

# CHALLENGER FILTER



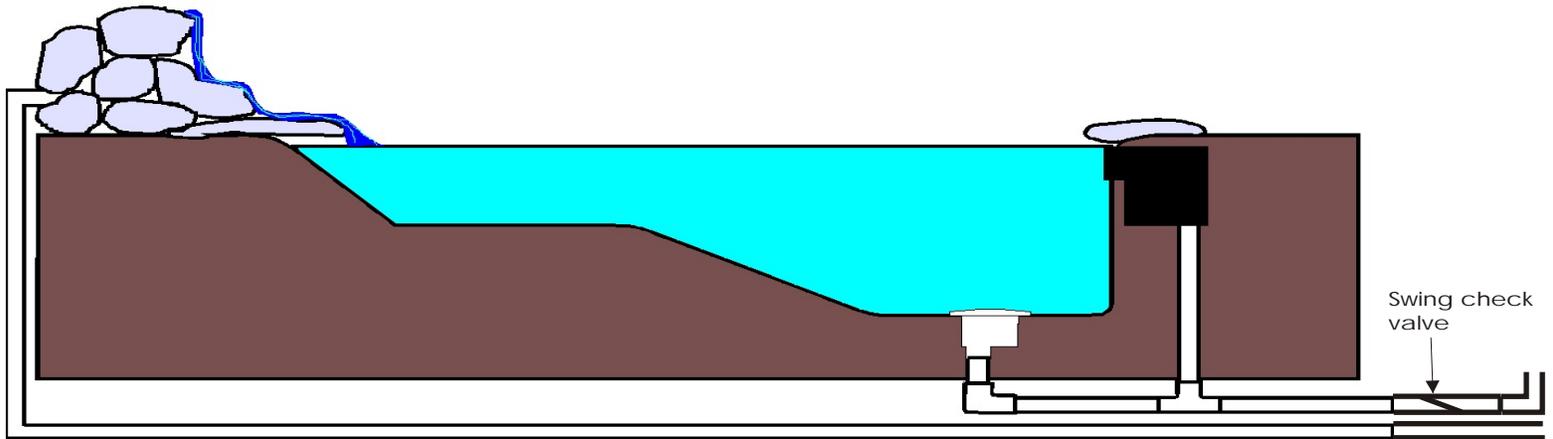
# Fluidart Technologies Bead Filter Owners Manual

**Congratulations on making the smart choice!**

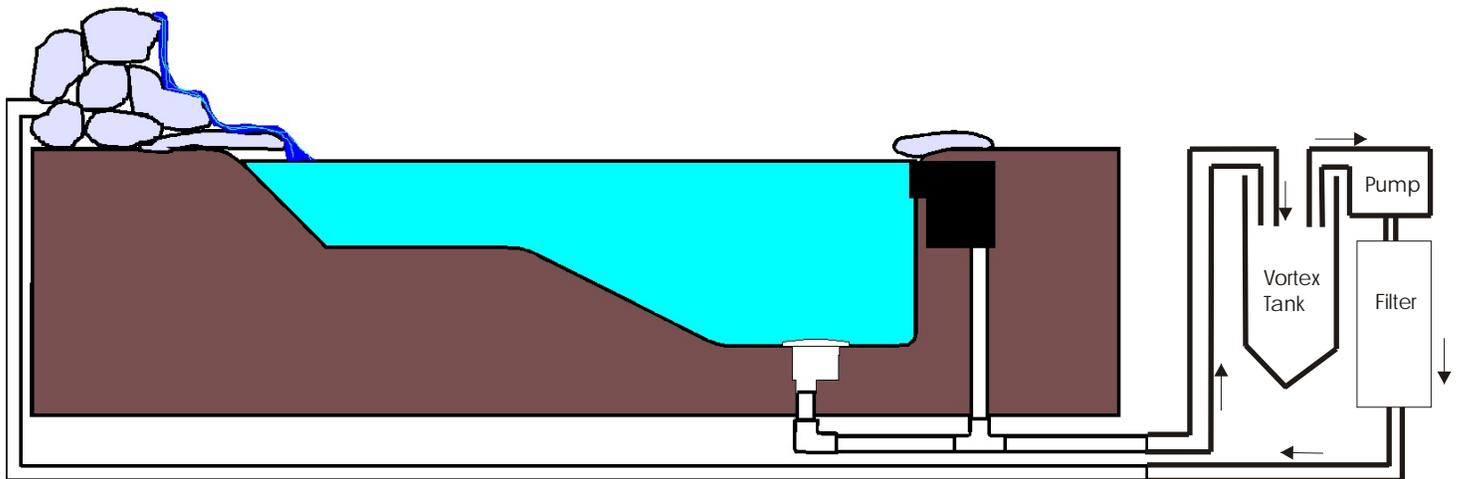
**Fluidart Technologies filtration systems are designed with the pond owner in mind. Our filtration systems are unparalleled in quality, performance, ease of operation, and maintenance. We are certain that you will have many years of happy KOI keeping with our system.**

