes. When complete, turn the manual override selector to the CLOSED position and then to the AUTO position. Repeat the process on remaining tanks. (See Figure 12)
4. When the system operating pressure reaches 50%, repeat the flush cycle manually to purge any remaining air.
5. When the system operating pressure reaches 100% or after 15 minutes of operation, repeat the flush cycle allowing three-minute flushes per tank.
6. With ALL solenoid manual override knobs in the OFF or AUTO position, activate the controller by enabling the system following the same procedure. The Synergy Controller is preset to flush every two hours with a flush duration of two minutes. See the Synergy Controller Instruction Manual to customize settings to fit your system. Push the Manual Start button to go through an automatic flush cycle.
7. Set the Pressure Differential (PD) switch to 8 PSI greater than the clean filter pressure-differential. (Example: Clean pressure-differential of 5 PSI + 8 PSI = 13 PSI switch setting.)
8. Set the automatic filter controller so that the backwash frequency corresponds with the buildup of pressure-drop to the established dirty filter pressure-differential set point. Establishing the time and frequency of flush may require several days of monitoring to determine the proper setting. (Example: If it takes six hours of operation to reach the dirty filter pressure-differential setting of 13 PSI, set the backwash frequency on the controller to six hours.)

NOTE: ON HIGH-PRESSURE SYSTEMS (100 PSI or more) adjust the pressure regulator supplied on the high-pressure water-stack assembly to permit the backwash valves to open. As soon as the system operating pressure is reached loosen the lock nut on the regulator handle and turn the adjustment handle counter clockwise. This reduces the pressure on the backwash valve actuator. Put one valve into backwash mode using the manual override on the solenoid valve. Slowly turn the adjustment handle on the regulator clockwise to increase the pressure in the backwash valve. Continue increasing the pressure slowly until the backwash valve opens smoothly and completely. *Excessive pressure* on the valve actuator can result in the backwash valve opening too fast, creating water hammer and possible valve damage. *Insufficient pressure* may not allow the valve to open fully. Tighten the locking nut once the pressure regulator is set properly.

SECTION II – SEMI-AUTOMATIC SYSTEMS WITH THREE-WAY BALL VALVES

1. Open the backwash restriction valve 25% and introduce water into the filter system, filling lines and tanks slowly.
2. When operating pressure reaches approximately 10 PSI, turn the handle on the three-way ball valve on tank #1 to the **BACKWASH** position for one to two minutes to purge entrapped air from the system. To stop, turn the handle back to the **FILTER** position and repeat the process on remaining tanks.



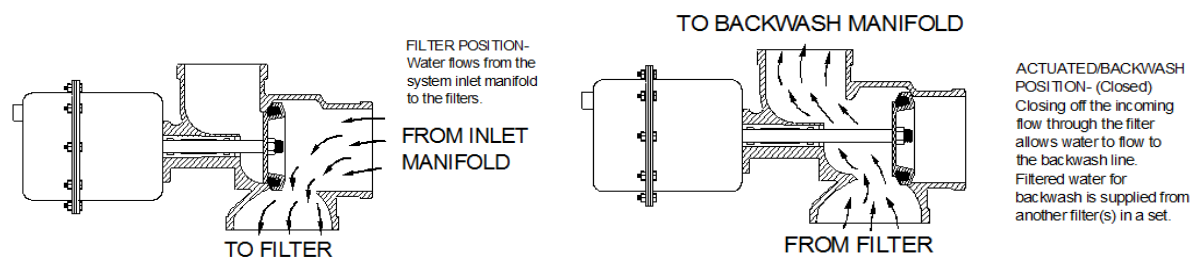
3. When the system operating pressure reaches 50%, repeat the flush cycle to purge any remaining air.
4. When the system operating pressure reaches 100% or after 15 minutes of operation, repeat the flush cycle allowing three-minute flushes per tank.

BACKWASH RESTRICTOR VALVE ADJUSTMENT

SECTION I - SETTING THE RESTRICTOR VALVE

Backwashing is the process by which clean water flows upward through the underdrain, lifting and expanding the media bed, allowing it to release collected contaminants. Contaminants are then carried away with the backwash water.

Note: Backwash flow rates must be properly adjusted to achieve maximum filter performance. Excessive backwash flow rates expand the media to the point that the media itself can expel out of the tank. Insufficient backwash flow may not expand the media enough to purge all the entrapped contaminants. This could result in residual pressure loss through the bed even after backwash.



