

INSTALLATION & OPERATION INSTRUCTIONS MANUAL

V-SERIES FILTERS

V-200P



Revision History

NOTE: Ensure printed copies of this manual are kept up to date with the latest revisions.

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PREFACE PAGES

DISCLAIMER STATEMENT

The operation and maintenance manual should provide complete and accurate information to meet your operating and/or service requirements based on the information available at the time of publication. The information in this manual may not cover all operating details or variations or provide for all conditions in connection with installation, operation, and maintenance. Should questions arise which are not answered specifically in this manual, contact your water system supplier.

Evoqua reserves the right to make engineering refinements that may not be reflected in these manuals. The material in these manuals is for informational purposes and is subject to change without notice.

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MANUAL USER'S GUIDE

This manual describes the procedures necessary to install, operate, and maintain your VAF Filtration Systems. Please read this manual carefully before installing and operating your equipment. The equipment warranty may be voided if installation or operation instructions are not followed correctly.

Warnings, cautions and notes are used to attract attention to essential or critical information in a manual. Warnings and Cautions will appear before the text associated with them, and notes can appear either before or after associated text.

WARNING

Warnings indicate a condition, practice, or procedure which must be observed to avoid personal injury or fatalities.

CAUTION

Cautions indicate a situation that may cause damage or destruction of equipment or may pose a long-term health hazard

NOTE:

Notes are used to add information, state exceptions, and point out areas that may be of greater interest or importance.



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WATER TECHNOLOGIES

EQUIPMENT SUPPORT

Evoqua continually strives to provide safe, trouble-free equipment using the optimum technology for your application. If problems should develop, Evoqua's worldwide network of technical support will be available to provide assistance. For service, sales, parts, or additional manual copies please visit website: www.vafusa.com or www.evoqua.com/vaf.

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WARRANTY

For additional information regarding Evoqua's Warranty, please reference the Standard Terms of Sale document provided.

FOREWORD

Thank you for purchasing VAF Filtration Systems' V-Series automatic backwash filter. The V-Series filter and electronic backwash controller function integrally, providing more effective, lower cost water filtration than traditional filtration systems.

Follow procedures contained in this Owner's Manual for proper installation, start-up, operation, and maintenance of the filter and backwash controller. Failure to follow these procedures may void warranty on the product. Refer to the Product Warranty for more details.

VAF designed and built your filter employing the latest technologies and engineering materials. As a consequence, you own the best automatic self-cleaning screen water filter available. And your filter is MADE in the U.S.A.

Quality at VAF Filtration Systems goes far beyond our line of products. Feel free to call our professional staff directly at headquarters in Denver, Colorado.

IMPORTANT - READ THIS FIRST

HANDLING AND INSTALLATION:

This filter is constructed of stainless steel. It is NOT designed to accept pipe stress or undue mechanical stress of any kind including stress imposed by an improperly designed mounting structure. Use caution and common sense when uncrating, moving and installing the filter. Do not use excessive force in tightening mounting straps or bolts. Never force the filter body to accommodate a mounting structure. Piping should be self-supporting and correctly aligned in all planes. Imposing undue stress may warp or make the filter body out-of-round and will void the warranty.

1.0 SAFETY & REGULATION

1.1 REQUIREMENTS

WARNING

Wear, as required, hard hat, safety goggles, rubber gloves, steel-toed boots, respirator mask and protective clothing when servicing the filter unit. Abide by applicable OSHA and industrial standards for your particular application.

V-Series filters and electronic backwash controllers are designed for safe operation when used according to instructions, specifications, procedures and requirements contained in this manual. It is the responsibility of the filter owner to verify that the filter is operating accordingly. Assure that all applicable rules, regulations, requirements, standards and codes, either local, national or industrial are followed in installation, operation, maintenance, servicing and moving of the filter and backwash controller. Consult our technical staff with your questions on safe operation of the filter.

1.2 STRUCTURAL SUPPORT AND RETENTION

WARNING

Depending upon your filtration system's components, the V-200P can weigh over 27.3 kg (60 lbs) when flooded with water. Exercise caution when transporting, installing or taking the filter out of service as the weight of the filter may cause serious injury or death from falling on persons.

CAUTION

When erecting the filter during installation (or taking filter out of service), make sure the filter is properly supported by the retention system. Remove retention systems only after filter has been properly secured to piping and adequately supported. If the existing piping arrangement is used as structural support for the filter, check to assure that it is structurally adequate considering the flooded weight of the filter.

Due to the methods used to construct the V-Series filter, it is recommended that the filter be supported primarily by the inlet and outlet piping.

1.3 OPERATING PRESSURE

CAUTION

Periodically check connections and sealing points for leakage, tighten connections or seal with Teflon tape if leaks occur. The main body seal will become watertight when pressure is supplied to the filter. Keep the operating pressure below the 8 bar (120 psi) maximum safe pressure limit. In applications requiring a higher-pressure limit, consult the manufacturer regarding a design that will safely satisfy higher pressure requirements. Assure that the body nut has been hand tightened fully until it reaches the stop molded into the thread. Before servicing filter internals, slowly open the filter bypass valve (if available), and slowly close the filter isolation valves. Manually backflush the filter to depressurize, and partially drain the filter. Before servicing the filter, always make sure the filter is depressurized. DO NOT REMOVE BODY NUT OR ANY PRESSURE FITTING UNTIL YOU ARE SURE PRESSURE IN THE FILTER IS ZERO.