**Contact us at [info@fluidart.com](mailto:info@fluidart.com) or phone 1-888-499-3852  
or 405-843-9060**

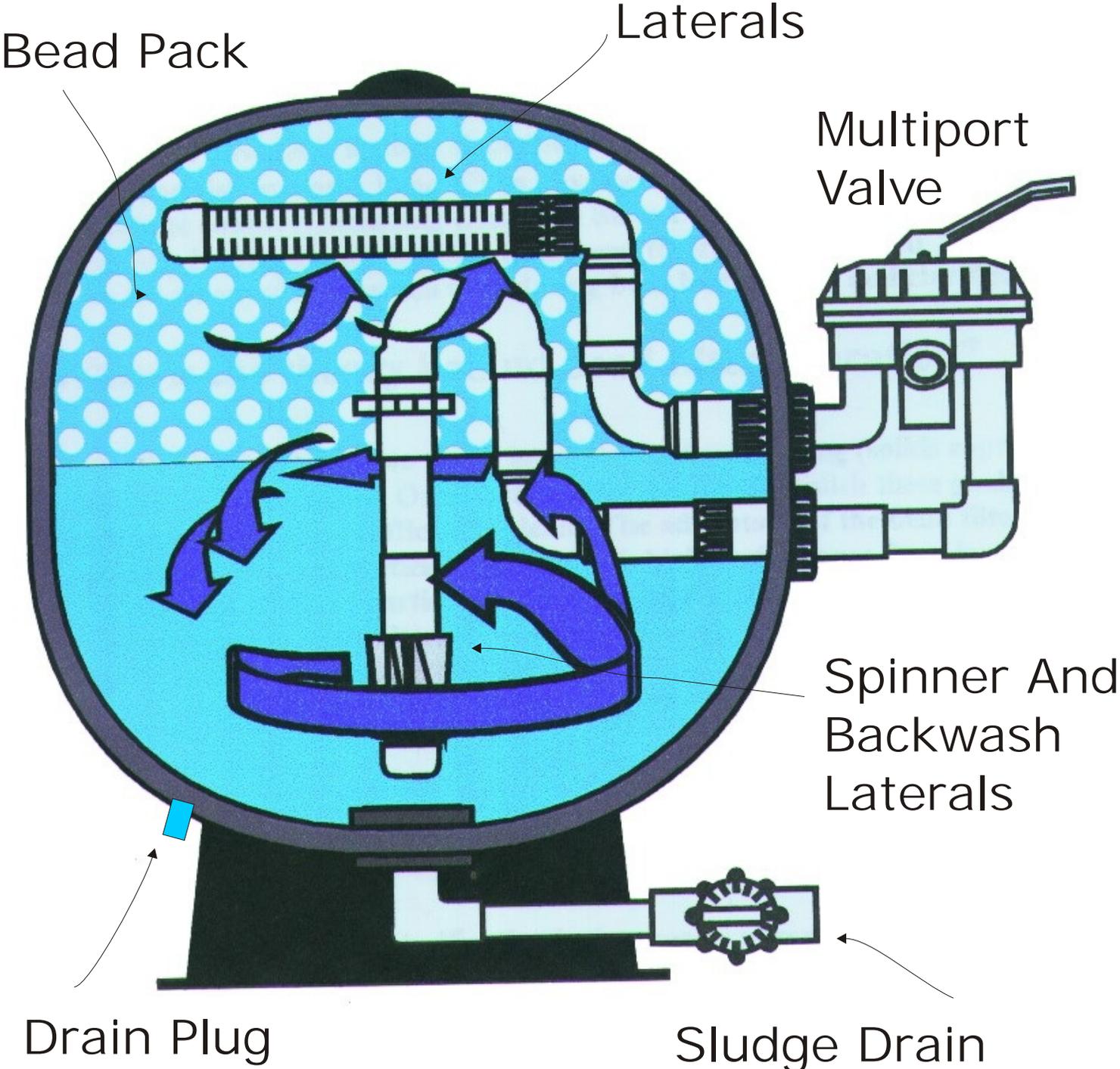
# Suggested installation of Fluidart Filtration System



