



Installation
and Operation
Instruction
Manual
INSMAN-107

Maxi-Flush™
Screen Filters

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MAXI-FLUSH SCREEN FILTER

TABLE OF CONTENTS

GENERAL SAFETY GUIDELINES.....1

1.0 LOCATION AND PREPARATION OF THE FILTER SITE2

2.0 INLET/OUTLET PIPING3

3.0 BACKWASH MANIFOLD INSTALLATION3

4.0 HYDRAULIC HOOKUP OF THE WATER POWERED VALVES.....4

5.0 AUTOMATIC BACKWASH CONTROLS HOOKUP5

6.0 SYSTEM CHECK-OUT PRIOR TO START-UP.....6

7.0 AUTOMATIC BACKWASH CONTROLS6

8.0 HYDRAULIC WATER-STACK (WATER PICKUP) ASSEMBLY9

9.0 SYSTEM START-UP9

REFERENCE | TROUBLE SHOOTING MAXI-FLUSH SCREEN FILTER 13

REFERENCE | PREVENTATIVE MAINTENANCE SCHEDULE15

GENERAL SAFETY GUIDELINES

Please read the entire manual before beginning any procedure.

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 safety operating limits of the system and any equipment directly connected to or affected by it.
5. Be sure that the system is depressurized before any maintenance work, removing components or opening of the vessels.
6. Be sure to re-examine the system before putting it back into service.
7. Be sure to maintain all equipment and to continuously check the system for leaks and or damage. Fixing problems as they occur will prolong the life of the system.

The Yardney Maxi-Flush Automatic Backwashing Screen Filter is constructed of heavy gauge fusion bonded epoxy coated steel for environmental protection and features a permanent Type 304 stainless steel filter cartridge.

1.0 LOCATION AND PREPARATION OF THE FILTER SITE

The filter should be located on the pressurized line source after the pump discharge. Pressure must be at least 25 psi into the filters to actuate valves. The following factors should be considered in selecting the installation site:

- A. Level surface for installation
- B. Access for servicing
- C. Electrical power for lights, electric tools and automatic control installation
- D. Disposal consideration for backwash water
- E. Security and safety

Tools and Materials Required:

- Teflon tape
- PVC fittings and pipe for backwash
- Pipe dope
- Discharge line
- Soapy water
- Wire cutters
- 1/2" drive socket set (11/16 thru 1 3/4")
- Wire strippers
- Electrical tape and connectors
- 8" and 12" wrenches
- Screw drivers (Phillips and Standard)
- Miscellaneous hookup wire, conduit and conduit fittings

NOTE: Inlet/outlet and backwash system manifolds are provided to the limit of the system. The installer needs to extend all manifolds beyond the system to connect with the pump discharge and irrigation main line hookups. The backwash manifold needs to be extended to the point of discharge.

A concrete pad should be poured allowing for a minimum perimeter of 12" for servicing. Location of filter should also allow for cartridge removal clearance of buildings, fences, etc. Cartridge lengths are as follows:

- | | | |
|---|---------------|----------------|
| ○ | MFS-6 | 25 3/4" |
| ○ | MFS-8 | 23 1/2" |
| ○ | MFS-10 | 45" |

Once the Maxi-Flush filter system is set in place, the following steps should be followed to complete the installation.

1.1 Installation

The Maxi-Flush Automatic Backwashing Screen Filter uses grooved type couplings for assembly of all piping supplied with the filter. The grooved type couplings mechanically lock the filters together while allowing some line flexibility. This type of coupling is also recommended for use in connecting field lines to the filter manifolds. The Maxi-Flush Screen Filter may be ordered optionally with flanged inlet and outlet.

If the grooved type coupling method is being used to connect the inlet and outlet piping to the filter manifolds, it will be necessary to have grooved to plain end adapters (supplied with the system package) welded to the pump discharge and irrigation main line. **Do not weld on the fusion epoxy lined inlet and outlet filter manifolds. Welding will damage the epoxy coating!**

If the filter system is supplied with flanged inlet and outlet manifolds, the same size and type of flange should be used for connecting the supply and discharge lines to the filter system.