1.4 DISCHARGE WASTEWATER

Conform to all applicable standards, codes and regulations for your particular industry and application. Follow environmental regulations when discharging backflush water.

1.5 ELECTRICAL

WARNING

When wiring the electronic backwash controller, follow the instructions in the manual along with local code and National Electrical Code. An explosion-proof solenoid (available as an alternate part) is required when the filter is used in a potentially flammable atmospheric environment. A filter installed with a general-purpose solenoid can ignite combustible fluids. Avoid touching a solenoid that has been electrically energized as heat from operation may cause burning of skin. Turn off electrical

power to the controller and solenoid before servicing either the controller or the filter.

2.0 INTRODUCTION

2.1 DESCRIPTION

The V-200P is an automatic, self-cleaning, screen water filter. The filtration system consists of a filter body, a fine screen, 3" NPT, BSP, or Victaulic inlet & outlet connections, a 1.5" NPT or BSP flush valve, and a filter controller.

2.2 THEORY OF OPERATION

Dirty water enters the filter through the inlet. The dirty water then flows to the inside of the fine screen and passes through the fine screen from the inside out. Dirt is collected on the inside surface of the fine screen. The clean filtered water then exits through the filter outlet.

As the dirt or cake builds up on the inside surface of the fine screen, the pressure drops across the screen increases. When the pressure drops (DP or differential pressure) reaches a preset level (0.5 bar or 7 psi), the filter controller starts a flush cycle by opening a flush valve on the flush outlet. The flush valve vents the drive chamber to atmosphere at 0 psi.

The flush chamber is separated from the filtration chamber by a flush chamber bulkhead. However, the dirt collector (a hollow pipe with suction nozzles) extends through the bulkhead. This provides a path from the suction nozzles, through the water motor, into the flush chamber, and to the flush outlet. The pressure around the dirt collector nozzle is the pressure inside the filter and as water flows through the "path", it drops to "0" psi when it leaves the flush outlet. This creates an aggressive "suction" at the suction nozzle opening. The clearance between the suction nozzle and the fine screen is approximately an eighth of an inch. The extreme low pressure at the nozzle opening creates a controlled backflow which vacuums the dirt from the fine screen.

The hydraulic drive has jets on opposite sides near its ends. Water jetting out of these openings (coming from the dirt collector nozzles) creates a reaction force (like a pin wheel) which rotates the internals. As the suction nozzles rotate, each nozzle cleans a band on the fine screen.

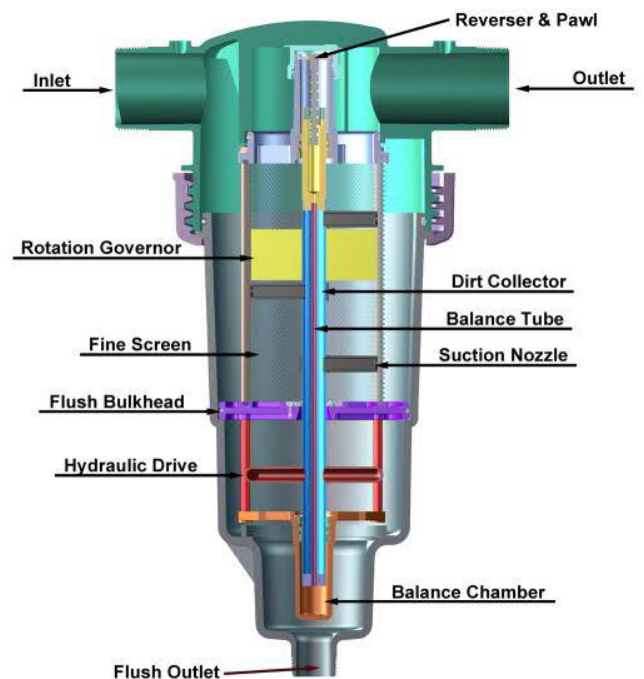


Figure 1: V-Series internal cutaway

As the internals rotate the reverser, a bi-directional screw which works like the level winder on your fishing reel or cable winch, causes the internal assembly to index along the screen. The bi-directional reverser is specially designed to provide a 10% overlap with each pass ensuring no portion of the screen is left unclean. The balance tube and chamber ensure that no uneven forces are present on the dirt collector.

NOTE: After a preset flush duration, the flush valve is closed and the flush cycle is completed. Minimal water is used for each flush cycle due to the highly controlled cleaning process. The filter continues to supply water to the system at all times, even during the flush cycle.

