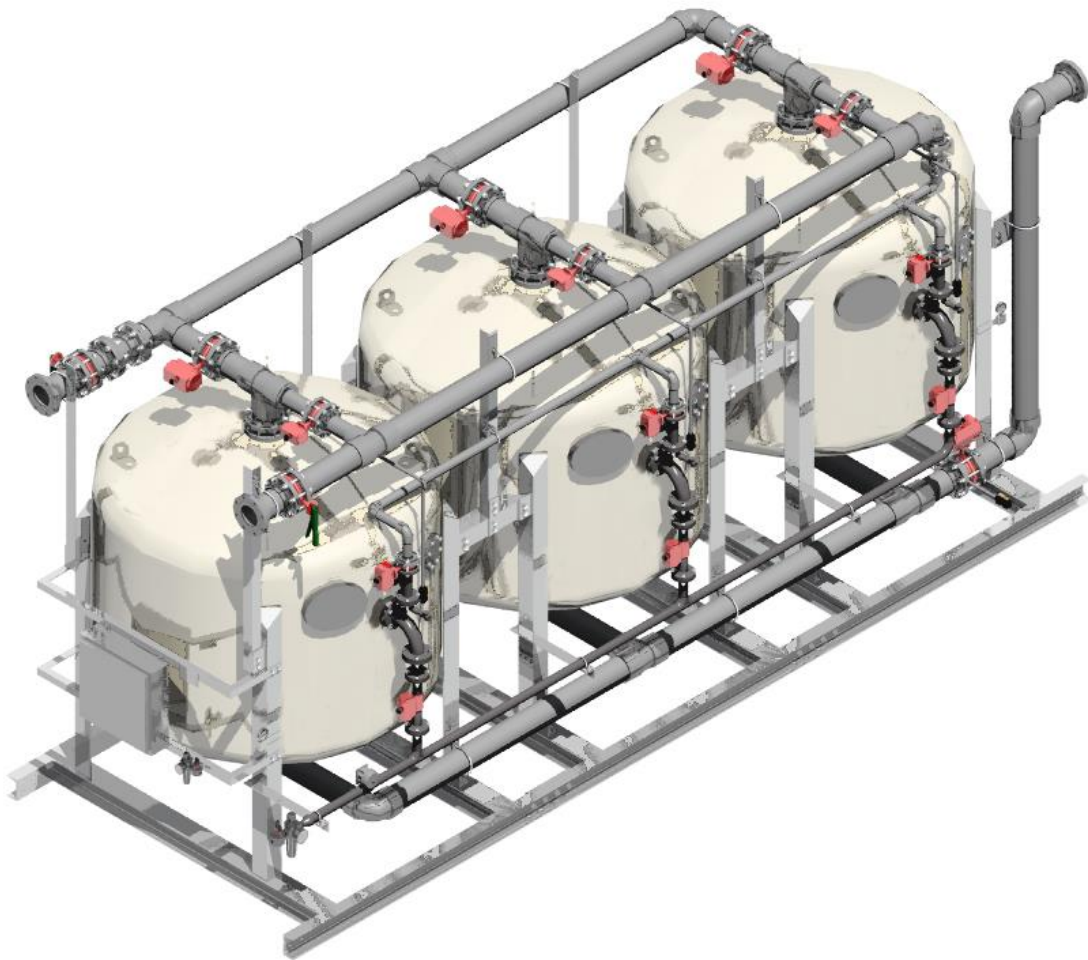




Installation, Operation & Maintenance Manual

(HCPF) Series

MULTI-MEDIA FILTER



1875 Big Timber Road • Elgin, IL 60123 • Tel: 630-762-0380

www.hydroflotech.com

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1. GENERAL DESCRIPTION

These instructions are written for both our carbon steel vessel configuration and our FRP vessel configuration. Refer to the supplements for more details on each type of vessel. This applies to standard HydroFlo Tech 2 and 3 cell sand filter designs. Customization or alternative configurations may require supplemental information for applicable details. Instruction supplements have been included, where necessary to further explain installation or operation procedures.

Power requirements are shown on wiring schematics provided with the unit.

Equipment is designed to treat unheated water up to 100 F. Special valve assemblies or conversion kits are available to handle heated water supplies.

2. FORWARD

This equipment has been carefully assembled, tested, and packaged at our factory. Sometimes damage can occur in shipment. Thoroughly inspect the equipment upon receipt and account for all items on the packing slip. We cannot assume responsibility for items lost or damaged in shipment. Claims for these items must be filed with the delivery carrier immediately.