2.0 INLET/OUTLET PIPING

2.1 Assembly Procedure

On filter systems that are supplied with grooved type inlet and outlet connections, remove the gasket from the coupling. Lubricate the gasket with soapy water and slip it onto the end of the inlet manifold. Align the inlet piping with the inlet manifold. Slide the gasket back until it is centered between the grooves. Apply soapy water to the outer surface of the gasket. Install grooved type-coupling clamps securely in the grooves. Tighten bolts alternately until tight. Install outlet piping to the filter system using the same procedure. **Do not weld on the filter housings or manifolds! These assemblies are fusion epoxy lined and the epoxy will be burned off if welding heat is applied!**

3.0 BACKWASH MANIFOLD INSTALLATION

3.1 Backwash Manifold Assembly

The backwash manifold and backwash control valve are supplied with the turf system. It will be necessary to complete the assembly of this unit by connecting the backwash control valve to the backwash manifold.

The MFS10 Maxi-Flush System is supplied with a 4" butterfly type restrictor valve. This valve is connected to the backwash manifolds with grooved type couplings and is used for the purpose of regulating the flow of backwash water and cleaning of the screen cartridge. The MFS6 and MFS8 Maxi-Flush systems are provided with a 2" gate valve. This valve is threaded onto the backwash manifold. This valve is used for backwash control on these smaller systems.

3.2 Yardney 2" Restrictor Valve Assembly - Model MFS10

To install the Yardney 2" butterfly type restrictor valve, remove the gasket from a 4" x 2" grooved reducing coupling. Lubricate the gasket with soapy water, slide the gasket over

the end of the backwash manifold. Align the restrictor valve and slide the gasket back, centering it between the grooves. Install the grooved coupling and tighten bolts.

3.3 4" Waste Disposal Line Hookup - Model MFS10 (Provided by Installer)

A 4" grooved by plain end adapter is provided with the backwash manifold assembly. This adapter is to be welded to the waste disposal pipe provided by the installer. This adapter is connected to the restrictor valve using the same procedure described in Paragraph 3.2.

3.4 2" Restrictor Valve Assembly - Model MFS6 and MFS8

To install the 2" gate restrictor valve, wrap the male threads with Teflon tape or apply pipe dope. Thread the 2" restrictor valve onto the backwash manifold and tighten securely.

3.5 2" Waste Disposal Line Hookup - Models MFS6 and MFS8 (Provided by Installer)

A 2" male thread by plain end steel adapter is provided with the backwash manifold assembly. This adapter is to be welded to the installer provided backwash waste disposal pipe that is connected to the restrictor valve.

3.6 Waste Disposal Discharge Considerations

The backwash waste disposal pipe should be discharged to atmosphere at a point in the lake or reservoir away from pump suction or intake boxes. Optionally the backwash water may be disposed of to a tree line, ravine or other suitable approved discharge location.

4.0 HYDRAULIC HOOKUP OF THE WATER POWERED VALVES

An assembly diagram of the water-stack assembly and its related system components can be found on page 12. Use Teflon tape on all threaded connections.

4.1 Discharge Pressure Indication and Hydraulic Pressure Line Installation

Thread a 1/2" x 1/4" reducer bushing into the discharge manifold at the 1/2" half coupling. Thread a 1/4" poly elbow into the reducer bushing. With 1/4" poly tubing, connect the poly elbow with the one side of the 1/4" poly tee (#5A) at the 3-way valve on the water-stack assembly. Inlet and outlet pressures are read on the same gauge by turning the 3-way valve.

4.2 Pressure Differential Sensing Tube Installation

Connect 1/4" poly tubing from the other side of the 1/4" poly tee used in 4.2 above (#5A) to the 1/4" poly fitting on the pressure differential switch. The pressure differential switch is mounted to the water-stack via the high-pressure port; no tubing is required to the inlet manifold.