1. Open the backwash restrictor control valve approximately 25%.
2. Be sure to purge all air from each tank by partially opening and closing the flush valve on each tank.
3. Before proceeding with backwash adjustments, run the pump long enough to fill the entire irrigation system at the designed pressure and flow.
4. Manually initiate a backwash on one tank. With semi-automatic systems, turn the three-way ball valve on the backwash valve to introduce water into the valve actuator.
5. If applicable, take a sample using a clear jar or a screen sampling device to monitor the contents of the backwash discharge water.
6. Gradually open the backwash restrictor valve until a small amount of media from the backwash water appears in the discharge flow.
7. When media begins to show in the backwash water, close the backwash flow control valve until the water is mostly clear of media. A trace amount of media is desirable so that lighter granules (fines) in the bed can wash out. After completing the above adjustments, backwash all tanks for three to five minutes each to remove contaminants and fines usually found in newly installed media.

Recommended Backflush Flow Rates

The following table shows the approximate backwash flow rates required to provide proper filter backwash. All factors are per single tank. The actual backwash flow should be determined, using the method described in Section I above. The use of a flow meter when setting the backwash restrictor valve is **not** recommended.

Approximate backwash flow rates

Media Type	Mean Efficient Media Size	Uniformity Coefficient	Approximate backwash flow rate (GPM)					
			1416	1816	2416	3016	3616	4816
G-78 (#11)	0.78 mm	1.54	15	25	50	80	110	200
S-47 (#20)	0.47 mm	1.42	15	25	50	80	110	200

(TABLE 2: RECOMMENDED BACKWASH FLOW RATES)

During backwash, tanks not being backwashed supply clean water for backwashing and filtered water for the field. If the volume is not adequate for both, install a valve in the filtered water output line to close off or restrict the filtered water flow. **NOTE: The flow must be restricted THE SAME AMOUNT each flush to prevent variable backwash performance.**

IMPORTANT: The backwashing function of your sand media filtration system is the most critical aspect of your filter system operation. Without proper backwashing, the entrapped dirt may not fully expel from the system. Filters should be flushed when the pressure loss is 8 PSI greater than the clean filter pressure loss. Flush each filter for a minimum of 90 seconds per tank. If the backwash water is not visually clear after 90 seconds extend the flush duration. Filters must be flushed at least once every 24 hours to prevent compaction of the sand and gravel media even if an 8 PSI pressure drop is not attained. The delay setting is the time between one backwash valve closing (tank #1) and the second backwash valve opening (tank #2). **Allow a slight overlap in time between the two tank backwash valve settings.** Record the time required for a valve to return to the filter position from the backwash position. Set the delay setting to the next shortest setting. The quality of water produced by your sand media filters is directly affected by the quality and frequency of the backwashing operation. In filters utilizing the wedgewire underdrain, some contamination buildup may occur where heavy silt-loading is present. Under these circumstances, a periodic, longer backwash cycle or mechanical agitation of the sand bed may be necessary.

1. If any significant changes are made to pressure or flow, recheck the above adjustments.
2. Backwashing at 8 PSI above a clean filter pressure-differential is recommended.
3. When operating at pressures lower than 40 PSI, pay close attention to the backwash function to ensure adequate cleaning. Maintaining back-pressure on the system during backwash is required for an effective backwash. A pressure sustaining valve may be needed. Backwashing should be more frequent on applications under 40 PSI.

PREVENTATIVE MAINTENANCE

SECTION I – PREVENTATIVE MAINTENANCE SCHEDULE

The following is a simple schedule for start-up and operational preventative maintenance. Store this chart in an accessible, but protected, location on the filter pad.

TASK	SEASONAL START-UP	SEASON SHUTDOWN	DAILY	WEEKLY	BI-MONTHLY	MONTHLY	QUARTERLY
Check media depth		x					x
Clean water pickup assembly filter	x					x	
Inspect hydraulic line connections	x						
Inspect electrical connections and control box seals	x						x
Lubricate backwash valve with general purpose water-insoluble grease	x						x
Inspect interior valve components (seals, diaphragm, shaft)	x	x					
Check coupling gaskets for leaks	x			x			
Check system pressure differential	x		x				
Check backwash flow rate	x						x
Check flow meter to assure proper flow rate	x			x			
Monitor duration of flush cycle	x				x		
Evaluate seasonal water quality fluctuations for possible settings adjustments					x		
Service downstream strainer		x					x
Chlorine shock treatment	x						x

(TABLE 3: MEDIA FILTER PREVENTATIVE MAINTENANCE SCHEDULE)

SECTION II - OPERATORS TROUBLESHOOTING GUIDE

POOR FILTRATION

PROBABLE CAUSE	SOLUTION
Excessive flow through the filters causing coning of media or forcing contaminants through the filter to the outlet.	Reduce the flow rate or add filter unit(s). See manufacturer for recommended flow range.
Air in filter(s) causing disruption (coning) of media bed.	Install auto or manual air bleed device.
Incorrect media in the filtration system.	Replace with proper media. See manufacturer for recommended media.
Insufficient depth of media allowing contaminants to pass through system.	Add media to achieve proper depth. (Typically 13 to 14 inches.)