2.3 RECOMMENDED APPLICATIONS

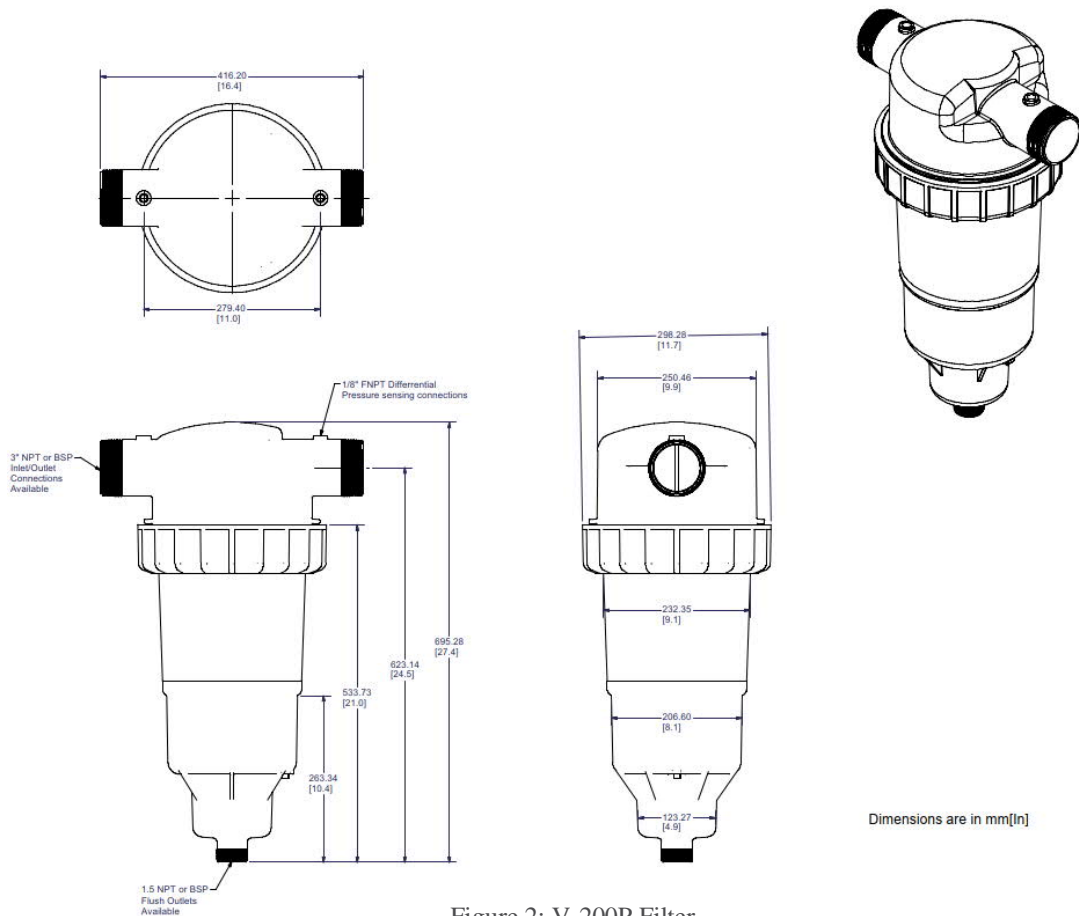
Ideal for filtering out suspended solids larger than 10 micron such as silt, scale, sand, rust, dirt, and organic material, like algae, from virtually all types of water sources.

2.4 DESIGN FEATURES

NOTE: The V-200P will never supply dirty water to the system downstream, this can happen with a sand media or centrifugal filter. The V-Series filter will deliver clean water or no water.

The most predominant feature is its ability to remove organics such as algae as well as other suspended particles such as sand and scale, from the fluid in a fast and efficient manner.

The entire back-flushing mechanism and fine screen assembly is modular and is removed from the filter body as a complete unit. This facilitates maintenance, inspection, and repair if necessary.



2.5 DESIGN SPECIFICATIONS

Materials	Tank	Glass reinforced nylon
	Reaction Motor and Nozzle assembly	Glass filled Nylon and CPVC
	Filter screen	Type 316L stainless steel Also available in 904L stainless steel
	O-Ring	EPDM
	Fasteners	Type 316 Stainless steel
Pressure Lost Through Filter	Adjustable DP flush set point at which backwash is initiated. Less than 1 psi loss with a clean screen element. Normal flush setting is 0.5 bar (7 psi).	
Controls	Electric, programmable, 120/220 VAC or DC.	
Pressure Range	2 to 8 bar (30 to 120 psi) maximum. Note: A minimum of 2 bar (30 psi) at the outlet is required to ensure efficient cleaning of the filter.	
Temperature Range	0° to 40° C maximum (32° to 104° F)	

2.6 CONTROLLER INFORMATION

MicroFlush™ Controller: The VAF MicroFlush (MF) Controller provides multiple advanced features that allow for the monitoring and control of a single filter or filtration system, not the least of which is the “failsafe” program to prevent cooling tower basin drainage. The MF can monitor a single filter or up to 4 filters in a system, when installed in parallel. The MF controller monitors the filter(s) Differential Pressure (DP) and automatically initiates a flushing cycle when the DP reaches the preset 0.5 bar or 7 psi across the filter’s inlet/outlet.

The MF controller provides the ability for data logging so that accurate monitoring and historical data can be accessed by means of the MF display. The controller is housed in a NEMA 3R weather resistant enclosure that is suitable for indoor or outdoor installation. The MF controller is offered with either Battery, Solar, 120VAC or 220VAC power inputs to maximize installation flexibility at any location. The controller provides outputs to operate solenoid diaphragm flush valves, electronically actuated ball flush valves or latching solenoids and provides terminal connections for “optional device” outputs, such as throttling valves or booster pumps. The MF4 (four filter model) also includes NO and NC closed contacts that can be used by the MF to receive and send notice of an alarm conditions, which are programmable by the operator. While very economically priced, the MicroFlush provides the most features of any filter controller offered today! Not only monitoring and controlling the V-Series filters, but other filter types as well.

NOTE: Contact VAF for alternative controller options.

3.0 APPLICATION

3.1 SYSTEM REQUIREMENTS

When designing and/or considering the system in which the V-Series will be installed, evaluate:

1. Line Size
2. Configuration
3. Pressure
4. Flow
5. Temperature
6. Dirt Load
7. Filter Screen
8. Industry

3.1.1 LINE SIZE

The filter shall be sized for the application, such that velocity, pressure, and flow rate are nominally maintained as water flows through the filter. A filter sized hydraulically too small for the application results in a relatively high flow rate through the filter and excessive pressure drop across the filter. Also, dirt builds up very quickly on the filter screen, causing frequent backwash cycling.