4.3 Solenoid Valve Assembly to Yardney Backwash Valve Actuator

The solenoid valves are connected to the backwash valve actuators with a 1/4" close nipple. Thread the 1/4" close nipple into the port marked "A" on the solenoid valve. Thread the solenoid valve with the nipple into the 1/4" port on the backwash valve actuator and tighten.

Connect 1/4" poly tubing to 1/4" poly tee on the pressure regulator (#5B), and connect the other end of the 1/4" poly fitting to the solenoid port marked "P." The second filter housing should be hooked up in the same manner. With systems using three or more units, it will be necessary to use 1/4" poly elbows and 1/4" poly tees to connect the 1/4" poly tubing from one solenoid valve to the next.

4.4 Solenoid Valve Exhaust Water Tubing Assembly

Install 1/4" poly elbows to the solenoid exhaust ports and connect a length of 1/4" poly tubing for exhaust disposal. During the course of normal filter operation a small amount of water will drain from this tubing after the flushing of each filter. This water may be disposed of, off the pad area, by running a 1/2" PVC drain pipe adjacent and parallel to the valves. The drain pipe should be capped on one end with the open end extending off the pad. The PVC pipe should be drilled to allow for insertion of the black 1/4" poly drain tubing into the PVC drain pipe.

5.0 **AUTOMATIC BACKWASH CONTROLS HOOKUP**

5.1 Control Box Mounting

The automatic backwash controller supplied with the filter system should be mounted on the stand provided with the filter system. The stand is provided with a mounting pad with holes for securing to the concrete pad with anchors. In the event you elect to mount the backwash controller to a panel or backboard, holes have been provided in the back of the enclosure. To gain access to the mounting holes, open the door and remove the screws that secure the panels to the enclosure. Hinge down the top panel to gain access to the mounting holes.

5.2 Automatic Controller Power Hookup

The automatic backwash controller requires 115 VAC or 12 VDC power for operation. Please refer to the automatic controller instruction manual for installation and operation information. The wiring of the controller should be done in accordance with all state and local electrical codes.

5.3 Electrical Solenoid Hookup Continuous Current Solenoids - 12 VDC or 24 VAC

Wiring from the backflush controller to the solenoid valves is accomplished by removing the electrical terminal housing from the coil housing. Remove the terminal assembly from the plastic housing by loosening the plastic screw. There are three terminals on the terminal assembly; Numbers 1, 2 and 3.

Loosen the strain relief fitting on the terminal housing and insert the jacketed cable into connector housing until approximately 2 to 3 inches of cable is exposed. Remove approximately 1 inch of the cable jacket, exposing 1 red (hot) wire and 1 (common) black wire.

Connect the red wire to Terminal #2. Connect the black wire to Terminal #1. Terminal #3 is not used in this hookup. Reinsert into the terminal housing and tighten the plastic screw. Reattach the terminal housing to the coil housing and tighten. Tighten strain relief fittings.

The strain relief fitting should always be pointed downward to minimize water leakage possibilities into the terminal housing assembly.

NOTE: The electrical terminal housing on the solenoid can be rotated in 90 degree increments. To rotate the terminal housing, remove it from the solenoid. Loosen the internal plastic screw and separate the plastic housing from the terminal assembly. Reattach the terminal assembly to the solenoid. Place the plastic housing over the terminal assembly and orientate the plastic housing in the position desired. After orientation remove the entire assembly and tighten the internal plastic screw. Reattach the terminal housing to the coil housing and tighten securely.

Although a strain relief fitting is provided, we do recommend that the connector be installed with the strain relief facing down. This will help eliminate moisture from penetrating the connector. The wiring may also be done in conduit if preferred. Solenoid conduit fittings in lieu of strain relief fittings are also provided.

