

MINITWIST USERS' MANUAL

Tekleen

Check List for Optimal Filter Performance

There should be no back-pressure on the flush line. A 1" valve should have a 2" waste line. Do not use rubber hosing or flexible tubing for the flush line. When hooking up the flush line to the flush valve, use a union.

The differential pressure gauge should be mounted within 3 feet of the filter. Long tubing lines will result in faulty gauge readings.

The water supply line to the top of the piston* should be connected to the fitting on the filter top section and filtered by a 1/4" mini filter.

The fitting on the side of all pistons* is for venting only. It should be open to atmospheric pressure.

Sealant should be applied to the wiring contact points on the backside of the d/p gauge to protect it from water. The d/p gauge should be mounted upside down to prevent shorting of the contact points in the event of a water leak.

If the filter outlet discharges to a tank, or to open atmosphere, a valve should be installed at the filter outlet to maintain a minimum working pressure of 40 PSI during the cleaning cycle.

If the flush valve fails to open or close, verify the connections to the controller are wired correctly (see diagram on pg. 15).

A surge protector should be installed before the electronic controller.

It is recommended that a pressure gauge be installed on the inlet of the filter.

*Some models are provided without pistons. If this is the case, disregard piston instructions.

MINITWIST USERS' MANUAL



AUTOMATIC FILTERS, INC.
Tekleen®

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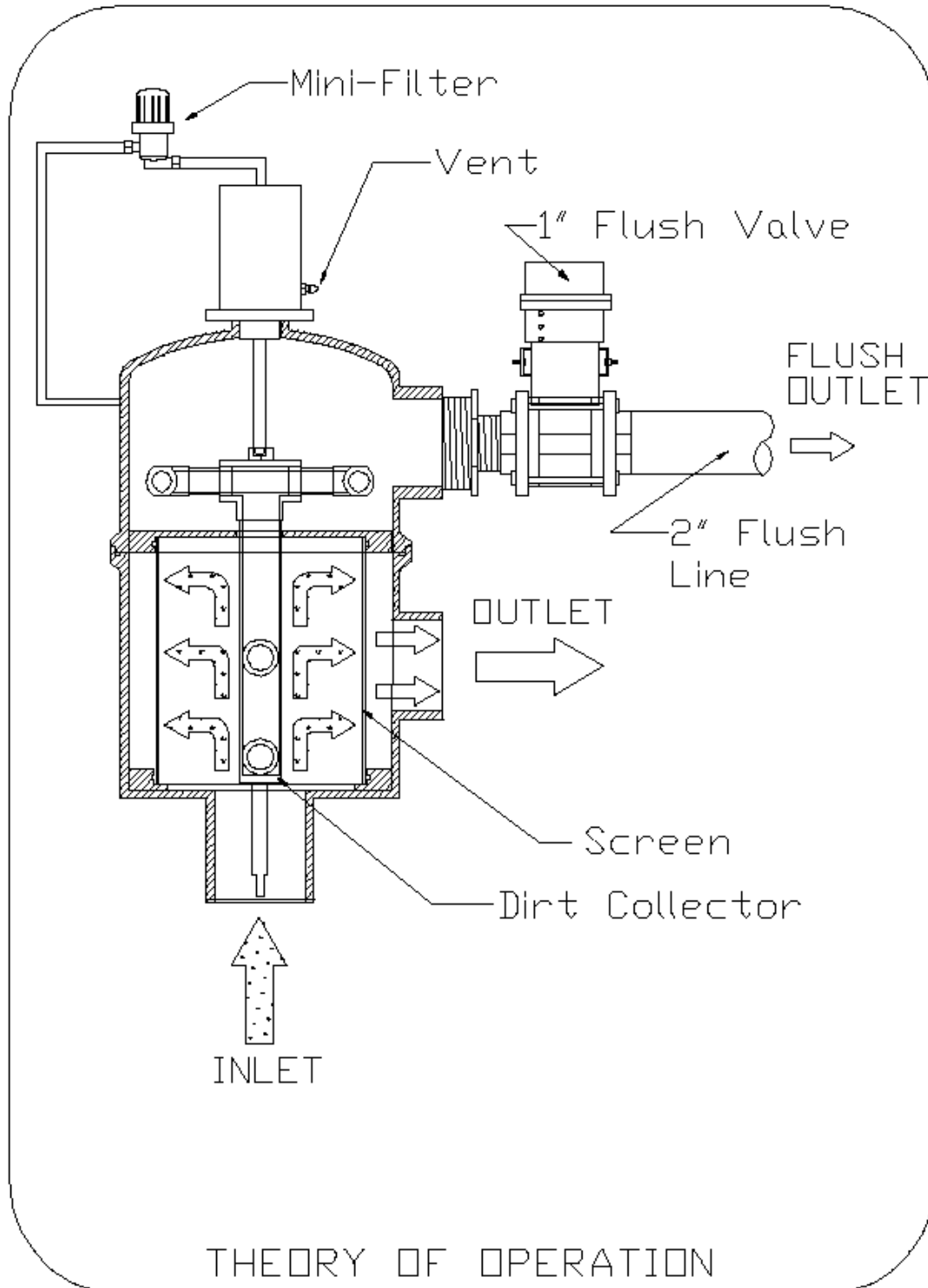
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SECTION I INTRODUCTION

1.1 Description

The MTF series features automatic, self cleaning screen type water filters. The filtration system consists of a filter body with a fine screen, a flushing valve, and an electronic controller.



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1.2 Theory of operation

Pressurized water enters the filter inlet and travels through a fine mesh stainless steel screen where small contaminants (down to 10 microns in size) are filtered out. The clean water then exits through the outlet of the filter.

When the fine screen becomes contaminated, a pressure differential is sensed causing the automatic controller to open the flush valve. When the flush valve opens, an atmospheric pressure path is established, causing the clean water to reverse flow at the point of suction across the filter element. This process removes contaminants from the screen, sending the dirty water through the nozzles and the dirt collector mechanism and out the flush valve.

The water passing through the hydraulic motor creates an axial rotation of the dirt collector. This movement, combined with linear advancement, allows the dirt collector to vacuum the entire screen element.

The entire cleaning cycle takes approximately 4-6 seconds. For piston-less filters, the cleaning cycle take approximately 2-4 seconds. It should be noted that even during the flush cycle, the filtration process and main flow continues uninterrupted.

1.3 Recommended Applications

Tekleen MTF water filters are ideal for filtering out silt, scale, sand, rust, dirt and organic material like algae from virtually all types of water sources. Applications include cooling water, drinking water, instrument and sensor protection, pump seals, irrigation, and many more.

1.4 Design Features

Among the many features of the MTF models is an avoidance of forcing contaminated water back into the system, which often happens with sand media filters. MTF filters will deliver clean water or no water at all.

The most predominant feature is its ability to remove organics such as algae and other suspended particles.

All internal elements can be removed and disassembled from the filter body without disruption of the plumbing.

The backwash cycle, Tekrinse, uses 90% less rinse water than other filters on the market today.

For special constructions and applications, see Appendix I, page 11.

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1.5 Filter Specifications Chart

Model	Flange Size	Screen Area	Max. Flow	Empty Weight	Service Area
	Inch	Sq. Ft.	GPM	Lbs.	Inch
MTF 1	1	0.6	100	25	6
MTF 1.5	1.5	0.6	100	25	6
MTF 2	2	0.6	100	25	6
MTF2-L	2	1.5	200	70	10
MTF3-L	3	3	350	100	20
MTF 3	3	1.5	350	75	10
MTF 4	4	1.5	350	80	10
MTF4-L	4	3	500	110	20
MTF6	6	3	600	120	20

SECTION II INSTALLATION AND HOOK-UP

2.1 Mechanical Hook-Up and Orientation

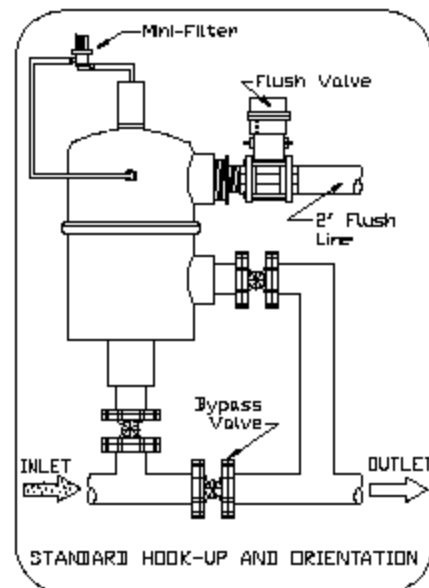
The positioning of the filter tank should be determined by the disposal of waste water and to allow easy access and removal of filter element (see Filter Specifications Chart for the required service area). The Tekleen filter can rest on the inlet and outlet flanges or can be mounted on a stand if desired. In fact, the filter can be mounted in any position (vertical, upside down, etc.). The electronic controller should be mounted in close proximity to the filter housing.

2.2 Plumbing Hook-Up

The waste discharge pipe should be at least one inch larger in diameter than the size of the flush valve (1" valve to 2" pipe). The waste pipe should be kept as short as possible with no more than one elbow. This will minimize back pressure on the flush line.

It is recommended that a union be installed between the flush valve and waste line for ease of filter maintenance.

Flush lines should not be elevated. This will affect the pressure difference required for the cleaning cycle. If it is necessary to run flush lines uphill, please consult with the manufacturer.