3.1.2 CONFIGURATION

NOTE: It is highly recommended to install the filter with a piping arrangement allowing full by-pass flow, especially for flow-critical applications. In this way, service and maintenance can be performed on the filter without shutting down process flow.

Multiple filters may be used hydraulically in parallel or in series to accommodate larger flow rates or high loading characteristics. In applications where the dirt load is relatively high and the particle size is relatively uniform, a bank of filters in parallel (all with the same screen size) is recommended. In applications where the dirt load is relatively high and the particle size is nonuniform, installing filters in series with decreasing micron size in the direction of flow may be effective. Whether filters are configured in parallel or in series, one filter will be flushed at a time to minimize disruption of flow to the system.

3.1.3 PRESSURE

Properly size a hydraulic pump to keep the operating pressure within the design limits of the filter. Keep the pressure inside the filter below the 8 bar (120 psi) maximum safe allowable pressure limit. The pump must maintain a MINIMUM pressure of 2 bar (30 psi) at the filter outlet DURING A BACKFLUSH CYCLE for the filter to backwash efficiently. If the filter is to be installed within an existing piping system, determine whether or not the existing pump will be sufficient to maintain the 2 bar (30 psi) minimum pressure requirement.

NOTE: For filter installations within low pressure systems (less than 2 bar or 30 psi), modifications can be made to boost pressure during the backwash mode, allowing proper flushing operation. Modifications to boost pressure include booster pumps, sustaining valves and downstream valves. Consult VAF with inquiries on pressure requirements.

CAUTION During normal filtering mode (when the filter is not backflushing), keep the differential pressure across the filter below 0.7 bar or 10 psi to prevent:

1. Pushing dirt through the fine filter screen
2. Embedding dirt in the filter screen mesh.
3. To prevent continuous back wash.

NOTE: VAF recommends utilizing a throttling valve to maintain significant back pressure.

3.1.4 FLOW

CAUTION Keep the flow rate through the filter below the maximum nominal flow rate specified to ensure optimum performance of

the filter. Contact VAF engineers for flows higher than the nominal rates.

3.1.5 TEMPERATURE

CAUTION

Keep the temperature of the water below 40°C (104°F) to prevent damage to the filter internals. Keep water within the filter above 0°C (32°F) to prevent freezing.

3.1.6 DIRT LOAD

The V-Series will filter out many types of particulates in water. In special applications, it may be necessary to modify the standard filter to achieve proper filtration. VAF Filtration Systems can test representative samples of filtered and unfiltered water to determine the effectiveness of the filter in your application. Filters placed into existing loop systems having relatively high dirt concentration (load), typically backflush often at first. In time, as dirt is removed from the water, the frequency of backflushing will decrease. In these applications where existing systems are extremely dirty, it is recommended to initially equip the filter with a screen having relatively large micron openings. After the frequency of backflushes decreases and then stabilizes, replace with a screen having smaller micron openings continue this process until a satisfactory level of filtration is achieved.

NOTE:

For existing cooling tower installations it is recommended the the basin is thoroughly cleaned prior to putting the filtration equipment on line.

3.1.7 FILTER SCREEN

VAF utilizes a sintered, three-layer, nominal rated screen for maximum open area and accurate filtration degrees. First layer is a coarse, 3/16" (4.7mm) perforation, thicker backing for rigidity. Second layer is a 500um weave wire screen to allow for a greater amount of flow paths through the fine screen. Third layer is the fine screen where particulate will be captured on the inside of the screen.

It has the following advantages.

- Sintering allows for the maximum amount of open area as there is no adhesive or welding material to block flow.



- Rated for the maximum amount of particulate removal at the desired filtration degree.
- All 316LSS construction for maximum product lifespan and durability.
- Greatest debris holding capacity for less frequent flushing.

3.1.8 INDUSTRY

Water has been a choice process and cooling fluid that until recently has been readily available, relatively inexpensive, and easily discharged when dirty. With the onset of diminished supply, rising cost and increasingly stringent environmental regulation, V-Series water filters have found increasing application across many industries. Some applications of the V-Series include steel mills, food processing, manufacturing, agricultural irrigation, mining, and cooling towers. The V-Series can be used in virtually any application where water is used. Because of widespread use, detailed explanation of how these filters shall be applied in each and every industry is beyond the scope of this manual.

Nevertheless, commonalities amongst different filter applications warrants general discussion of installation, start-up, troubleshooting, maintenance, parts & service, and operation. Refer to the following Sections of this manual for information on these topics.

4.0 INSTALLATION & HOOK-UP

4.1 MECHANICAL HOOK-UP AND ORIENTATION

The positioning of the filter should be determined in order to allow easy access and removal of the filter internals. The filter will operate in any orientation. Always install filter on discharge side of pump, 2 bar (30 psi) minimum required during the flush cycle.

The use of unions or companion flanges on the inlet, outlet, and flush connections is recommended to ease installation and maintenance of the filter.

The location of the flushing valve should provide no obstruction to its operation.

The tank can be supported by the inlet/outlet connections. Alternatively, can be mounted on a stand if desired.

4.2 PLUMBING HOOK-UP

Backwash discharge pipe can be the same diameter but should be larger than the flush valve diameter with no more than one elbow and a downward slope to the sump or drain. Any restrictions in the backwash line will reduce the cleaning efficiency of the filter.