3. GUARANTEE

The manufacturer guarantees that, under normal operating conditions, the filter media shall not be washed out of the system during service or cleaning cycles. The manufacturer also guarantees that any materials deemed defective within one year after installation or 18 months after shipment, whichever occurs first, shall be replaced F.O.B. factory.

Filter media is excluded from the warranty as it is a consumable, replaceable service item.

4. INSTALLATION

4.1 SKID PLACEMENT

Select locations that provide accessibility to the unit, near a floor drain. The floor drain shall preferably go to a sump that then feeds the plant head works.

Allow ≥ 24 " above the tank to simplify the loading of gravel and media (For top loading vessels. Vessels with sidewall man ways will not require this additional height.).

Locate the skid on a firm, relatively level foundation, preferably concrete, with piping facing, forward.

CAUTION: DO NOT USE HANDHOLD, MANWAY, FACE PIPING, OR SUPPORT BRACKETS AS LIFTING POINTS.

Level the skid using machine grout until the media tank sidewalls are plumb on all sides. If shims are used should be placed a minimum of thirty-six inches apart. Face piping must be squared up precisely to the inlet and outlet piping.

CAUTION: THE SKID MOUNTED UNIT CAN BE UNSTABLE, DUE TO HEAVY FACE PIPING. MAKE SURE THE UNIT IS TEMPORARILY SUPPORTED UNTIL IT IS PLUMBED IN AND LOADED WITH MEDIA.

4.2 INSTALL PIPING

NOTE: FOLLOW ALL APPLICABLE PLUMBING CODES WHEN INSTALLING THIS SYSTEM.

Install piping as shown on the project specific layout drawing provided with this manual. Include unions (flanges) and manual isolation valves, as needed, in the inlet and outlet service lines. Include a manual by-pass valve between the inlet and outlet service lines if desired.

NOTE: CLEAN ALL PIPING OF THREAD CHIPS AND FOREIGN MATTER BEFORE CONNECTIONS TO THE UNIT.

If the **optional** automatic by-pass valve has been provided with the equipment, installation is as indicated on the project specific layout drawing.

Install a drain line from the backwash outlet to a suitable floor drain or low elevation tank for further processing, recycling. Pipe the drain line following the straightest allowable run, using as few elbows as possible, at the lowest elevation possible. Include a union (flange) near the backwash outlet to facilitate cleaning in the future.

NOTE: DO NOT INSTALL A VALVE IN A DRAIN LINE OR USE PIPE SMALLER THAN LISTED IN THE TABLE BELOW.

TANK DIAMETER	DRAIN PIPE SIZE
20", 24"	1 ½"
30", 36"	2"
42", 48", 54", 60"	3"
60", 66", 72"	4"
84"	6"

CAUTION: DO NOT MAKE A DIRECT CONNECTION TO THE FLOOR DRAIN. PROVIDE AN AIR GAP OF AT LEAST FOUR (4) PIPE DIAMETERS TO CONFORM TO SANITATION CODES AND PERMIT OBSERVATION OF THE WATER FLOW TO DRAIN.

CAUTION: PIPING CAN LOOSEN DURING TRANSPORT DUE TO ROAD VIBRATION. BE SURE TO CHECK ALL THE THREADED AND FLANGED FITTINGS UPON ARRIVAL AND BEFORE WET TESTING. AGAIN CHECK THE FITTING DURING WET TESTING AND TIGHTEN AS NEEDED.

4.3 MEDIA LEVELING PROCEDURE

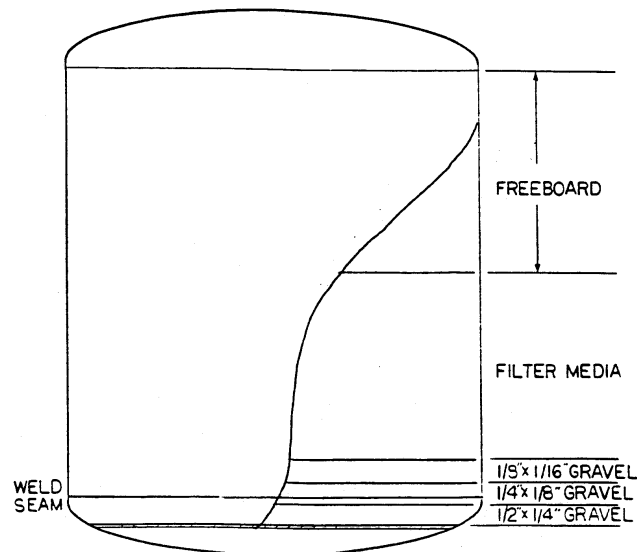
A convenient method of determining if the media is level is to add water from the bottom of the tank until the water level is midway between the high and low points of the media. Use your hand or a board to spread the media, adding or draining water as required to determine level.