Flush line pipe must be ridged. It should not be made out of flexible tube or rubber hosing. Any restrictions in the flush line will reduce the cleaning ability of the filter.

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A block valve should be installed at the inlet of the filter. During start-up, the block valve should be only slightly open to prevent a surge of pressure across the filter when the pump is started. Once the pump is on-line, slowly open the block valve. This will prevent any possible damage to the filter due to a pressure surge.

2.3 GB6, DP Gauge, and Electric Ball Valve Connection

Before power is applied to the electronic controller, make all connections between the controller, DP Gauge, and electric ball valve (see page 15).

1. **BALL VALVE:** Connect the ball valve to the controller as shown in the wiring diagram (page 15). Activate the manual start switch on the GB6 controller and visually inspect the open and close movement of the ball valve.
2. **FLUSHING TIME ADJUSTMENT:** The flush time is normally set to 4-6 seconds. **NOTE:** Excessive flush time will not improve cleaning, and may lead to unnecessary wear and tear on filter equipment.
3. **PRESSURE DIFFERENTIAL ADJUSTMENT:** The differential switch is preset for 7 PSI. It can be changed to different set points (see your electronic controller manual).

USING 1/4 INCH DIAMETER TUBING

1. Attach tubing to the low pressure 1/4" fitting (on the outlet flange). Attach the other end of the tubing to the fitting on the DP switch marked "low" pressure.
2. Attach tubing to the high pressure 1/4" fitting (on the inlet flange). Attach the other end of the tubing to the fitting on the DP switch marked "high" pressure.

Notes: Do not run tubing more than three feet in length (preferably two feet or less). Due to the pressure drop across the tubing, the electronic controller may not operate properly if tubing is too long.

3. Attach tubing to the end of the piston (if included). Attach the other end to the fitting on the top section of the filter. The mini-filter should be added to this 1/4" line to prevent larger debris particles from plugging the piston. The fitting on the side of the piston should be used to vent the piston (see appendix IV pg. 14).

SECTION III OPERATION AND ADJUSTMENTS

3.1 Start-Up

During start-up, the block valve at the filter inlet should be only partially open to prevent a surge of pressure across the filter when the pump is started. Once the

pump is on-line, slowly open the block valve. This will prevent any possible damage to the filter due to a pressure surge.

During the initial filling of the main pipeline, there may not be enough back-pressure downstream from the filter to allow the cleaning cycle to function properly. Therefore, it is necessary to install a valve at the outlet to be partially closed (i.e., gate valve, ball valve or butterfly valve).

If a downstream main line valve is partially closed, enough to provide 40 PSI at the filter inlet pressure gauge, the self cleaning cycle will operate properly. Once the total system is fully charged, the downstream valve can be adjusted, as long as 40 PSI is maintained at the filter inlet during the cleaning cycle.

In applications where the main flow to the filter is intentionally interrupted and the line is drained, it is advisable to install a flow control or pressure sustaining valve downstream from the filter. This will create back pressure on the filter in order to enable proper flushing while main line pressurizes.

Once the system is fully pressurized, push the manual flush button on the electronic controller and verify that the piston is moving. For pistons with non-metal casings, a flashlight can be held up to the case, where the bottom cap of the piston can be seen, and a visual check performed to verify the piston is completing the full stroke. For metal pistons, an indicating pin located on the piston can be checked to verify the full stroke of the piston is obtained. Also during this manual flush, verify that the flush valve is opening all the way. During the first cleaning cycle, air in the system will be expelled, so it may require more than one cycle to achieve proper cleaning.

3.2 Cleaning Cycle Requirements

WORKING PRESSURE

The filter requires a minimum pressure of 40 PSI at the inlet during the cleaning cycle for effective cleaning.

Maintaining the necessary minimum working pressure during the cleaning cycle requires a pump with sufficient capacity. Pump selection will depend on three key parameters: the required **working pressure (40 PSI)**, the **process flow** of the system, and the **flush flow** of the filter.

PROCESS FLOW

Process flow is the volumetric rate of water that will pass through the filter during normal operation (when the filter is not in a cleaning cycle).

FLUSH FLOW

The flush flow is the volumetric rate of water that will be used during a cleaning cycle. This rate depends on the size of the flush valve used.

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FLUSH VALVE SIZE		FLUSH FLOW	
inch	mm	gpm	m ³ /hr
1"	DN25	60-80	14-18
1.5"	DN40	120-160	27-36
2"	DN50	240-320	55-73

To determine if a pump will satisfy the performance needs of your system, add the process flow of the system to the flush flow of the filter to find the total flow.

Process Flow + Flush Flow = Total Flow

Consult the pump curve provided by the pump manufacturer to determine if it meets the performance requirements. The pump curve describes the performance of the pump in terms of flow and pressure. Locate your total flow on the graph to determine what pressure will be maintained at that flow. If the pressure is greater than 40 PSI, then the pump satisfies the requirements.

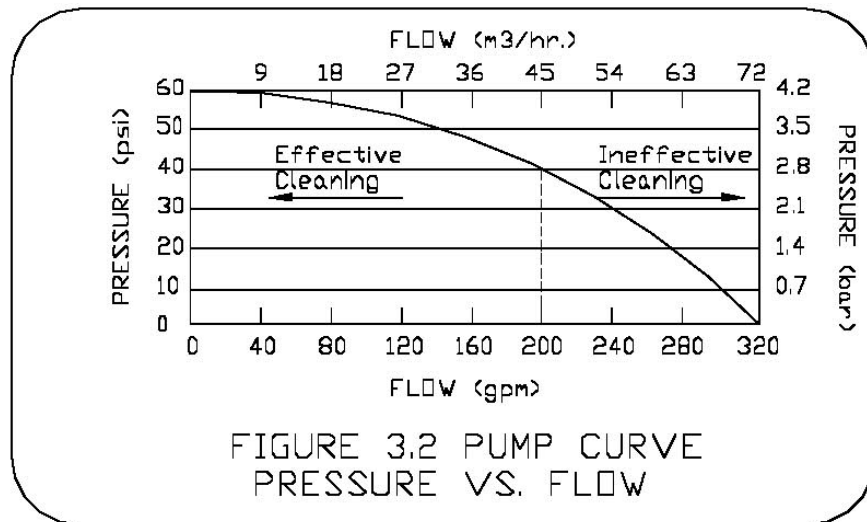


Figure 3.2 shows an example of a pump curve. Since a minimum of 40 PSI must be maintained, the critical point for this pump is at 200 gpm. Any flow greater than this will not yield effective cleaning during the backwash cycle.

If, for example, the process flow were to be 190 gpm and the flush flow 40 gpm, the total flow would be 230 gpm. This would produce an inlet pressure less than the required 40 PSI and as a result the filter would not be able to perform an effective cleaning cycle.

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If the process flow were to be 150 gpm with a flush flow of 40 gpm, the total flow would be 190 gpm. This would produce an inlet pressure greater than the required 40 PSI and result in an effective cleaning cycle.

SECTION IV MAINTENANCE

4.1 Shutdown Procedure

When shutting down the filter, steps must be taken to ensure that there will be no reverse flow across the screen that may damage components. The proper shutdown sequence is as follows:

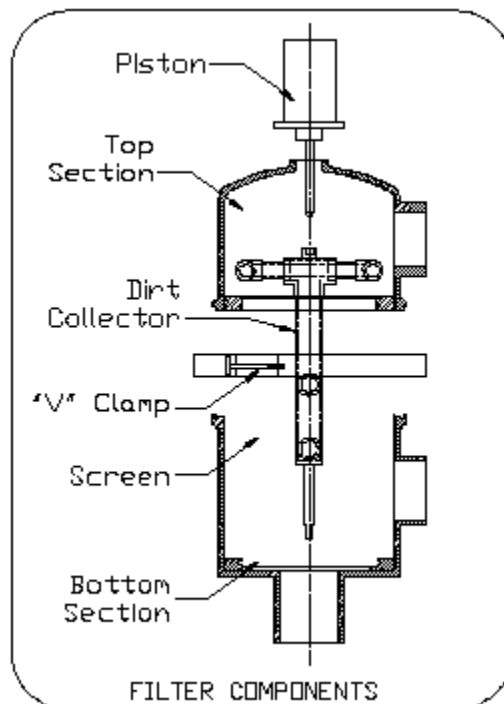
1. Open the bypass valve.
2. Close the outlet valve completely.
3. Close the inlet valve completely. The filter is now isolated and the system flow is bypassed.
4. Relieve any residual pressure in the filter housing by detaching the 1/4" plastic tubing from any fitting.

4.2 Filter Cleaning

It is recommended that the fine screen be inspected periodically for wear and tear. The dirt collector, flush valve, piston, and differential pressure gauge should be inspected at this time as well. Inspection should be performed every three months to ensure that the filter is operating effectively.

To inspect the MTF filter, follow the shutdown procedures outlined in Section 4.1 and proceed as follows:

1. Switch the controller to the "Off" position and unplug it from the power source.
2. Disconnect the valve from the controller.
3. Remove all 1/4" tubing from the filter housing.
4. Disconnect the flush line from the filter.
5. Remove the "V" clamp from the center of the filter housing.
6. Lift the top section of the filter directly up. This will lift the dirt collector from the screen.