Tubing connecting the inlet and outlet of the filter to the differential pressure switch/gauge or pressure transducers on the selected controller should be installed for automatic operation. The inlet is connected to the high-pressure port (unfiltered), and the outlet is connected to the low-pressure port (filtered water). Carefully check to ensure these connections are not reversed. Consult your controller manual for more information.



Figure 3: High & low-pressure ports on the DP switch/gauge



Figure 4: Flush valve

Install pressure relief, air/vacuum release valves within the adjoining piping if deemed necessary. If using a diaphragm type flush valve with solenoid actuator, the supply to the solenoid must be connected to a pressure source, typically on the inlet of the filter or upstream of the valve. The solenoid must also be connected to the controller. Consult your controller manual for specific wiring information.

If using an electrically actuated ball valve [Figure 5] install per wiring diagram shown in your controller manual to the controller circuit board. These terminal outputs 24 VAC at a maximum of 1 amp. An interpose 24VAC relay will be required if the value requires a different voltage or amperage.

Other flush valve options are available, consult factory for details.

When designing piping to and from the filter, consider installing bypass piping and valves along with isolation valves. This allows the filter to be taken offline without interrupting the flow.



Figure 5: Electrically actuated ball valve

NOTE: If flooding is a concern, Evoqua recommends having a containment plan in place in case of a system failure.

5.0 OPERATION & ADJUSTMENTS

5.1 START -UP

5.1.1 POWER CONTROLLER

Ensure that there is power to the controller and that the controller is turned on

5.1.2 PRESSURIZE FILTER

During the initial start-up of the filter, with the outlet valve closed, slowly open the inlet valve in order to flood the filter and to pressurize the filter body.

5.1.3 CHECK FOR LEAKS

WARNING

Once the filter is flooded and pressurized, check for any leaks. If leaks are detected, isolate filter, reduce pressure immediately, and perform necessary steps to eliminate leaks.

5.1.4 START FILTRATION

Slowly open the outlet valve to allow the filter to begin operation. Initially, it is advisable to open the outlet valve only partially to slowly fill the downstream lines and avoid line surges. The filter will slowly develop a dirt cake on the screen. As it does, the differential pressure across the screen will rise. Once the differential pressure reaches its current setting (factory set at 0.5 bar or 7 psi) the controller will automatically initiate a backwash by opening the flush valve. After the backwash is complete, the differential pressure should have returned to zero. Once the filter has gone through several successful backwash cycles the outlet valve can be opened and the flow rate through the filter can be increased. If problems are encountered during start-up, consult the troubleshooting section of this manual or call VAF's field service team.

6.0 MAINTENANCE

6.1 DISASSEMBLY OF V-200P SERIES FILTERS

Required tools:

- 3/32" Allen key wrench (Included with manual)
- 7/16" Box wrench or socket
- O-ring lubricant (Silicon or Glycerin based)

1. Isolate the filter by first turning the outlet valve off, then turn the inlet valve off.
2. Relieve pressure inside of filter body by initiating a manual flush, opening a drain valve.
3. Ensure that no pressure is present in the filter. This can be accomplished using the pressure gages (if equipped), by opening the electronically actuated flush valve (if equipped), or by disconnecting the tube from the valve bonnet (if equipped with a diaphragm style valve).
4. Slowly loosen main body nut. Nut should be hand tight. If nut does not loosen double check that no pressure is present in the filter. Hang body nut after completely loosened. No tools are required for the removal of this nut.
5. Partially loosen inlet and outlet unions. Completely loosen flush line union (if equipped).
6. Rotate bottom of filter body free of flush union. Pull body to separate lid from body.
7. The internal assembly can now be removed from the filter body. The lower bulkhead O-ring is all that restrains the internals. Pull internals from body, tilting may help to unseat O-ring. [Figure 6]
8. The bulkhead O-rings should be inspected for wear and tear. A poorly sealing O-ring will adversely affect the operation of your filter. [Figure-7]
9. A pressure washer can be used to thoroughly clean the filter internals. Pressure washing the screen from the outside in will remove any accumulated particulate.



Figure 6: Internal assembly

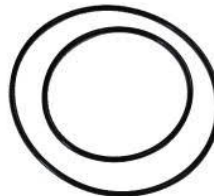


Figure 7: O-Ring



Figure 8: Water motor rotation

10. Rotate the water motor by hand until it reaches the bottom of its travel range. Rotation should be smooth and relatively free of resistance; if not, diagnose source of resistance. [Figure-8].
11. Remove reverser cap [Figure-9].
12. Push water motor to topmost position. This will expose the reverser. [Figure 10 & 11]



Figure 9: Cap removal



Figure 10: Water motor position



Figure 11: Reverser

13. Using a 3/32" Allen key wrench, remove the pawl carrier screw (shown with red arrow). Ball Point Allen Key Wrench included with purchase. Check plastic bag attached to manual. [Figure 12]
14. Remove reverser, pawl, and pawl retainer from shaft by pulling on the hexagonal reverser restraint. [Figure 13]
15. Inspect pawl and reverser for wear. Reverser should rotate very smoothly with very little resistance. Corners and transitions should be well defined and not rounded [Figure 14].