Refer to the layout drawing for valve identification and location.

NOTE: PROJECT SPECIFIC DRAWINGS SUPERCEDE THIS DIAGRAM. REFER TO THE PROJECT SPECIFIC MEDIA LOADING DRAWING FOR PROPER DEPTHS OF MEDIA.

CAUTION: MANUAL VALVES MUST BE ACTUATED SLOWLY TO PREVENT HYDRAULIC SHOCK, WHICH CAN IMPART SERIOUS DAMAGE TO THE SYSTEM.

CAUTION: BE CAREFUL WHEN LOADING MEDIA AND BE SURE NOT TO DAMAGE THE DISTRIBUTION MANIFOLD PIPES AND HEADERS.



MEDIA LOAD

NOTE: THE DIAGRAM ABOVE IS A TYPICAL REPRESENTATION. PLEASE CONSULT THE APPENDIX OF THIS MANUAL FOR SPECIFIC MEDIA LOADING INSTRUCTIONS.

4.4 LOAD SUPPORT BED GRAVEL

All support bed gravel is packaged in bags of usually 100 pounds. Before loading any gravel, verify the proper amount of gravel is on site. Refer to the specification table for the gravel amounts. An improper gravel load may result in improper filter operation. Carefully follow the procedure below:

1. Open the air vent/sample valve to relieve and verify that all pressure is released from the system.
2. Verify all system manual isolation valves (including the air vent/sample valves) are closed.
3. Remove the access hole covers from the top head or side wall shell, however your filter is equipped.
4. Visually check the distribution headers in the bottom of the tank. Tighten any loose distributors.

CAUTION: IF THE FILTER TANK IS FITTED WITH PLASTIC STRAINERS OR LATERALS, HAND TIGHTEN ONLY; DO NOT USE A WRENCH.

5. Fill the vessels with water to 2/3 full.
6. Slowly pour in the correct amount of SUPPORT MEDIA bed gravel as your filter may be equipped to cover the distribution headers and level the media. Refer to section 4.3, Media leveling procedure OR the project specific drawings.
7. Slowly pour in the correct amount of MEDIA(S) as your filter may be equipped and level. Refer to section 4.3, Media leveling procedure OR the project specific drawings.
8. The vessel should be drained after each level is added to insure proper leveling for the media bed.

4.5 LOAD FILTER MEDIA

All filter media is packaged in bags of usually 50 or 100 pounds each (Approximately 2 Cu. Ft.). Before loading any media, verify that the proper amount of media is on site. Refer to the specification table for the media types and amounts.

CAUTION: AN INCORRECT MEDIA LOAD MAY RESULT IN IMPROPER FILTER OPERATION. IF THE CORRECT AMOUNTS OF MEDIA ARE NOT ON SITE, DO NOT LOAD THE TANK.

Carefully follow the procedure below:

NOTE: Wetting the bags of media while loading media will reduce the amount of airborne dust during loading.

CAUTION: VALVES MUST BE ACTUATED SLOWLY TO PREVENT HYDRAULIC SHOCK, WHICH CAN IMPART SERIOUS DAMAGE TO THE SYSTEM.

1. Install the SUPPORT BED GRAVEL media per section 4.4 of this manual OR the project specific drawings.
2. Slowly pour in the correct amount of FILTER MEDIA and level.
3. Measure the "FREEBOARD" dimension to verify the tank has been loaded correctly. Freeboard is the open area measured from the surface of the media bed to the knuckle in the top head. Any deviation from the dimension given in the specification table by + 10% indicates that one or more of the media amounts is not correct.
4. Partially open the manual inlet isolation valve. Slowly fill the tank until the water level is just below the top access hole then close the valve.
5. MEDIA has the tendency to retain air on the granule surface therefore we highly recommend soaking the media to displace the air.
6. After the media has been soaked, clean all seating surfaces of the top access hole and gasket, and then replace the cover. Make sure the gasket is centered.