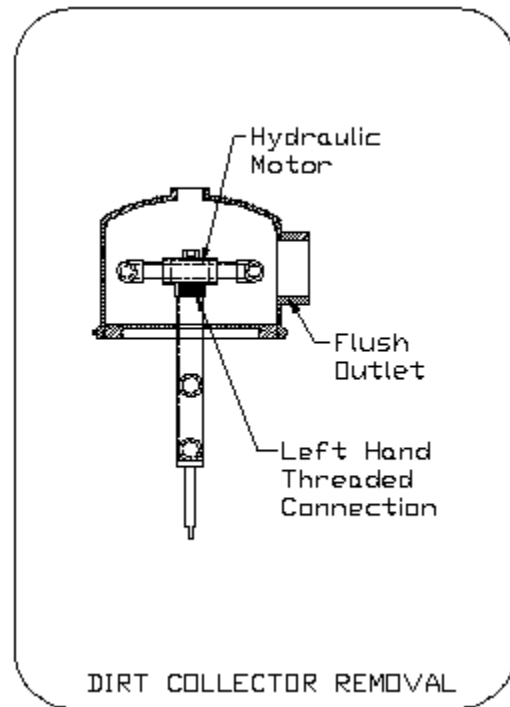
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4.3 Dirt Collector Replacement

Should the dirt collector ever need replacing, follow steps outlined in section 4.1 & 4.2 and proceed as follows:

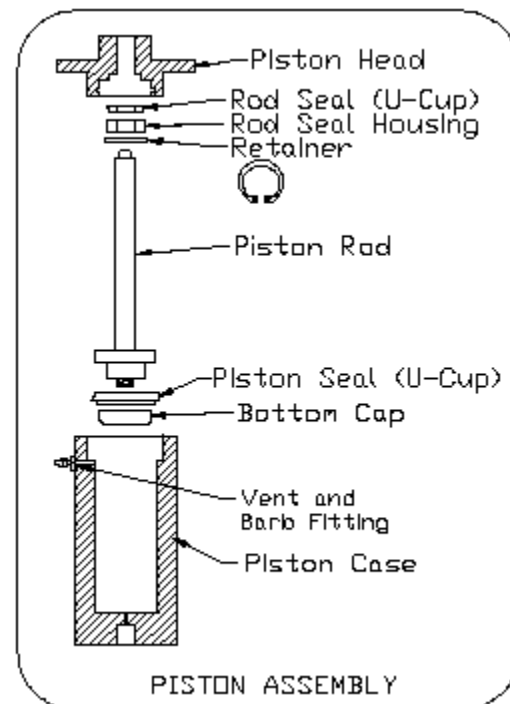
1. Brace against the hydraulic motor by way of the flush outlet to prevent rotation.
2. Twist the dirt collector in a right hand direction (**the connection is a left hand thread**).
3. Remove the hydraulic motor from the top section.
4. Remove the dirt collector.



4.4 Piston Removal/Replacement

If the piston needs to be removed or replaced, follow the steps outlined.

1. Follow steps 1-4, section 4.1
2. Disconnect the 1/4" tubing to the piston.
3. Unscrew the hex head of the piston from the top section.



4.5 Periodic Inspection

The following parts should be inspected annually for wear and tear and should be replaced if necessary:

- Cover Seal
- Fine Screen
- Dirt Collector Nozzles
- Air/Water Connections
- O-rings
- Piston
- Dirt Collector

SECTION V TROUBLESHOOTING GUIDE

5.1 Problem: Excessive pressure drop through filter without flushing.

POSSIBLE CAUSES

1. Controller is not turned on.
2. Flush valve is wired incorrectly.
3. Filter is installed backwards.
4. D/P switch is malfunctioning.

SOLUTIONS

1. Turn the power switch to “on”.
2. Consult the wiring diagram and verify that the valve is connected correctly.
3. Verify correct flow through filter.
4. Check set point on D/P switch. Make sure ¼” black tubing is less than 3 feet in length and unobstructed. Verify that the D/P switch is connected to the appropriate fittings on the filter.

5.2 Problem: Frequent or continuous flushing while filling main pipeline.

POSSIBLE CAUSES

1. Downstream pressure is not available to provide effective cleaning cycle.
2. High flow rate exceeds the D/P switch’s preset differential.
3. Filter may have been shut down while the screen is dirty, resulting in a layer of contaminant on the screen that has caked on.

SOLUTIONS

- 1&2. Partially close downstream mainline valve. Filter inlet gauge should read at least 40 PSI.
3. A “super flush” must be performed as follows: Close the outlet valve and initiate a cleaning cycle. Open the outlet valve and check the filter differential. If the differential does not return to zero, repeat the process.

5.3 Problem: Frequent flushing during normal operation.

POSSIBLE CAUSE

1. Very dirty water.
2. Marginal working pressure results in poor cleaning cycle.
3. Screen may be partially plugged.
4. Dirt collector may be jammed which results in only cleaning the screen directly in front of the nozzles.

SOLUTION

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1. Screen mesh may be too small for the given application. Consult manufacturer.
2. Verify the inlet pressure is at least 40 PSI during the cleaning cycle. If not, partially close the outlet valve to increase inlet pressure.
3. Perform super flush as described in section 5.2.
4. Open filter and verify the dirt collector rotates freely.

5.4 Problem: Screen will not clean properly.

POSSIBLE CAUSE

1. The flush cycle duration is too short.
2. Filter was shut down dirty with contaminants caked on the screen.
3. Flush line is causing back pressure on the flush valve.
4. Piston is not operating properly.

SOLUTION

1. Increase flush duration on controller panel.
2. Perform super flush as described in section 5.2.
3. Make sure the flush line is 1" larger than the flush valve (See section 2.2).
4. Inspect piston components and verify movement of the piston rod. Make sure that the inlet pressure is at least 40 PSI during the cleaning cycle.

SECTION VI SPARE PARTS

6.1 Recommended Spare Parts

The following are recommended spare parts to keep in stock:

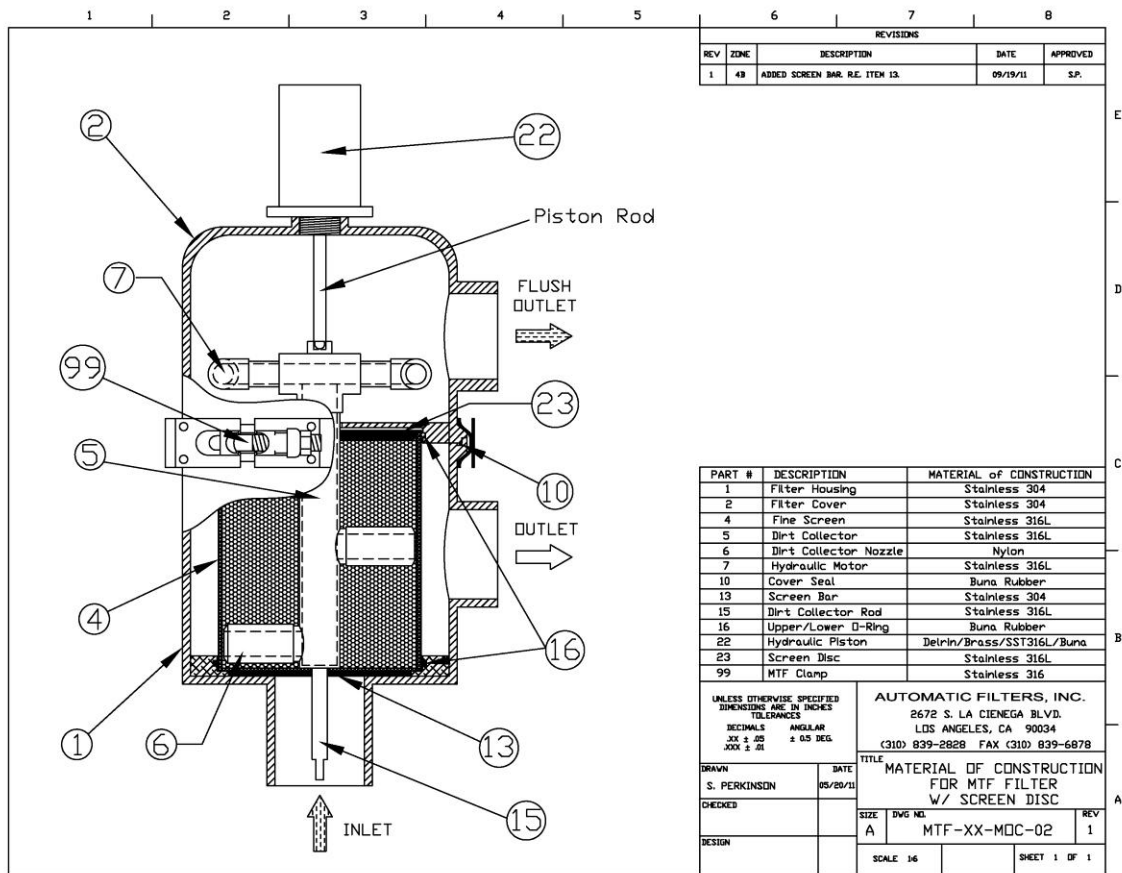
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|--------------------------|------------------------------|
| - Fine Screen (4) | - Set of O-rings (16) |
| - Cover Seal (10) | - Dirt Collector (5) |
| - D/P Switch (34) | - Controller Board |
| - Piston Repair Kit (29) | - Dirt Collector Nozzles (6) |
| - Mini-Filter (18) | |

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6.2 Spare Parts List



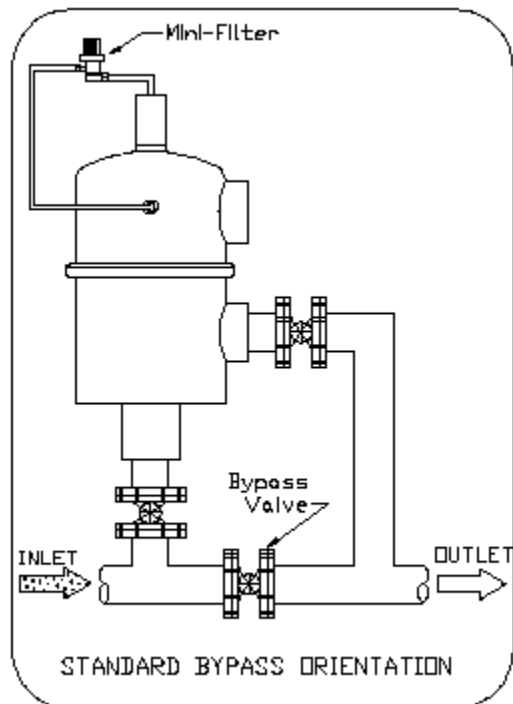
APPENDICES

Appendix I Special Installation

Frequently it is necessary to have flow even when the filter is out of service for periodic maintenance. In this situation, it is recommended to create a by-pass.