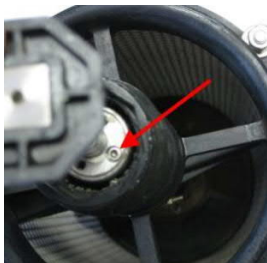


Figure 12: Pawl carrier screw



Figure 13: Removal of pawl removal



Figure 14: Inspection of pawl

16. The (3) 7/16"-14 nuts and washers can now be removed from the support rods that secure the upper bulkhead [Figure 15].
17. Once the nuts are removed, the upper bulkhead will slide free [Figure 16].
18. The screen can now be removed, inspected, and cleaned if necessary.
19. Inspect the suction nozzles and water motor for any damage [Figure 17].
20. Suction nozzles, speed reducer (not shown) and water motor can be removed using an Allen key if required. Removal of the water motor allows for removal of the lower bulkhead. To remove water motor, remove suction nozzles, one side of the speed reducer will slide allowing separation and removal of the speed reducer.



Figure 15: Nut and washer removed from support rods.



Figure 116: Upper bulkhead



Figure 17: Internals

6.2 ASSEMBLY OF V-200P SERIES FILTER

Follow disassembly instructions in reverse order.

MUST READ BEFORE ASSEMBLING.:

When assembling the V-Series filter, the following **MUST** be considered

1. The floating seal (washer) in the lower bulkhead must be free floating and properly secured by the retainer and retainer screws.
2. Filter elements must fit into the bulkhead's screen grooves before securing the filter assembly to the filter frame. If this step is done incorrectly, the bulkheads may misalign causing the rotor assembly to rub and/or not rotate.
3. Before installing the complete filter assembly into the tank, one must lubricate the bulkhead seals. Silicon based lubricant will work well unless prefiltering for a reverse osmosis system. In this case, use a glycerin-based lubricant. Failure to do so could result in seal failure and difficulty in removing the internal assembly later.
4. Do not use tools to secure main body nut. This nut is hand tightened, tighten by hand until it reaches the thread stop.
5. When installing the pawl, hold it in place by applying pressure with your thumb, with the teeth aligned correctly. Rotate the shaft until the pawl is seated properly in the reverser threads. Once the pawl is installed, rotate the shaft several times to ensure that it is functioning properly.

NOTE: Do not use power tools or impact to tighten hardware.

7.0 WINTERIZING

Required tools:

- 7/16, 3/4" wrenches or sockets and ratchet
 - Teflon tape
 - Air nozzle and compressor
1. Relieve system pressure.
 2. It is recommended at this time to remove, and pressure wash the internal assembly, and inspect for wear or damage.
 3. Remove pressure gauge using the 7/16" wrench (Figure 18).
 4. Using the air nozzle, blow out the water in all lines (Figure 19).
 5. Blow any remaining water out of gauge, reapply Teflon tape to threads, and reinstall gauge.
 6. The focus now moves to the flush valve and solenoid (Figure 20).



Figure 18: Removal of pressure gauge



Figure 19: Blowing out air lines



Figure 20: Flush valve

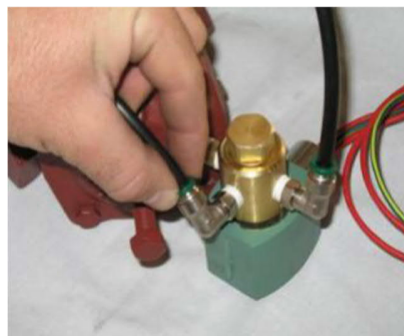


Figure 21: Removal of solenoid water supply lines

NOTE: It is not necessary to remove the flush valve from the filter body when winterizing

7. Remove the 2 quick connect solenoid water supply lines (Figure 21).
8. Loosen and remove the 3/4" nut and spring (USE CAUTION, DO NOT LOSE!!) from the solenoid body (Figures 22 and 23).
9. Remove plunger from solenoid body (Figure 24).



Figure 22: Loosening 3/4" Nut

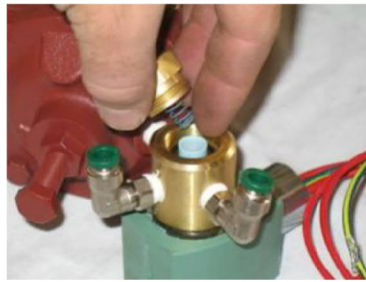


Figure 23: Removal of nut & spring

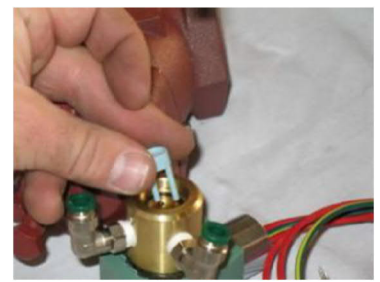


Figure 24: Plunger removal

10. Using the air nozzle, blow out remaining water in solenoid and solenoid water supply lines (Figures 25 and 26).
11. Remove 4 nuts and bolts (7/16") shown in (Figure 27) and remove the diaphragm cover plate (Figure 28).



Figure 25: Blowing out the solenoid supply lines

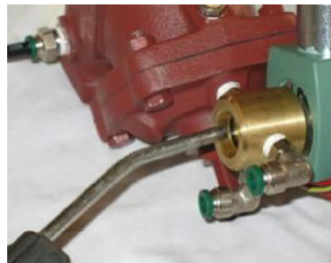


Figure 26: Blowing out the solenoid

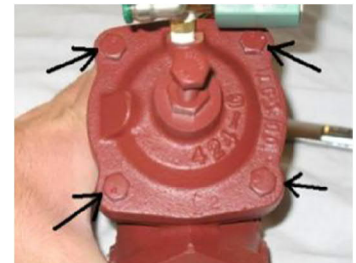


Figure 27: Diaphragm bolts



Figure 28: Removal of diaphragm cover plate



Figure 29: Removing water from cover plate

12. Blow excess water out of cover plate (Figure 29).
13. Reassemble flush valve and solenoid by following directions in reverse.