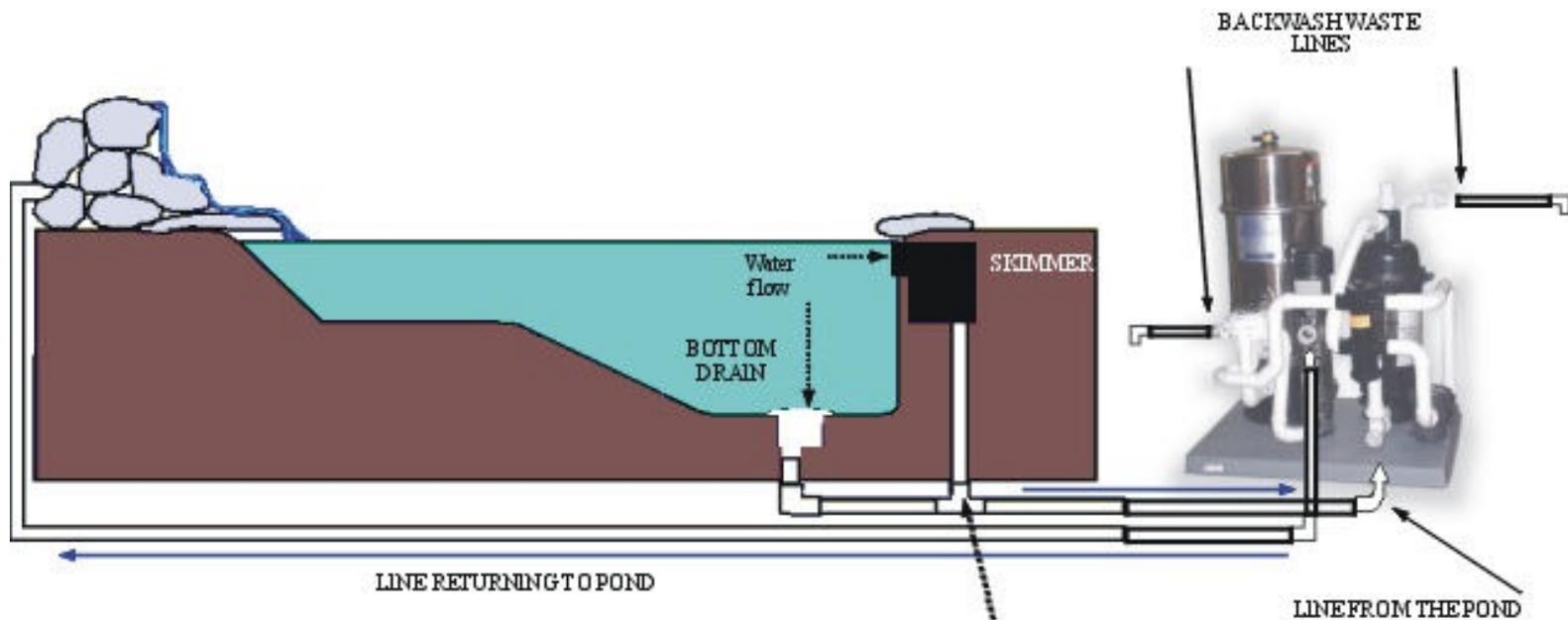
Swing check valve installed below water level in an easily accessed location will make keeping the pump and Turbovortex primed much more easy.



# Challenger Internals



# Typical installation of FluidArt Ultimate System



THIS T MAY BE SUBSTITUTED FOR A 3 WAY MIXING VALVE AND MOVED CLOSER TO THE EQUIPMENT PAD. THIS WILL ENABLE YOU TO VARY THE AMOUNT OF FLOW COMING FROM THE BOTTOM DRAIN AND SKIMMER.

# Introduction to Bead Filtration

## How long have bead filters been in use?

Bead filters have been around since the mid-70's and got their start in the food fish industry. Bead filters have been tested at various universities around the country, including Louisiana State University and Langston University in Oklahoma. In these tests, bead filters outperformed other filtration systems, when considering both biofiltration and clarification.

## What is the theory behind bead filter operation?

Bead filters accomplish two goals, one being water polishing (solids capture) and the other being biofiltration. Other filtration systems accomplish these goals, but are much larger and more difficult to clean. The advantage of the bead filter is that it provides a home for beneficial bacteria with high surface area for a large colony per cubic foot and fine particulate straining all within the same vessel. The other big advantage the bead filters have over other types of filters is that they are much easier to clean. This makes the hobby of KOI or pond keeping much more enjoyable, with less work involved in maintaining a healthy environment for the fish.