FILTER BY-PASS

It is very simple to create a by-pass, especially for the on-line models. To do so, add a block valve on both the inlet and outlet and a bypass with another block valve (see drawing).



For more information:

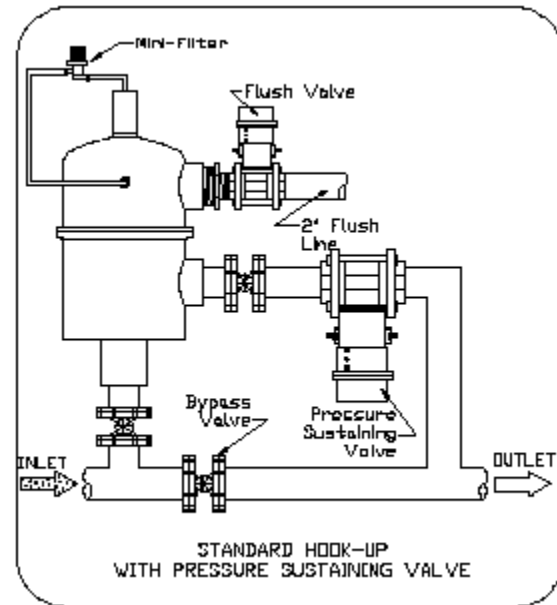
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If the by-pass valves are provided with actuators, it can be converted into an automatic by-pass system by wiring them to the controller (consult controller manual).

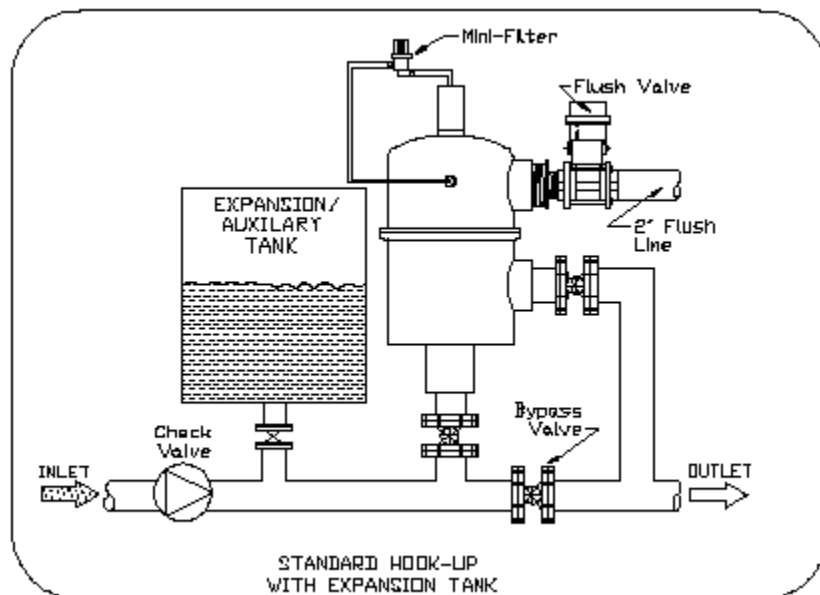
Appendix II Alternate Flushing Methods

There are several possible solutions if there is not enough pressure and/or flow to successfully achieve a backwash. For low flow installations with pressure greater than 40 PSI, proceed as follows:

1. The simplest solution is to place an automatic valve (pressure sustaining valve) at the filter outlet. The valve will close when the filter is flushing. During the cleaning cycle, there would be no water available to the system and the full pump capacity will be used for the backwash filter.



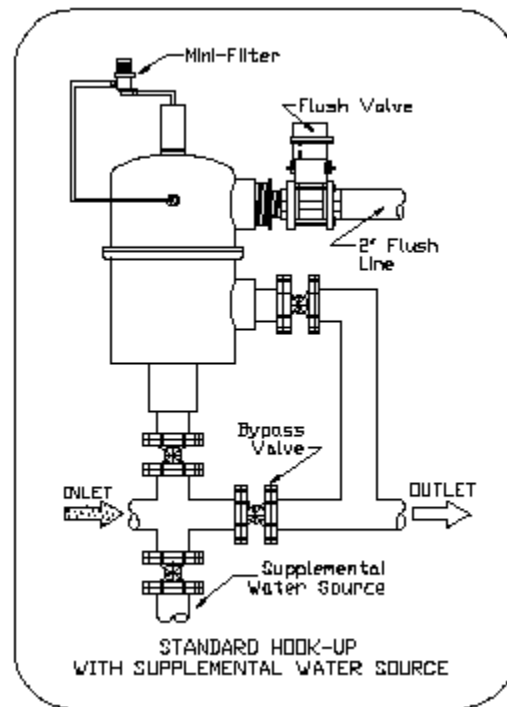
2. The required extra flow can be obtained by means of an expansion tank installed directly upstream of the filter inlet. The expansion tank contains water at operating pressure to supply to the filter during the cleaning cycle.



For more information:

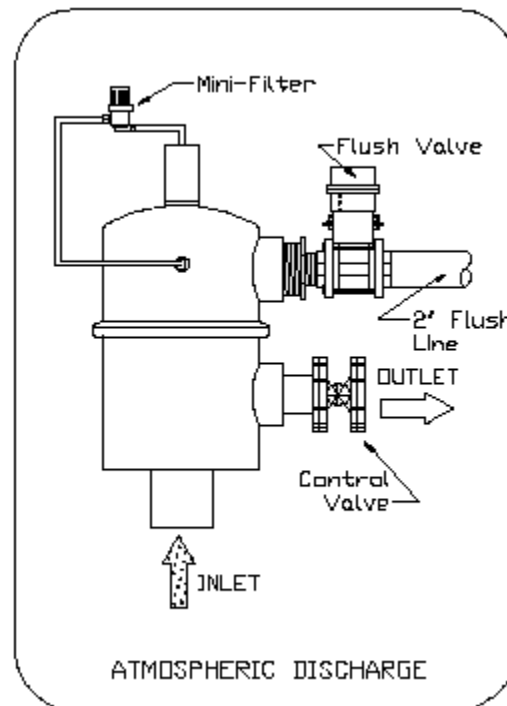
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3. Another way to obtain supplemental flow is to add a water source to the inlet of the filter. The water source would be controlled with an actuated valve, opening during the cleaning cycle (see controller manual for wiring).



Appendix III System with Discharge to Atmosphere

If the filter freely discharges to the atmosphere, it is recommended that a control valve be installed at the filter outlet. In this case, the control valve at the outlet would be used to create back pressure on the system by reducing the flow across the filter. In addition, the discharge valve can be used as a pressure sustaining valve in cases where pressure is not adequate during backwash.

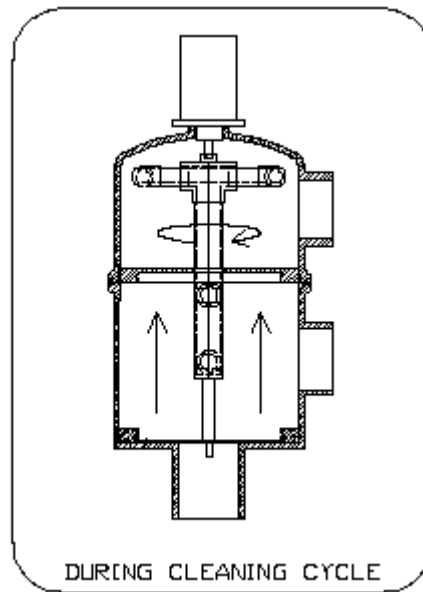
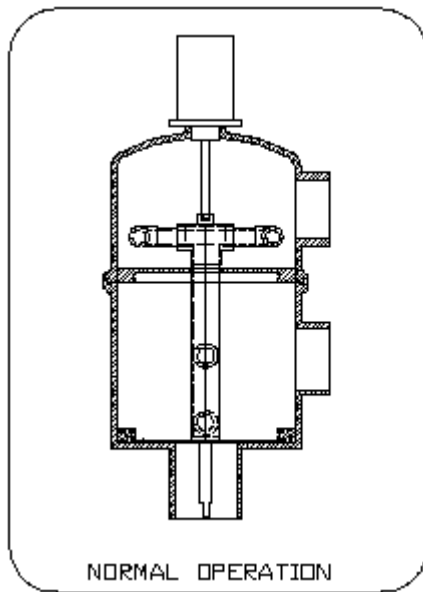