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4.6 PRESSURE TEST SYSTEM

1. Starting Conditions
 - a) Open the air vent/sample valves on each tank.
 - b) Verify all other manual isolation valves are closed.
 - c) Top access hole cover is installed.
 - d) Turn the needle valve that feeds the Drain Valves so that NO air is delivered to the solenoids.
 - e) Turn the field installed air shut off valve on the 2" air scour line OFF so that no air is delivered to the air scour valves.
 - f) Verify that the unit is in "Filtration Mode".
2. Open the raw water inlet isolation valve 1/3 and fill the tank until the flow to the air vent/sample ports is steady.
3. Close the air vent/sample ports.
4. Slowly open the inlet isolation valve until fully open.
5. Open all of the manual isolation valves.

NOTE: SLOW LEAKS IN GASKETS AND PIPING WILL USUALLY SEAL THEMSELVES IN 7-10 DAYS. HOWEVER, IT MAY BE NECESSARY TO RE-SNUG THE ACCESS HOLE COVER LUG NUTS AFTER THE FIRST WEEK OF OPERATION.

6. Initiate the manual backwash cycle with the Air Scour selector switch in the AUTO position. Verify that there is a high flow of water to the backwash outlet.
7. The valves will automatically cycle through the Air Scour Backwash, Drain, Air Scour, Fill, Backwash and Settle Cycles for each vessel. This will allow all trapped air to be purged from the system.

4.7 PRESSURIZE THE SYSTEM

1. Starting conditions:
 - a) All manual isolation valves are closed.
 - b) Power is "OFF".
2. Partially open the inlet isolation valve and slowly fill the media tank.
3. There will be an inconsistent flow of water to drain until the media tank is filled with water. When the flow to drain is steady slowly open the inlet isolation valve until fully open.
4. Check the top access hole gasket for leaks.
5. Check the piping for leaks.

NOTE: SLOW LEAKS IN GASKETS AND PIPING WILL USUALLY SEAL THEMSELVES IN 7-10 DAYS; HOWEVER, IT MAY BE NECESSARY TO RE-SNUG THE ACCESS HOLE COVER LUG NUTS AFTER THE FIRST WEEK OF OPERATION.

4.8 INITIAL CLEANING

NOTE: REFER TO THE LAYOUT DRAWING FOR VALVE IDENTIFICATION AND LOCATION.

CAUTION: MANUAL ISOLATION VALVES MUST BE ACTUATED SLOWLY TO PREVENT HYDRAULIC SHOCK THAT CAN IMPART SERIOUS DAMAGE TO THE SYSTEM.

1. Starting Conditions:
 - a) System is pressurized.
 - b) Manual inlet isolation valve open approx. 1/3.
 - c) Manual outlet isolation valve closed.
 - d) Power on.
2. The initial flow of water at drain may be inconsistent as trapped air in the media is vented to drain. When the flow at drain is consistent, fully open the inlet isolation valve.

NOTE: THE INITIAL BACKWASH DRAIN WATER MAY CONTAIN SOME MEDIA, AS DEFORMED AND INCONSISTENT PARTICLES ARE WASHED OUT OF THE BED.

3. Allow the unit to BACKWASH until the flow at drain is as clear as the raw inlet water (approximately 30 minutes).
4. Let the unit SETTLE for about six (6) minutes to re-stratify the media bed.

4.9 SUPPLEMENTARY INSTRUCTIONS

Filter with Differential Pressure Initiation

WIRE SYSTEM

1. Wire circuit as shown on the wiring diagram following all applicable electrical codes. Three wires run from the Differential Pressure Switch; white - common, red - normally open, and black - normally closed. Connect a continuous load to the white wire and connect the red wire to the cycle controller as indicated on the wiring diagram. Cap the black wire.
2. Include an on-off switch in the power supply line.

PRESSURE DIFFERENTIAL SWITCH

1. The pressure differential switch has been factory set at 5 psig. This is a nominal setting; specific situations may require adjustment of the set point.
2. Once the system has been placed into service, note the pressure drop across the unit. This will be the normal pressure drop.
3. Generally, a filter should be cleaned when the pressure drop across it reaches 3 to 5 psig above the normal pressure drop. Add 3 to 5 psig to the normal pressure drop to determine the total pressure drop at which the system should be cleaned.
4. If the preset 5-psig setting is not acceptable for your application, adjust the pressure differential switch to the new set point following the manufacturer's instructions. After changing the set point, monitor the operation of the filter to verify that it is initiating the cleaning cycle at the desired pressure drop.