6.0 SYSTEM CHECK-OUT PRIOR TO START-UP

Prior to system start-up it is advisable to do a checkout of the filter system. This check should include the following items.

6.1 Cartridge Assembly Check

Remove the lid assembly and cartridge. Inspect the cartridge, making sure that u-channel seals are secure. Reinstall the cartridge and lid assembly. Tighten the lid securely.

6.2 Grooved Coupling and/or Flanged Connections

Check all grooved coupling and flanged connections making sure that all bolts are tight and the couplings are seated in the grooves.

6.3 Solenoid Valve Check-out and Override Verification

Check all solenoid valve manual overrides. Make sure all are in the "OFF" position.

NOTE: The manual override is the small slotted screw located on the base of the solenoid valve. The solenoid is in the "OFF" position when the slot is parallel to the base of the solenoid. Rotating the screw clockwise 90 degrees will open the solenoid valve, allowing the backwash valve to be operated manually. To shut off the solenoid valve, rotate the screw 90 degrees counter clockwise. This will put the solenoid into the normally closed, de-energized position.

6.4 Hydraulic Tubing Visual Inspection

Inspect all hydraulic lines making sure they are free of any kinks, bends or foreign material. Make sure all connections are tight and secure.

7.0 AUTOMATIC BACKWASH CONTROLS

Prior to system start-up, it is advisable for the operator to have a basic understanding of the automatic backwash controls. This understanding will help minimize problems that may be encountered during the actual start-up and operation of the filter system.

The automatic backwash controller is designed to provide for unattended backwashing of the filter system and incorporates all the functions that are required to perform this task.

7.1 Periodic Flush Time (Flush Frequency)

The periodic flush time setting is adjustable from 1/4 to 24 hours, and is used to set the frequency of backflushing. The frequency of backwashing should be determined by the elapsed time required by the filters to accumulate a full inventory of dirt before the next flush cycle. This elapsed time will vary depending upon the amount of dirt in the source water.

Maxi-Flush Screen filters are designed to operate at a 5 PSI or less clean filter pressure differential. The Maxi-Flush Screen filters should be backwashed at 8 PSI. The periodic flush timer should be adjusted to backwash the filters when this pressure differential has been reached. This should be determined by operational observation during the initial start-up period.

7.2 Flush Time (Flush Duration)

The flush time setting is adjustable from 5 seconds to 240 seconds and is used to set the amount of time each filter station solenoid valve is energized. Once the solenoid valve is energized, there will be a short delay before the backwash valve begins its movement into the backwash position. Once the backwash valve is in the backwash position the time required to backwash each filter is approximately 15-20 seconds. When setting the backwash flush time consideration should be given to the time it takes for the backwash valve to complete its travel to the backwash position. Travel time is generally 10 seconds. **A minimum flush time recommendation is 30 seconds. Excessively dirty water applications may require a slightly longer flush time to eliminate the accumulated dirt.**

7.3 Dwell Time (Delay between Stations)

The dwell time setting is adjustable from 5 seconds to 90 seconds and is used to adjust the amount of delay between the de-energizing of the previous solenoid valve and the energizing of the next solenoid valve in sequence. This delay is necessary in order to allow the preceding valve to return to its on-line position prior to the next valve going into the backwash position. When setting the dwell time, consideration should be given to the amount of time it takes for the backwash valve to return to the normal on-line position after the solenoid valve has been de-energized. Normally a 15-20 second delay allows for smooth "phasing" of the valves. Adjust this setting for smooth valve operation dependent upon your specific site conditions.

7.4 Pressure Differential Switch

The filter system pressure differential switch is connected electrically to the backwash controller. The pressure differential switch is adjustable from 0-15 PSID and is used to monitor the system pressure differential and should be used as a secondary and not a primary source of backwash indication. The primary backwash indicator should be the "periodic flush timer." The pressure differential switch will override the periodic flush timer in the event the pressure differential set point has been reached prior to the periodic time. If this ever occurs, then the periodic timer will reset and start a new periodic flush cycle.