8.0 TROUBLESHOOTING

8.1 PROBLEM - Flushing diaphragm valve is not closing during start-up.

Possible Causes:

1. System pressure is too low to close the valve.
2. An object has lodged in the valve preventing full closure.
3. Solenoid not installed properly.

Solutions:

1. Partially close a valve downstream of the filter to maintain 2 bar (30 psi) on filter gauges. This pressure will ensure valve closure and supply back pressure necessary to clean the screen.
2. Disassemble the flush valve and remove the object. Check to ensure that the valve actuates properly.
3. Check solenoid installation diagram provided with installation instructions.

8.2 PROBLEM - Differential pressure never decreases, only builds.

Possible Causes:

1. Flush valve is not opening.
2. Flushing valve is installed backwards.
3. Filter is installed backwards.

Solutions:

1. Verify connections to filter controller and power (hydraulic and/or electrical) to flush valve.
2. Install according to directional arrow.
3. Ensure filter inlet connected to (unfiltered) incoming water supply.

8.3 PROBLEM - Flush valve chatters

Possible Cause:

1. Air in the valve bonnet.

Solutions:

1. Manually flush filter several times to flush air from bonnet, the controller tank, and the filter tank.
2. Add a 13 mm (½ in) air vent/vacuum relief to the flush line.

8.4 PROBLEM - Frequent or continuous flushing

Possible Causes:

1. Downstream pressure is not available to provide adequate cleaning power.
2. Filter may have been shut down "dirty" with a contaminant that is difficult to remove after it sets on the screen.
3. The differential pressure setting on the DP gauge at the base of the controller is set too low or the adjustment knob on the face of the dial malfunctions, allowing continuous electrical signals to the solenoid.
4. Dirt load is too high and/or flow rate exceeds maximum specified flow.
5. Screen may be partially plugged.
6. Rotor may be jammed which results in only cleaning the screen area that is directly in front of the nozzles.
7. A relatively large object or obstruction at the filter inlet is causing appreciable pressure drop or a significant amount of large hard debris has collected.
8. Dirt particles are not being removed from the fine filter screen due to:
 - Particle embedment.
 - Particle bonding.
 - The dirt collector does not function during backflush.
 - The dirt collector does not rotate during backflush.

Solutions:

1. Partially restrict (close) downstream valve. Filter gauges should read 2 bar (30 psi) during the flush cycle.
2. A power flush needs to be performed as follows: a downstream valve should be closed or partially closed, providing that the static pressure against the valve does not exceed 5.5 bar (80 psi). After the valve is adjusted, cycle the filter through several long flush cycles. This process uses the entire available system pressure in the filter cleaning process.

3. Adjust DP gauge to a higher differential pressure setting (0.5 bar or 7 psi is recommended). If the adjustment does not stay at the desired setting, but falls down to 0 psi, replace the DP gauge.
4. Reduce flow rate through the filter. If reducing the flow rate, reduces backflush frequency, it may be advisable to install a fine screen with larger openings and/or install additional filters to provide additional screen area.
5. Perform power flush as described previously.
6. Open filter tank and check for free movement of rotor mechanism. If rotor does not rotate freely find cause of jamming and eliminate. If no cause can be found, inspect pawl for wear or damage.
7. Depressurize and drain the filter. Wash and rinse all debris from the screen. Check the filter inlet for objects and remove any if found.
8. Depressurize and drain the filter. Remove the filter cover and pull the internal assembly. Check rotation and transverse movement of the dirt collector. Remove the filter screen and check for blockage. Consider the following solutions based on your observations:
 - Particle Embedment—the size, shape and type of article may be imbedding into the pores of the filter screen. Analyze the dirt particles for size, shape and type and then determine whether or not a different screen design or screen mesh size would be more appropriate for your application. Contact VAF Filtration Systems for consultation.
 - Particle Bonding—the particles may be bonding to the surface of the filter screen. Analyze the dirt particles and then determine whether or not a different screen design or screen mesh size would be more appropriate for your application. Contact VAF for consultation.
 - Resistance to Dirt Collector Movement—Upon checking for movement of the dirt collector, if resistance is detected, check for contact between the dirt collector nozzles and filter screen. Remove any obstructions.
 - Resistance to Dirt Collector Rotation—Upon checking for rotation of the dirt collector, if resistance was detected, check for contact between the dirt collector nozzles and filter screen. Nozzles should clear the fine screen by approximately 3 mm (1/8"). If the nozzles are rubbing the screen, contact VAF for possible solutions.

8.5 PROBLEM - Water exiting the filter outlet is not sufficiently clean.

Possible Causes:

1. The pore size of the screen mesh is larger than particles in the water.
2. The differential pressure for flushing across the filter is set too high.
3. The filter screen has developed a sizable hole through which the dirty water can pass.
4. The O-ring seal between filter body and one of the bulkheads is damaged or not properly seated on the sealing surface.

Solutions:

1. Try a new filter screen with a mesh size that captures enough particles, bringing the outlet water to a sufficiently low level of dirt concentration.
2. The differential pressure setting at the DP gauge is too high, resulting in excessive pressure on the particles which forces them through the screen; adjust the DP gauge to a maximum 0.5 bar (7 psi) pressure differential.
3. Replace the damaged filter screen with a new screen; determine how the screen was damaged and correct the problem.
4. Replace O-rings at the top and bottom of the internal assembly and properly install the screens within the screen chambers.