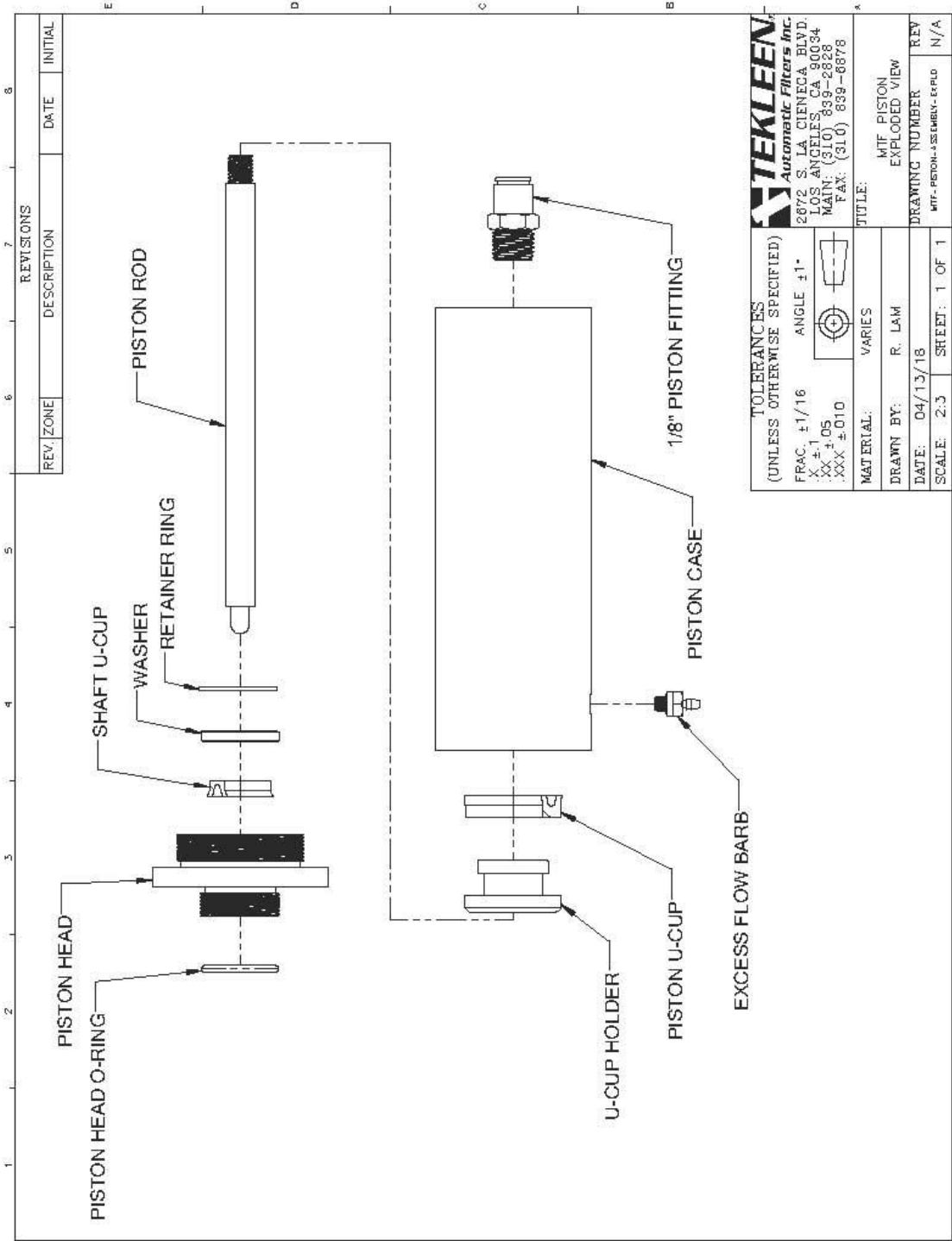
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Appendix IV Piston

Due to longer screens on larger filters, it is necessary to employ a piston for the cleaning mechanism. The piston is used to control the linear movement of the dirt collector during cleaning cycles. This enables the dirt collector to clean the entire surface area of the screen in a spiral-upward motion. At the end of the cleaning cycle, the flush valve closes and the normal filtration process resumes. At this time, the piston is pressurized, which pushes the dirt collector back into its original position, ready for the next cleaning cycle.

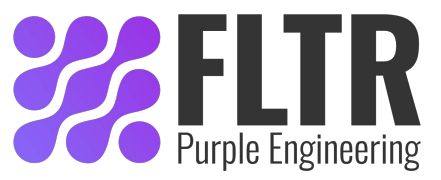




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TOLERANCES (UNLESS OTHERWISE SPECIFIED) FRAC. ±1/16 ANG. ±1° XX ±.05 XXX ±.010	
MATERIAL: VARIES	TITLE: MIF PISTON EXPLODED VIEW
DRAWN BY: R. LAM	REV
DATE: 04/13/18	DRAWING NUMBER
SCALE: 2:3	MIF-PISTON-ASSEMBLY-EXPLO
SHEET: 1 OF 1	N/A

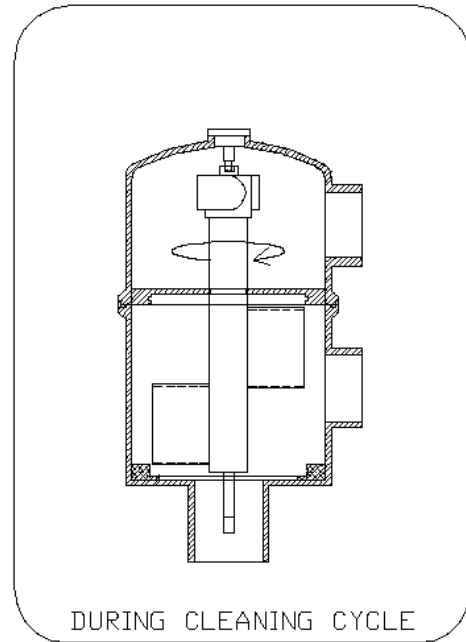
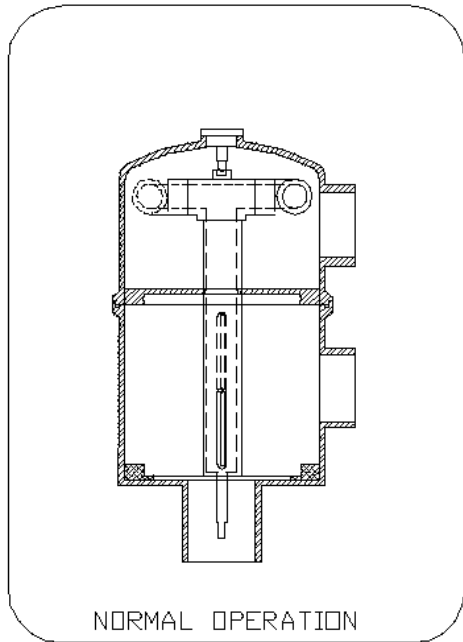
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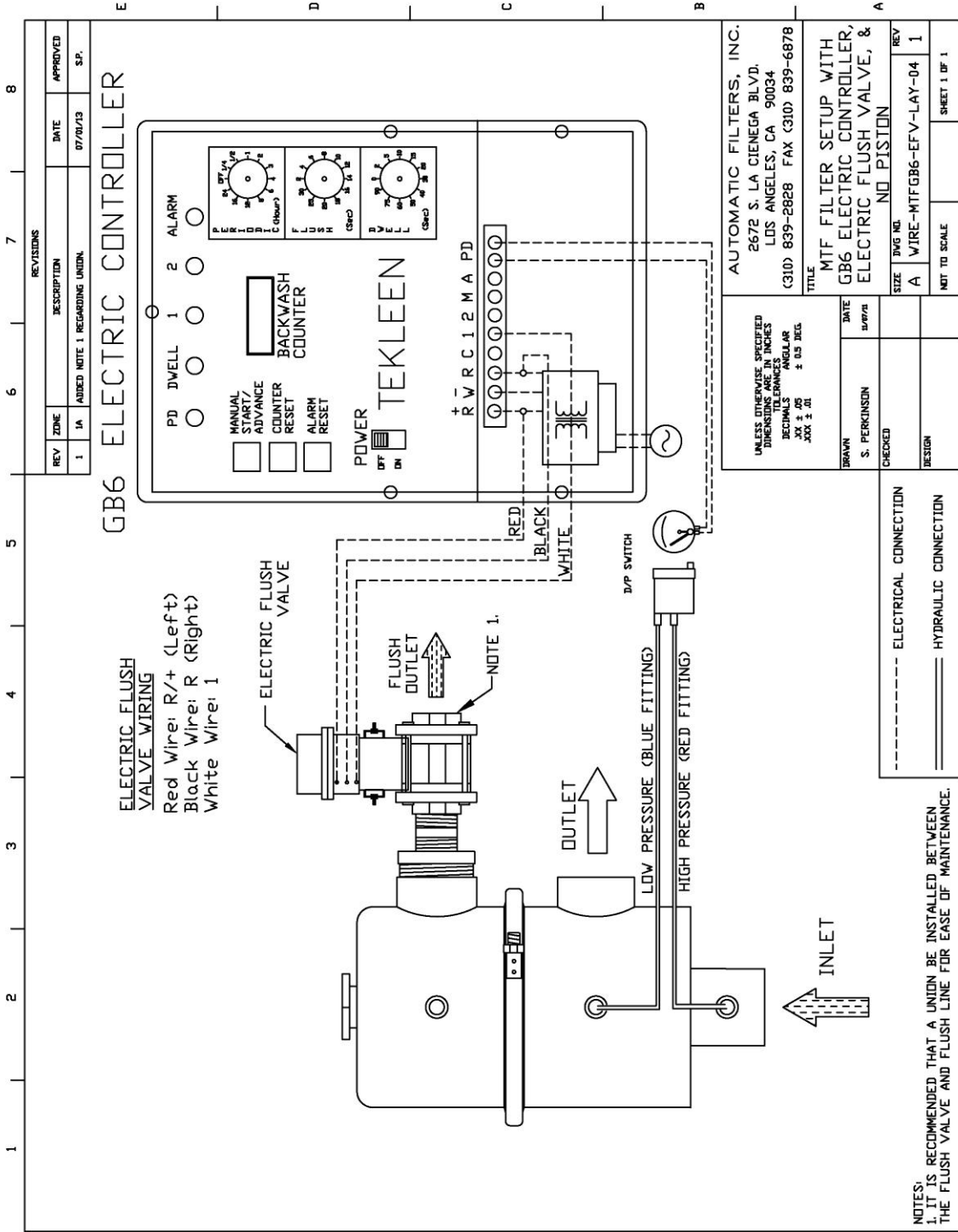
Appendix V Piston-less Filters