The pressure differential switch should be adjusted to initiate a backwash cycle at 8 PSI (5 PSI for the clean operating filter + 3 PSI for the accumulated dirt load = 8 PSI).

8.0 HYDRAULIC WATER-STACK (WATER PICKUP) ASSEMBLY

Maxi-Flush Screen filters are supplied with a hydraulic water-stack assembly which is connected to the inlet manifold as is discussed in Section 4.1. The water-stack assembly is made up of the following components: inlet pressure gauge, pressure differential switch, 3/4" screen filter and pressure regulator. See Page 12 for a reference diagram.

Hydraulic water pressure to operate the backwash valves is supplied through the water-stack assembly. The water is routed through the 3/4" filter to remove contaminate that could cause plugging of the solenoid valves, pressure differential switch, etc. **The water-stack 3/4" filter should be cleaned periodically to remove accumulated dirt.**

9.0 SYSTEM START-UP

The following start-up sequence can be used for starting Yardney Maxi-Flush Automatic Backwashing filter systems.

NOTE: First time start-up should be done with caution. All air must be purged out of all lines and filters. Valves and pumps must be opened slowly to prevent damage to the filters and irrigation system.

9.1 Controller Operation during Initial Start-up

Start the system in the manual mode with the controller in the "OFF" position. Introduce water into filter system filling lines and tanks slowly; the 1/2" shut-off valve on the water-stack assembly should be in the "OPEN" position.

9.2 Air Purge Procedure

When approximately 10 PSI system pressure is reached, turn the manual override screw on solenoid for Filter #1 to "ON" position for 1 to 2 minutes. Turn Filter #1 "OFF" and repeat on Filter #2, etc. This procedure will purge air from the system. When 50% of system pressure is obtained, repeat flush cycle manually again.

9.3 Initial Manual Flush Cycle

When 100% of system pressure is reached or after 15 minutes of operation, repeat the flush cycle allowing 1 minute flush per cartridge.

9.4 Initial Automatic Flush Cycle

With the manual override screw in "OFF" position, turn the backwash controller "ON." Set 30 seconds on the flush time and 15 seconds on the delay time. Push manual "START" button and system will go through a flush cycle.

9.5 Setting the Pressure Differential Switch

Set the pressure differential switch pointer/contact to 8 PSI.

9.6 Hydraulic Water Pressure Adjustment to Backwash Valves

On Maxi-Flush filter systems it will be necessary to adjust the pressure regulator on the water-stack assembly to permit the backwash valves to open. As soon as the system operating pressure has been reached, loosen the lock nut on the regulator and turn the adjustment handle counter clockwise. This will reduce the water pressure supplied to the backwash valve actuator. Manually put one valve into backwash using the manual override on the solenoid valve. Slowly turn the adjustment handle on the regulator clockwise, which increases the water pressure supplied to the backwash valve. Continue increasing the pressure until the backwash valve opens smoothly. This can be observed by watching the piston stroke through the observation slit in the valve actuator. Excessive pressure on the valve actuator could result in the backwash valve opening too fast and creating water hammer along with possible valve damage. After reaching the proper regulation pressure tighten the locking nut.

9.7 Backwashing Frequency

The automatic controller should be set so that the timed frequency of filter backwashing corresponds to the pressure differential set point. Establishing the time frequency of flush may require several days of monitoring to determine the proper setting. (Example: If it takes 2 hours of operation to reach the dirty filter pressure switch setting of 8 PSI, the backwash frequency should be set at 2 hours on the controller.) If the system is not running at rated flow, a differential may never be reached. If that is the case, set the timed flush to operate once every 2-hour period.