## How does a bead filter perform Mechanical Filtration?

Mechanical filtration or clarification is the process of removing suspended solids from water. Suspended solids in a recirculating system are generally small particles of undigested food, bacteria, and algae. These solids tend to reduce the clarity of water and cause problems in consuming tremendous amounts of oxygen, also needed by our beloved fish. Bead filters remove solids from water by different mechanisms. Physical straining is probably the most dominant mechanism removing larger particles (>50 microns). Finer particles (<20 microns) are removed at a lower rate by a process called bioabsorption. The particles are captured by bacterial biofilm on the surface of the bead. Studies show that bead filters capture 100% of particles >50 microns and 48% of particles in the 5-10 micron range per pass. The more passes the more solids captured.

**\*\*Important\*\*** in order for the bead filter to perform FINE micron straining it **MUST** be fully colonized with bacteria. Depending on the temperature this can take up to 4-6 weeks, at temps. above 60-65 degrees F.

## How does a bead filter perform Biofiltration?

Biofiltration depends on the establishment of a colony of bacteria on the surface of the beads large enough to convert dissolved toxic nitrogenous waste to harmless compounds. When the bacteria are given the proper environment, they grow in a thin biofilm on the surface of each bead. Each cubic foot of beads contain about 600,000 beads. This is one of the secrets of the bead filters success--high surface area per cubic foot for a large bacterial colony per cubic foot of filter media. The two most common types of bacteria are, *Nitrosomonas* which is responsible for the break down of ammonia in the system. The next is *Nitrobacter*, which is responsible for the breakdown of nitrite into relatively harmless nitrate.

**\*\*Important\*\*** in order for the bead filter to perform Biofiltration the beads must be colonized with a large enough colony to handle the load of dissolved ammonia presented to it. This may take up to 4-6 weeks at temps. above 60-65 degrees. Until the colony has grown large enough, the pond owner **MUST** be responsible for monitoring the levels of ammonia and nitrites in the pond water and taking appropriate measures to correct dangerously high levels.

## How do you size a bead filter?

When we start talking bead filter size, usually the first thing said is "I have a \_\_\_ gallon pond. What size filter do I need?" This just gets the conversation rolling. The next question should be, "How many fish do you plan to keep in the pond?". Fish have to eat and what it really boils down to is how many pounds of food is the pond keeper going to feed per day. The larger the fish load and the more food that will be fed, the larger the filter needs to be. A good rule of thumb when dealing with bead filters is this: 1cu. ft. of beads will handle the solids capture and nitrification of up to one lb. of food per day. 100lbs of fish fed at 1% body weight or 50lbs of fish fed at 2% body weight. This is feeding 35% protein food. Water quality and clarity can be achieved by adjusting feeding rates and/or stocking densities.

## What pump do I use with my filter?

Almost any out of pond pump will work with a FLUIDART FILTER. 2 speed pumps have proven to be favorites among many bead filter owners. 2 speed pumps have the versatility of running on low for normal filtration and saving energy dollars, while using high for backwashing. High is also great to have when you are having friends over and you want your waterfall to really roar!

## **Challenger Filter Installation Instructions**

- 1. Remove the filter from the box and locate the plastic bag containing the lid to the filter and opening wrench.**
- 2. Inspect the internals for any shipping damage. You will note that there are plastic zip lock bands on the internals to hold them in place during shipping. Cut and discard these, as they are not needed.**
- 3. Position the filter at the site of installation. Be sure that this is a level site with full access to all sides of the filter, as you will need to use the sludge drain on a regular basis and may eventually need to use the tank drain valve. We also recommend that the filter be installed on a pad of some sort to prevent settling.**
- 4. Attach the multiport valve. Be sure that the "O" rings of the valve are properly positioned. **\*\* Important \*\*** Hand tighten the unions, do not use a wrench, as you may crack the outer ring by over tightening.**
- 5. Make pipe connections. The pressure (pump) line, return line, and the waste line connections are clearly labeled on the valve. **\*\* Important \*\*** Install a swing check valve on the suction line from the pond to the pump. Install this below water level and you will have much less trouble priming your pump. See ideal installation diagram at the front of the manual. Also be sure that the waste water is directed away from the filter site, so that there is not settling of the filter system from moist ground around the filter**
- 6. Fill the tank about one half full of water. Now pour the beads into the tank from the top opening. When all the beads have been placed in the tank, screw the lid into place and tighten with the tool provided.**
- 7. Set the multiport valve to the filter position and open the air relief valve at the top of the filter. Turn on the pump and when water sprays out the air relief valve, close it. Your filter is now operational.**
- 8. Insert the section of PVC pipe that came with the filter into the upper union of spring check valve for the blower attachment. Glue this union. Then slide the blower down onto this pipe and secure with set screw. (Do Not Glue). When you turn on the blower the spring check valve will open allowing pressurized air to enter the filter tank for bead agitation.**

# **Challenger Filter Operating Instructions**

Now that your filter is installed and running there are a few simple things that you need to know and understand.