CONSTANT HIGH PRESSURE-DIFFERENTIAL

PROBABLE CAUSE	SOLUTION
Filter sealed over with contaminants restricting backwash flow.	Open tanks and skim away any excess or caked contaminants from the media bed surface. Return tanks to normal service. Backwash each filter tank until backwash flow runs clean.
Insufficient backwash flow rate.	Readjust the backwash restrictor valve and/or partially close the field valve to create system back-pressure.
Fouled underdrain.	Perform shock treatment on underdrains.

SAND MEDIA APPEARS DOWNSTREAM

PROBABLE CAUSE	SOLUTION
Incorrect filter sand media (i.e., too fine).	Replace with the proper sand media. See manufacturer recommendations.
Broken or damaged underdrain.	Replace or repair.

BACKWASH VALVE LEAKAGE CAUSE

PROBABLE CAUSE	SOLUTION
Obstruction in the valve seat area.	Remove obstruction.
Polyurethane sealing disk is worn or damaged.	Replace.
Diaphragm damaged (leaking from port of diaphragm chamber at rear of valve).	Replace diaphragm.
Pinched or worn O-ring.	Replace O-ring and/or lubricate shaft.

AIR HAMMER

PROBABLE CAUSE	SOLUTION
Air in tanks.	Bleed off trapped air. See start-up instructions. Also, check for leaks in the pump suction line. An air bleed at the filter inlet may also help.
Long backwash line causing vacuum induced slamming of valves.	Install a vacuum breaker on the backwash line.

FREQUENCY OF BACKFLUSH INCREASING

PROBABLE CAUSE	SOLUTION
Backwash flow or duration is not adequate to flush filter tanks of all contaminants.	Readjust backwash flow and/or increase duration of backwash cycle.
Insufficient media depth.	Add media to achieve proper depth.
Increased concentration of contaminants in water supply.	Greater filter capacity required.

AUTOMATIC BACKWASH FAILS TO CYCLE

PROBABLE CAUSE	SOLUTION
Improper setting on differential pressure switch.	Inspect seals for signs of tampering.
Solenoid(s) malfunctioning.	Check connections. Clean ports. Check filter screen on water pickup assembly for damage. Clean or replace if necessary.
Loss of sufficient system pressure to actuate valve(s.)	Check system for pressure leaks. Also, inspect the filter screen on water pickup assembly for damaged screen. Clean or replace if necessary.

FILTER UNDERDRAIN OBSTRUCTION OR BLOCKAGE

Infrequent flushing, lack of chemical treatment, improperly set backwash restrictor valves, or operating the filters outside of the recommended flow range are the most common causes of underdrain blockage. All four of these situations, either singularly or in combination, result in contaminants reaching and possibly fouling the filter underdrain. Monitor pressure gauges for evidence of underdrain blockage. If the pressure differential does not return to 2 to 6 PSI after a flush cycle, there is a possibility of underdrain contamination.

First, determine and rectify the cause of the blockage (i.e., reset the backwash restrictor valve, increase the frequency of flushing, adjust the flow rate to manufacturer's recommendation, or install chlorine injection equipment). If the cause of the blockage is corrected, and the pressure differential does not return to 2 to 6 PSI after backflushing, more severe steps are necessary to clear the underdrain. If **organic** contaminants are suspected, a chlorine shock treatment may be necessary.

SECTION III - CHLORINE SHOCK TREATMENT FOR SAND MEDIA FILTERS

1. Remove filter manway lids and fill each tank with water up to the top weld seam. It is not necessary to remove the sand. Close the field valve to keep the water in the filter tanks.
2. Add 10 to 20 ounces of 12% pool chlorine per square foot of filtration area, to each vessel. If pool chlorine is unavailable, use double the amount of household chlorine bleach as an acceptable alternative. **BEWARE OF CHLORINE FUMES.**
3. Allow tanks to stand for 12 hours.
4. Secure manway lids, open the field valve and initiate a backflush cycle. Flush each vessel for approximately three minutes. Repeat the full sequence several times.

NOTE: One or two shock treatments can usually unplug an underdrain that is contaminated with organics. Consult the manufacturer if a high pressure-differential persists after a maximum of two shock treatments.

SAFETY NOTE: Always wear eye protection, gloves, and protective clothing when handling chemicals. A safety water rinse station should also be available to rinse off any chemicals which come in contact with personnel. Always introduce chemicals into a water-filled filter tank. Do not mix chlorine with other chemicals during this procedure.