9.8 Backwash Flow Adjustment

9.8.1 2" Restrictor Valve - Model MFS 6 and Model MFS 8

The 2" restrictor should be opened approximately two turns which will provide for adequate flushing of contaminants from the filter system. If the filter does not return to its clean filter pressure differential after flushing, and the "flush duration" setting is adequate, the valve should be adjusted to a more open condition that provides for removal of contaminants. The valve should be set at its minimum open setting that still provides adequate dirt removal from the system.

9.8.2 2" Restrictor Valve - Model MFS 10

The 2" restrictor valve is supplied in its minimum open position which may provide for adequate flushing of contaminants from the filter system. **If the filter does not return to its clean filter pressure differential after flushing, and the "flush duration" is adequate, the valve should be adjusted to a more open condition.** A 12" adjustable wrench will be required when making this adjustment. To adjust the restrictor, turn the hex nut on the valve clockwise until the desired valve opening is obtained. The valve should be set at its minimum open setting that still provides adequate dirt removal from the system.

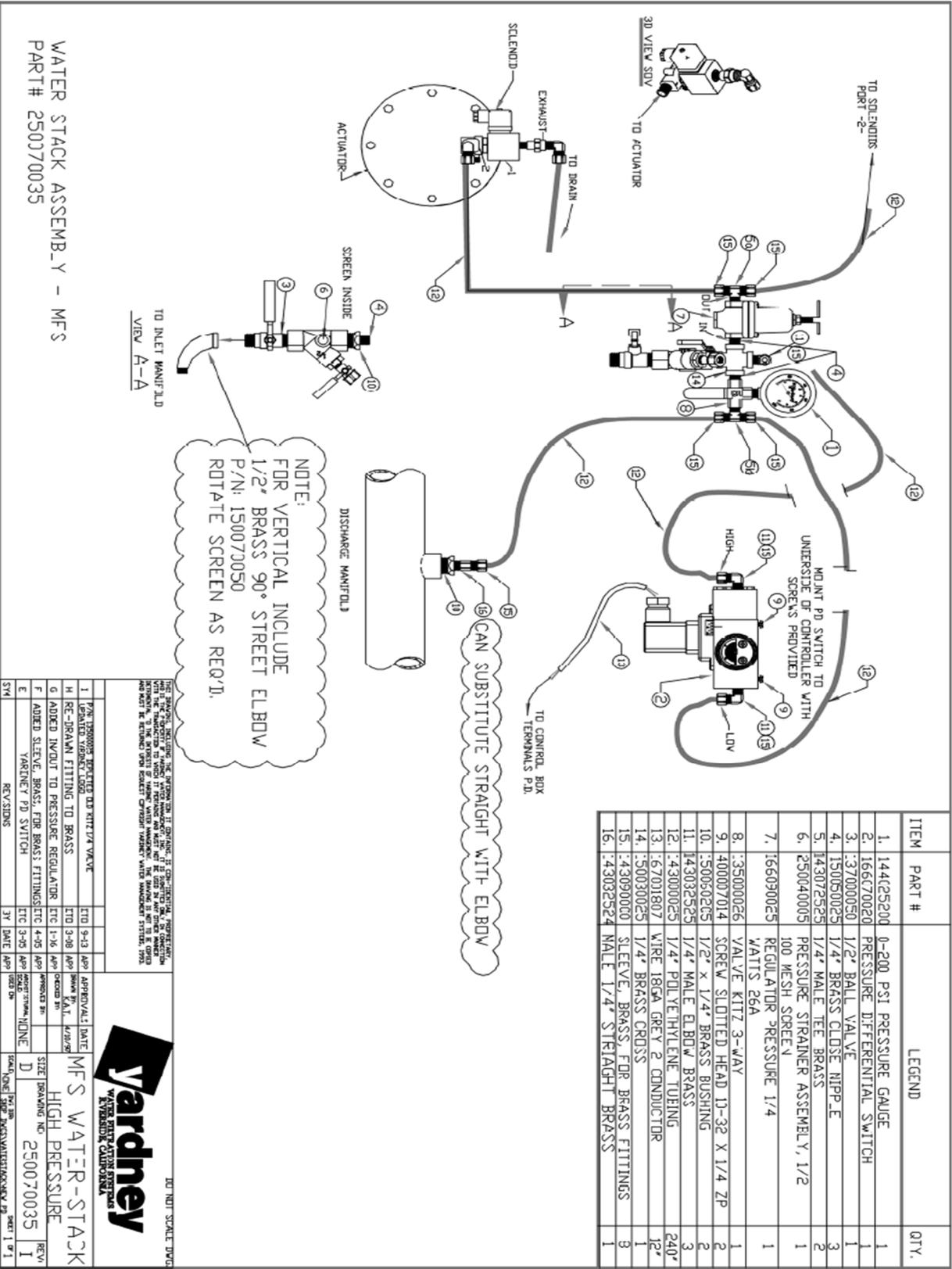


FIGURE 1: WATERSTACK ASSEMBLY.

REFERENCE | TROUBLE SHOOTING MAXI-FLUSH SCREEN FILTER

PROBLEM: POOR FILTRATION

PROBABLE CAUSE	SOLUTION
Excessive flow through filters forcing contaminants through filter outlet.	Increase flush frequency and/or adjust pressure differential pressure switch.
Air in filters (s)	Install auto or manual air bleed device on inlet piping.
Excessively high pressure forcing contaminants through filters.	Readjust backwash flow control valve to proper setting to effect removal of entrapped dirt.

PROBLEM: CONSISTENTLY HIGH PRESSURE DIFFERENTIAL

PROBABLE CAUSE	SOLUTION
Filter sealed over with contaminants restricting backwash flow.	Open filters and remove any excess or caked from the surface of the screen. Pressure wash cartridges if fouled with residual contaminant. Return filters to normal service. Backwash each unit until pressure differential returns to normal.