Some MTF models do not use a piston. Instead, a buttress is inserted where the piston would be. This configuration reduces the number of moving parts, and can provide a simple and durable solution.



For more information:

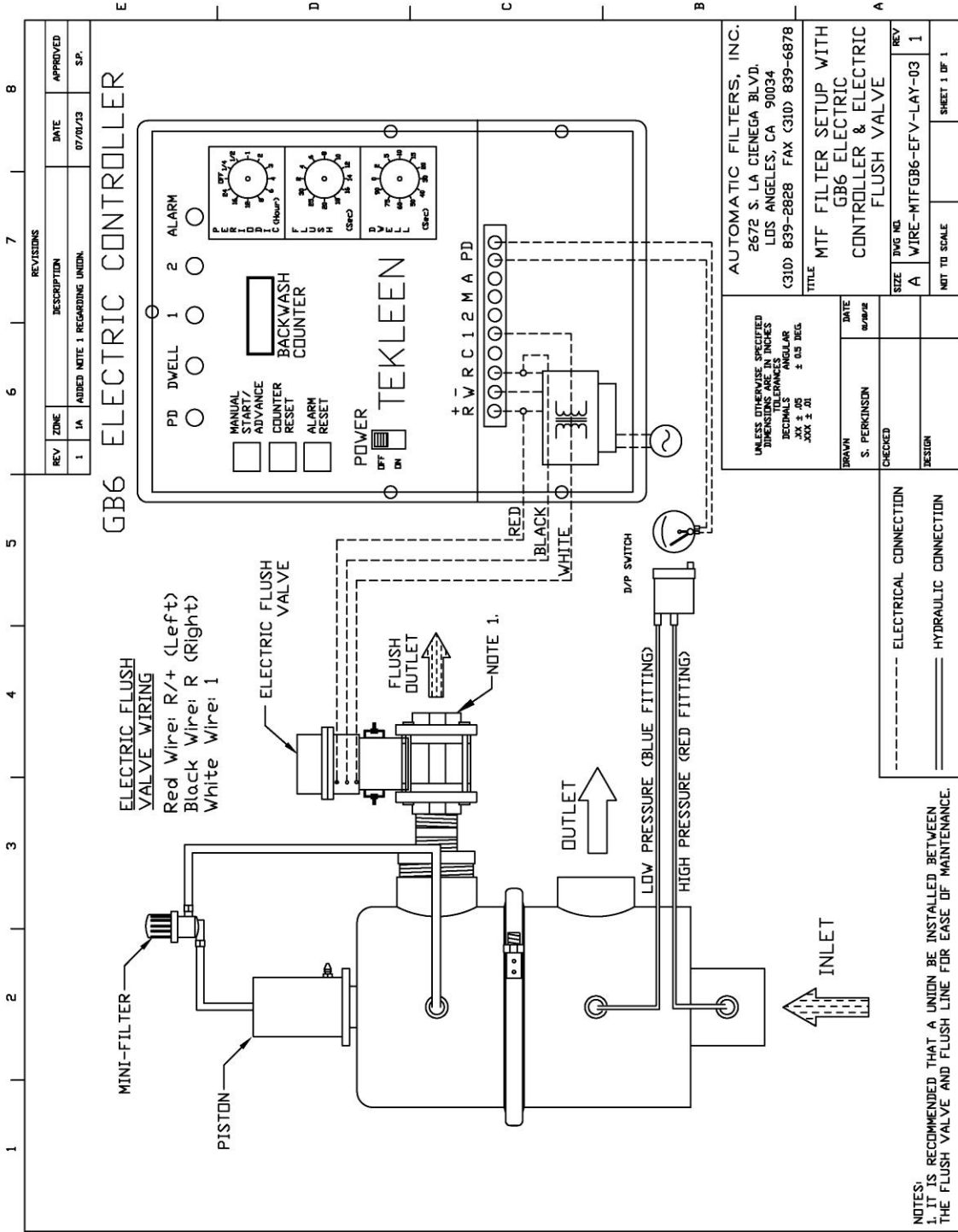
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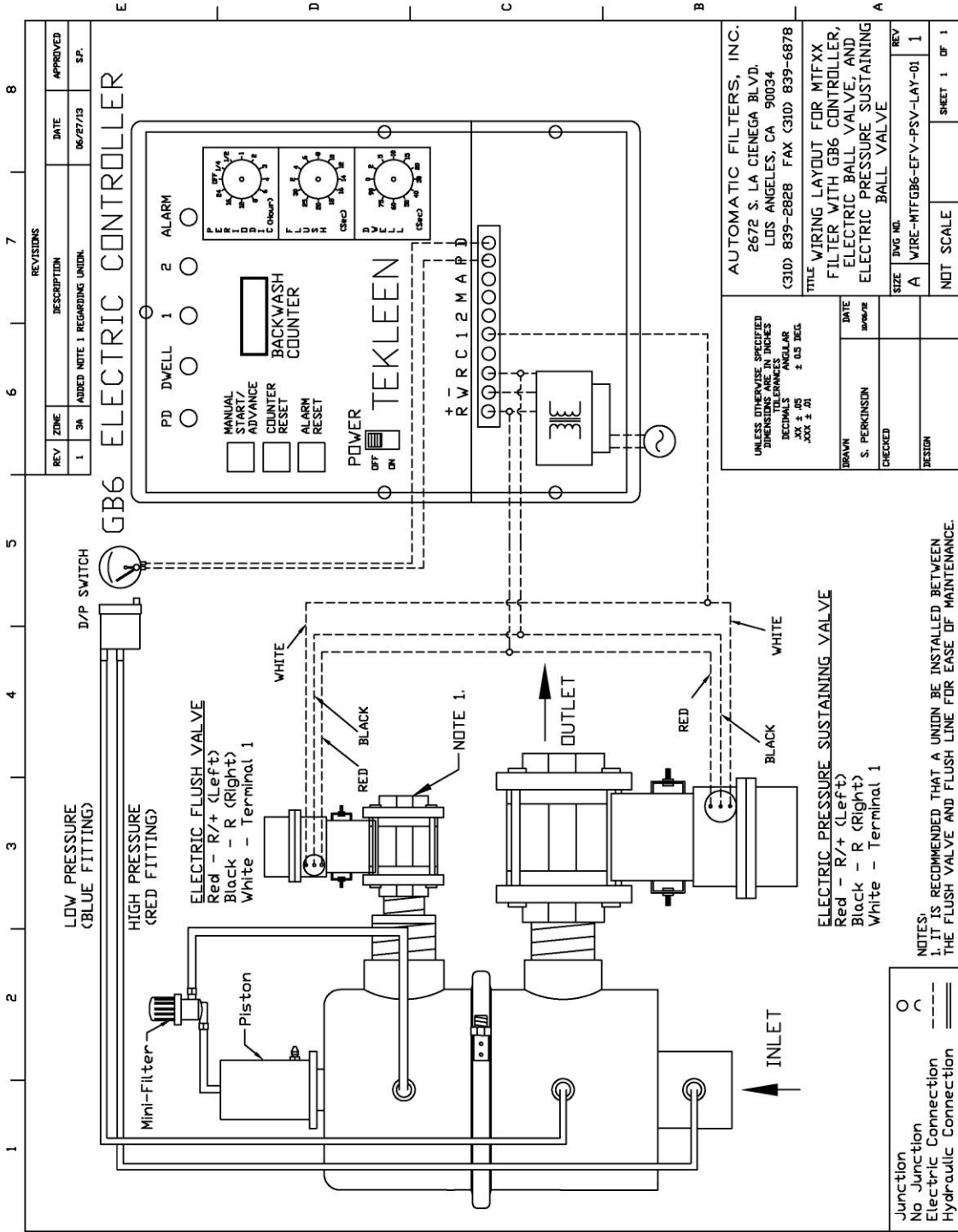