8.6 TROUBLESHOOTING HINTS:

External Observations:

1. Check the DP gauge during backflush to verify the needle returns to near zero at the end of the backflush cycle.
2. Check the discharge piping to verify that dirty water is discharged only during the backflush cycle.

Possible Reasons for Observations:

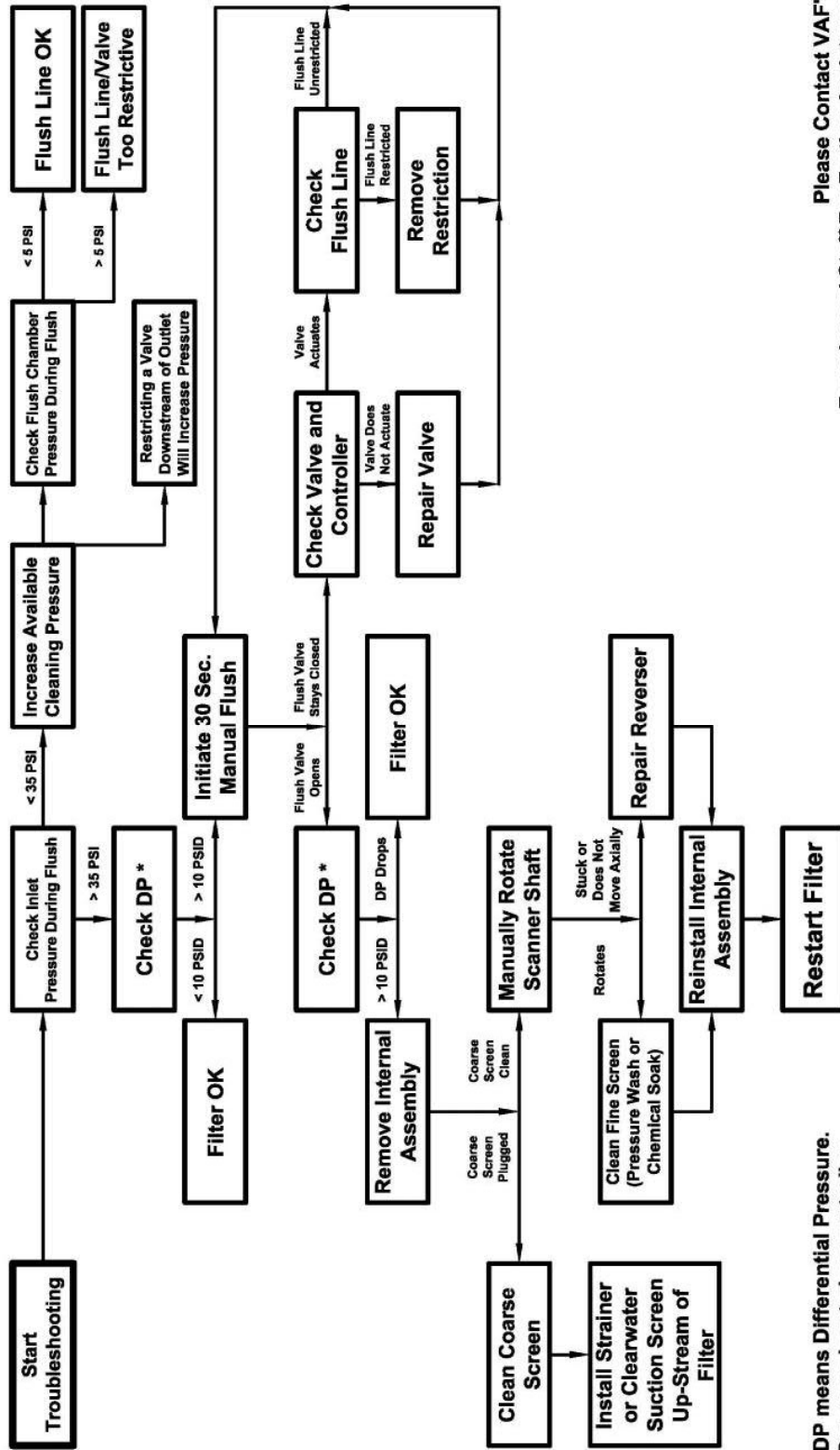
1. If the needle on the face of the DP gauge does not return to near zero after the rinse cycle, then the filter screen is probably not being thoroughly cleaned. Check the cleaning pattern left on the fine screen immediately after a backwash cycle to determine the cause for malfunction.
2. If the flush valve does not open, then either the flush valve is not being energized or an obstruction prevents the flush valve from opening. Check the electrical and hydraulic signaling that actuates the flush valve. Also, check for obstructions in the flush valve and discharge piping.

8.7 TROUBLESHOOTING DIAGNOSTICS:

1. Check for actuation of the solenoid valve by listening for two distinct clicking noises at the solenoid, once upon energizing and a second time when de-energizing.
2. Temporarily disconnect the hydraulic tubing at various fittings (one fitting at a time) on the filter body during normal filtration mode and backflush mode to determine whether or not pressurized water is available when it is supposed to be available.

NOTE: If corrosion is a concern utilizing a sacrificial anode is recommended. Contact our Aftermarket team to discuss options.

VAF Filtration Systems V-Series Filter Troubleshooting Diagram



*** DP means Differential Pressure.**
See gage located on controller.

**Please Contact VAF's
Experienced Staff For Further Assistance.**

9.0 EXPLODED VIEW