Insufficient backwash flow	Readjust backwash flow control valve to proper setting to effect removal of entrapped dirt.

PROBLEM: BACKWASH VALVE(S) LEAK

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

PROBLEM: WATER HAMMER

PROBABLE CAUSE	SOLUTION
Air in tanks.	Bleed off trapped air. See start-up instructions Section 9.2. Check also for leaks in pump suction line. An air bleed at filter inlet may also help.
Long backwash line causing vacuum on backwash valve.	Install vacuum breaker on backwash valve.
Excessive pressure on valve actuators causing rapid opening.	Reduce water pressure to actuate valves by adjusting pressure regulator. See Section 9.6

PROBLEM: INCREASING FREQUENCY OF BACKWASH CYCLE

PROBABLE CAUSE	SOLUTION
Backwash flow or duration is not adequate to flush filter of all contaminants.	Readjust backwash flow and/or increase flush time of backwash cycle.
Increased concentration of contaminants in water supply. (Note: May only be a seasonal problem.)	Flush more frequently. Possible over filtering of water; consider coarser filtration.

PROBLEM: AUTOMATIC BACKWASH FAILS TO CYCLE

PROBABLE CAUSE	SOLUTION
Controller power off, blown fuse or circuit breaker tripped.	Turn power on. Be sure wiring is connected. Re-set circuit breaker or install new fuse.
Improper setting on pressure differential switch.	Adjust pressure differential switch.
Solenoid(s) malfunctioning.	Check connections. Clean ports. Check filter screen on water pickup assembly for damaged screen and clean or replace if necessary.

REFERENCE | PREVENTATIVE MAINTENANCE SCHEDULE

The following is a schedule for preventative maintenance. The chart should be located in an accessible, but protected, location.

TASK	SEASONAL START-UP	SEASON SHUTDOWN	DAILY	WEEKLY	BI-MONTHLY	MONTHLY	QUARTERLY
Inspect and clean cartridge	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					X
Inspect valve interior components (seals, diaphragm, shaft)	X						
Check coupling closure gasket under pressure	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		