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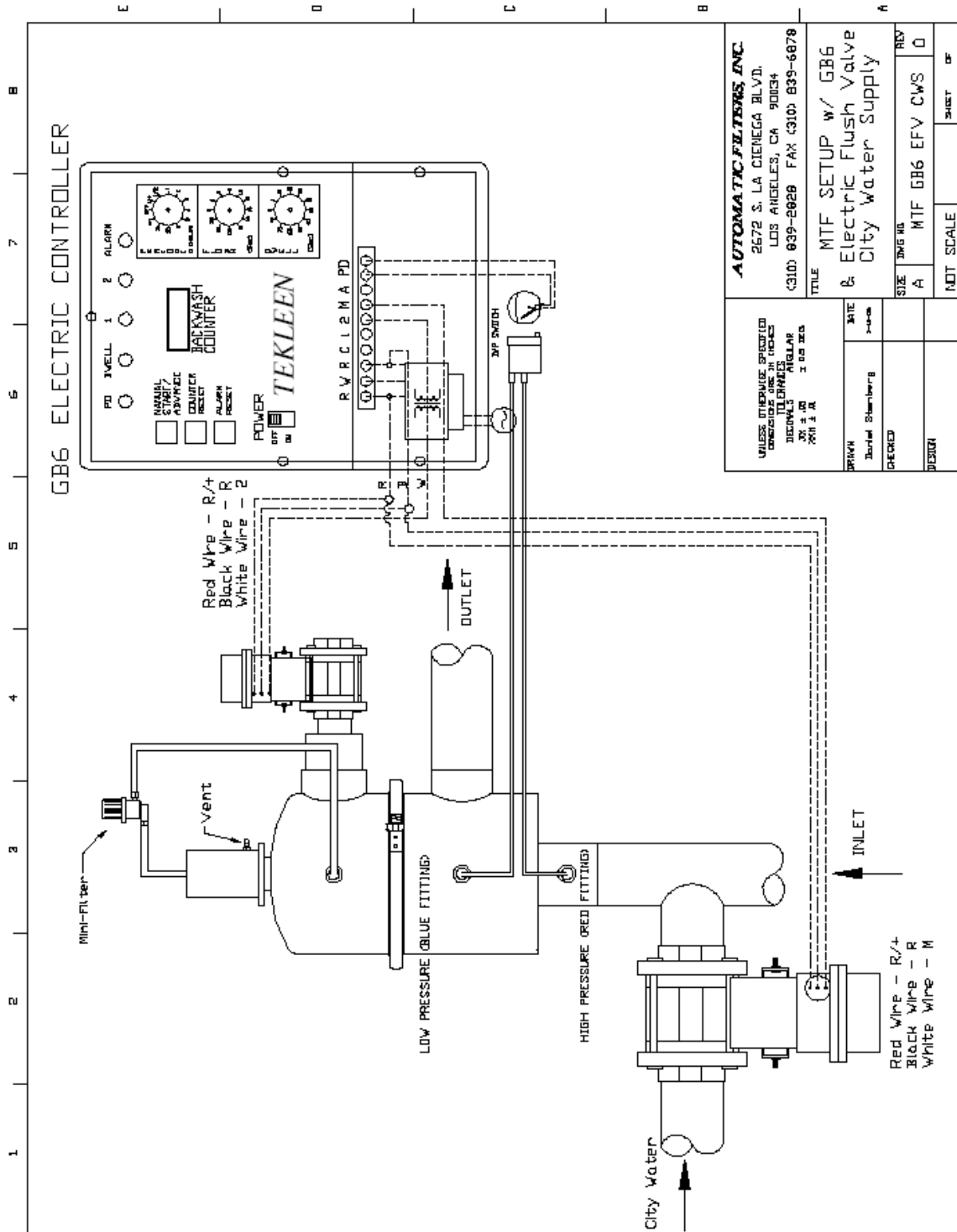
REV		ZONE		REVISIONS		DATE		APPROVED	
1		3A		ADDED NOTE 1 REGARDING UNION.		06/27/13		S.P.	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DECIMALS & 16'S DEC. XXX ± .01		DRAWN S. PERKINSON CHECKED DESIGN	DATE 06/27/13	SIZE 1/8" X 11"	WIRE-MTFGB6-EFV-PSV-LAY-01 REV 1
AUTOMATIC FILTERS, INC. 2672 S. LA CIENEGA BLVD. LOS ANGELES, CA 90034 (310) 839-2828 FAX (310) 839-6878			TITLE WIRING LAYOUT FOR MTFXX FILTER WITH GB6 CONTROLLER, ELECTRIC BALL VALVE, AND ELECTRIC PRESSURE SUSTAINING BALL VALVE		
NOT SCALE			SHEET 1 OF 1		

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 LOS ANGELES, CA 90034
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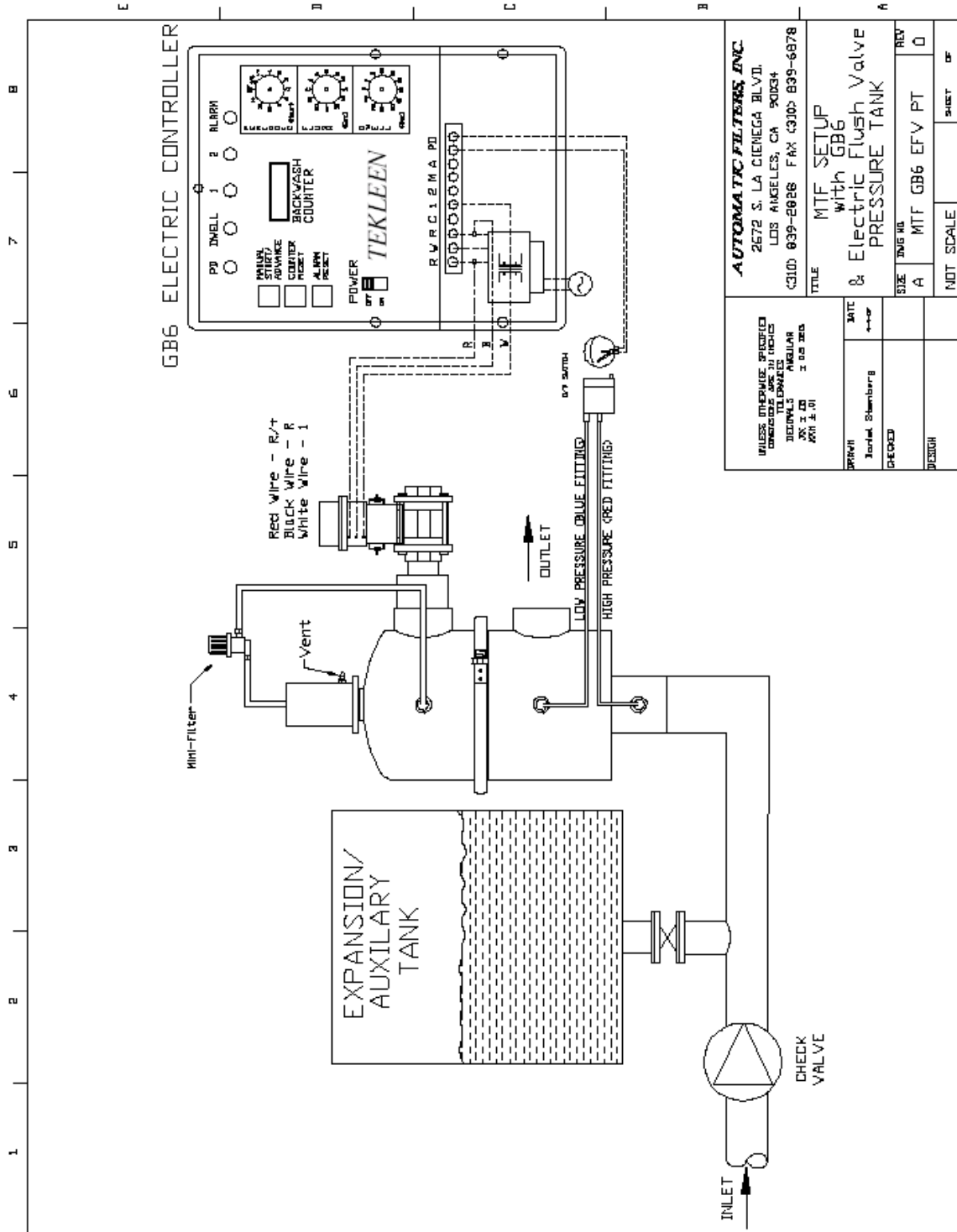
UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES
 DECIMALS ARE TO THE NEAREST
 1/32" 1/16" 1/8" 3/16" 1/4" 5/16" 3/8" 1/2" 5/8" 3/4" 1" 1 1/4" 1 1/2" 1 3/4" 2" 2 1/4" 2 1/2" 3" 3 1/2" 4" 4 1/2" 5" 5 1/2" 6" 6 1/2" 7" 7 1/2" 8" 8 1/2" 9" 9 1/2" 10"

TITLE: MTF SETUP w/ GB6
 & Electric Flush Valve
 City Water Supply

DATE	DATE	BY	DATE
2011-08-08	2011-08-08	2011-08-08	2011-08-08
DESIGNED	CHECKED	APPROVED	DESIGNED
BY: [Signature]	BY: [Signature]	BY: [Signature]	BY: [Signature]