5. OPERATING INSTRUCTIONS

The filter media removes both suspended matter and heavy sediment from the raw water supply. In FILTRATION MODE, raw water passes through the valve nest and into the top of the tank. The raw water is filtered as it passes down through the media bed. Filtered water leaves the bottom of the tank, flows through the outlet valve and into the service lines.

Please refer to the P&ID drawing (as well as the general arrangement and electrical drawings) for detailed process instructions / descriptions.

To keep the filter operating properly, it is necessary to periodically remove the accumulated sediment from the media bed. When the pressure drop across the filter increases 3-5 PSI over the normal pressure drop or when the service water quality deteriorates, the filter must be put through a multiple step cleaning process.

AIR SCOUR BACKWASH

The flow of water through the media bed is reversed. The media bed is expanded and accumulated sediment is loosened and washed out to drain. An automatic flow controller maintains the proper flow rate to prevent the loss of media during backwash. This step is a precursor to the Air Scour Cycle.

DRAIN

Air is introduced to the vessel in order to partially drain the system to prepare it for an Air Scour Cycle. An operator adjustable timer on the MMI controls the amount of air. The vessel should be drained such that the water level is just below the sight glass.

AIR SCOUR

Air is introduced into the system below the media bed in order to break up any crustification or "mud balls" that may have formed during operation.

FILL

Water is introduced through the process valve in order to refill the vessel.

BACKWASH

The flow of water through the media bed is reversed. The media bed is expanded and accumulated sediment is loosened and washed out to drain. An automatic flow controller maintains the proper flow rate to prevent the loss of media during backwash. This step is a precursor to the Air Scour Cycle.

SETTLE

The flow of water through the filter is stopped. The expanded media bed settles and restratifies in preparation for filtration mode.

Your filter media bed should be manually cleaned a minimum of once per month to prevent clotting of the media bed.

5.1 VALVE NEST AND CONTROLS

The valve nest of your filter provides the means for automatic operation. The valve nest consists of a series of solenoid valves that direct the flow of the water required for operation.

5.2 FILTER SAND AND GRAVEL SPECIFICATIONS

Sand or gravel shall be hard, durable, washed and graded, angular or rounded silica base granular material, free of limestone. It shall contain less than 5% flat particles and less than 1% clay, loam, dust or other foreign materials. It shall conform to the following effective size and uniformity coefficient.

DESCRIPTION	LAYER
Filter Sand 0.45-.55 SG	Filtration Layer # 3
High Density Garnet 30 X 40 Mesh	Filtration Layer # 2
High Density Garnet 8 X 12 Mesh	Filtration Layer # 1
1/8 X 1/16 Quartz Gravel Under bedding	Support Layer # 2
1/4 X 1/8 Quartz Gravel Under bedding	Support Layer # 1

6. MAINTENANCE INSTRUCTIONS

6.1 FILTER MEDIA INSPECTION

The media needs to be inspected on a bi-annual basis as a minimum. Different applications may require more frequent inspections. If you notice that the frequency of backwash cycles is increasing, the media may be in need of service.

Prior to inspecting the media initiate a backwash to remove as many contaminants as possible.

To inspect the media, drain the vessel to be inspected and remove the access hatch. Check the surface of the media for blinded areas and "mud-balls". If the surface appears blinded, refer to the following section on media service and replacement.

6.2 FILTER MEDIA SERVICE / REPLACEMENT

All mud-balls and blinded areas at the surface of the media bed must be removed. A small scoop or shovel should prove handy.

Any material removed from the filter should be replaced. Care should be taken to keep the level of the filter bed at its original startup level.

If repeated efforts to clean the surface of the bed do not result in improved performance, the entire bed must be replaced.

Remove all the material from the access hatch. **DO NOT TRY TO REMOVE THE MEDIA FROM THE BOTTOM FITTING.** It is recommended that a vacuum truck be utilized for the removal of the media.

After all material has been removed, flush the tank internals and inspect all internal devices for damage or fouling. Replace any damaged devices.

Refill the filter with fresh media.

6.3 CONTROL VALVE SERVICE

Please refer to the manufacturers supplied cut sheets for specific service and maintenance instructions.

6.4 SERVICE REQUEST AND REPLACEMENT PARTS

When requesting service, ordering replacement parts or in need of warranty services, please use the telephone numbers listed below. Remember to have the following information available prior to communication with HydroFlo Tech.

1. Job number and equipment serial number. Your Job # is XX-XXXX-XX
2. Date unit was placed into service. Please provide ON-Line date as well.
3. Operational manual
4. Description of problems or required part

Service Request:

Contact: Service Department
Phone: (630) 762-0380