SIZE	DATE	BY	DATE
A	2011-08-08	2011-08-08	2011-08-08
NOT SCALE	MTF GB6 EFV CWS	0	
SHEET	OF		

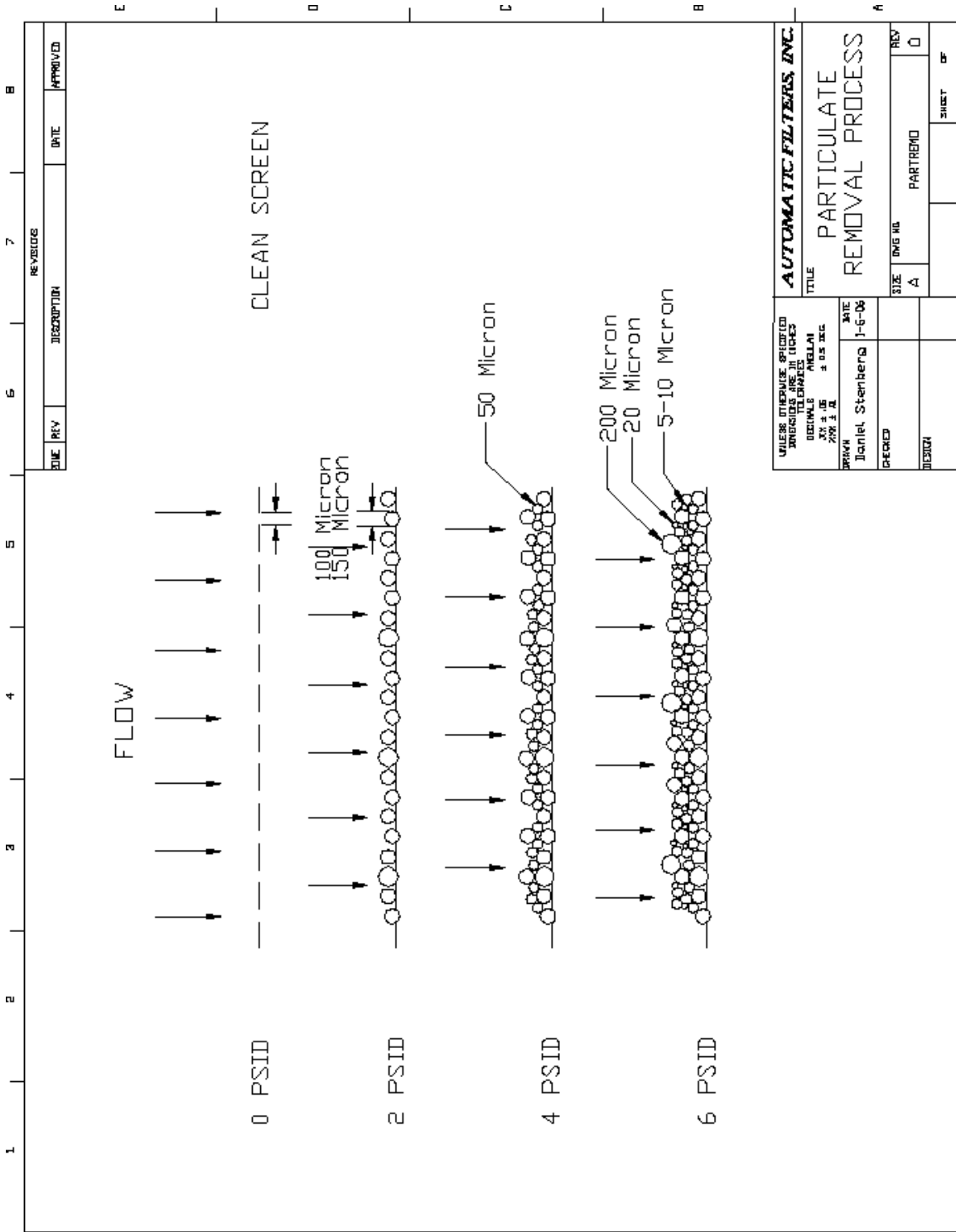




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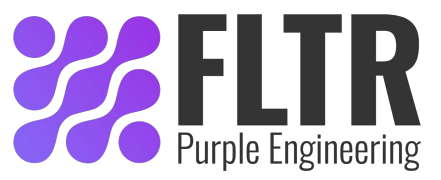




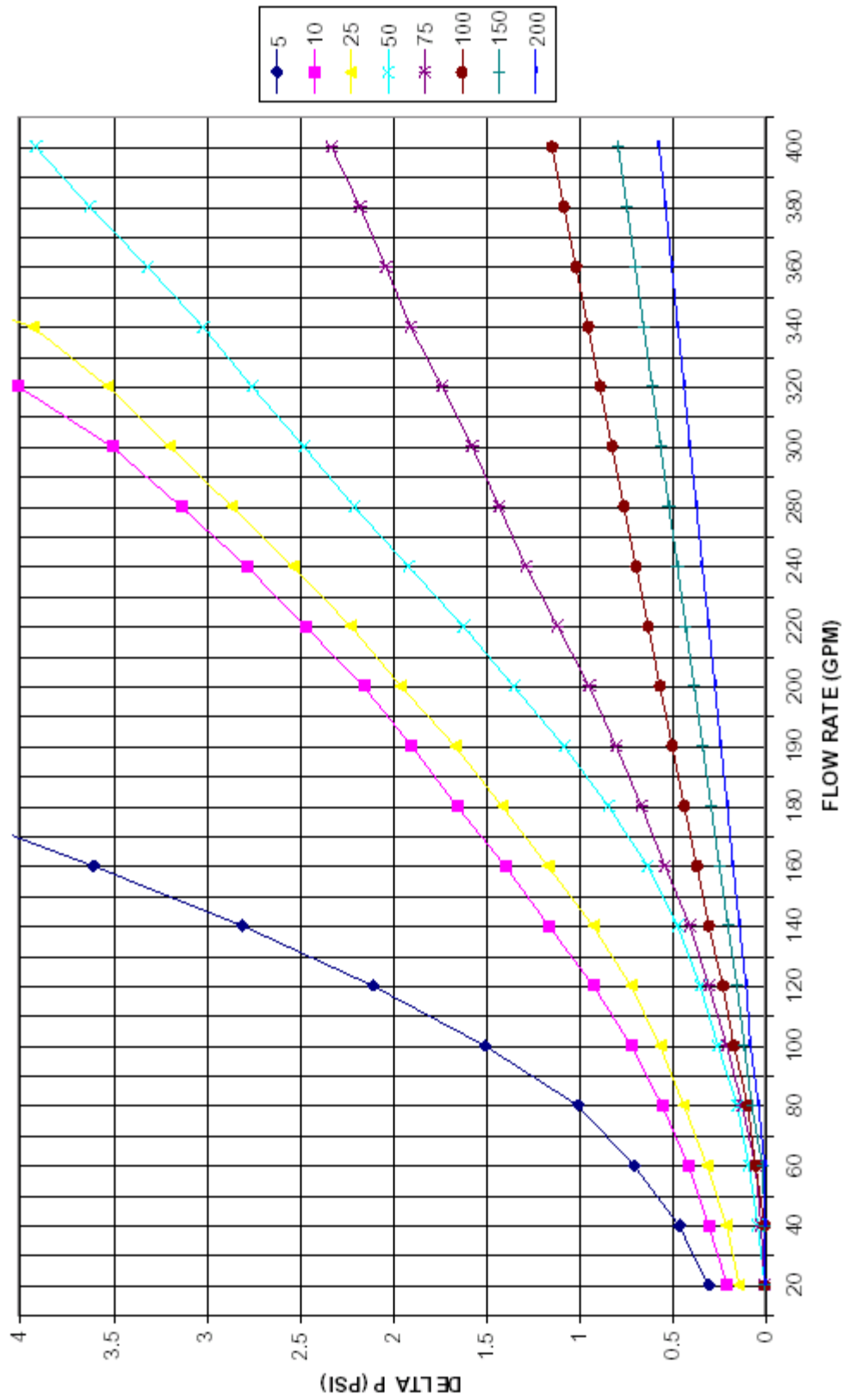
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		AUTOMATIC FILTERS, INC.	
DECIMALS	FRACTIONS	TITLE	
.XX ± .05	1/16 ± .005	PARTICULATE REMOVAL PROCESS	
.XX ± .05	1/16 ± .005	SIZE	DRG NO.
DRWN	DATE	A	0
Daniel Stenberg	1-6-06	PARTNO	REV
CHECKED			0
DESIGN			SHEET
			OF

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PRESSURE DROP DATA 1SQ FT.



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WARRANTY

Automatic Filters, Inc. (AFI) warrants its filters and controllers to be free from original defects for one year from the date of original sale. The manufacturer will replace, free of charge, any part found defective under normal use and service within the guarantee period, provided the product is installed, used, and maintained in accordance with good engineering practice and all applicable instructions or limitations issued by AFI. The manufacturer assumes no liability for incidental or consequential damage sustained in the adoption or use of our engineering data, service, or products. Liability is limited to the repair or replacement of the products. No agent or representative of AFI has the authority to waive or add to this agreement. Altered products or use of products in a manner not intended shall void this warranty. All warranty claims must be sent along with the defective product, freight prepaid to AFI at its business address. All warranty shipments are for the account of the buyer. The warranty period shall be 12 months from the date of shipment to the client.

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