## **FILTER MATURATION**

This has been stated earlier, but is very important. It takes 4-6 weeks of operation at temperatures above 60-65 degrees F. before there is a large enough colony of bacteria to handle the bioconversion of ammonia and fine particulate straining. During this transition period the pondowner must watch the ammonia and nitrite levels in the pond. If they become dangerously high, steps should be taken to correct the problem, such as a water change. Also during this period fine particulate straining will not be fully mature and you may notice your water being less polished than you would like. Both of the above issues will improve with time and the growth of the bacterial colony. This will occur with any type of bead filter used.

## **ULTRAVIOLET LIGHT STERILIZERS**

Bead filters will remove suspended particles down to 5-10 microns in size. However, some algae particles are smaller than 5 microns and will not be removed by the beads. These tiny algae cells will give the water a green cast and affect the clarity of the water. If the pond owner wants crystal clear swimming pool clarity, then a UV-light is needed. UV-lights will also remove many harmful bacteria and decrease the suspended bacterial counts in the water. We recommend the use of UV-lights for the above reasons.

## **BACKWASH INSTRUCTIONS**

When you first start up your filter, we recommend that you let it run for two weeks before you perform your first backwash. After that, once a week during the warm season should be all that is needed. During the winter months backwashing can be reduced to as little as once every 2-3 weeks. To perform a backwash do the following:

- 1. With the pump running open the valve to the sludge drain. Keep it open for 15-20 seconds, then shut it. This will purge the large solids that have made it into the filter and settled out in the bottom of the tank to waste. It is very important to get them out of the system for overall water quality and more efficient filter operation.**
- 2. Next turn off the pump.**
- 3. Move the multiport valve to the backwash position and turn on the pump for 10-15 seconds. This does an initial breakup of the bead pack. Then turn off the pump.**
- 4. Move the multiport valve to the rinse position. When the blower is activated**

in this position, air and a small amount of water will leave the filter to waste. It is important that the valve be in the rinse position for the blower agitation of the beads.

5. Activate the blower unit for 1-2 minutes. During this time the beads and debris are dispersed throughout the interior of the filter. This breaks up the beads and releases the trapped particles. This debris then can easily be backwashed out to waste. Place your ear to the side of the tank. You should hear a lot of "plopping and sloshing" going on inside the filter. If you only hear air moving through the filter then you need to open the tank and make sure that the beads are not gelled.
6. **!!IMPORTANT!!** Some water has been forced out of the filter. The tank needs to be entirely full of water before backwash is performed. To fill the tank with water, with the valve in the rinse position, open the air release valve at the top of the filter and turn on the pump. When water sprays out the air release valve, the tank is full. Turn off the pump and shut the air release valve.
6. Move the valve to the backwash position. Turn on the pump and run until the water is clear in the sight glass. The water will run clear at first then dark and then clear. If you are using a two speed pump, alternate between high and low speed, spending most of the backwash time in low speed. Once or twice during the backwash procedure, turn the pump off for 10 seconds and turn it back on low. You may notice another cloud of dirt leave your filter.
7. Move the multiport valve to the rinse position. Turn on the pump and run until water is clear in the sight glass. This takes any remaining debris and sends it to waste, instead of sending a cloud of dirt back to the pond. Turn off the pump.
8. Move the multiport valve to the filter position and turn on the pump. Backwash is done.

**NEW FOR 2003 ALL CHALLENGER, HYDRABEAD, PINNACLE AND ECONO-BEAD FILTERS COME STANDARD WITH THE WATER MISER SLUDGE DRAIN.**

The **Water Miser Sludge drain** allows a low volume backwash if water is expensive, in short supply, or you have a low volume pond. To use your Water Miser Sludge drain do the following:

1. Turn off your pump and move the multiport valve to the rinse position.
2. Turn on the blower and allow it to run for 2-3 minutes. Now open the Water Miser Sludge drain valve with the blower running. You will notice water being forced out of the sludge drain. Allow the blower to evacuate all the water from the tank.
3. Now turn off the blower, close the sludge drain valve, and open the air release

valve at the top of the filter. With the multiport valve still in the rinse position turn on the pump. You will be filling the tank with water at this point and you will notice air rushing out of the air release valve at the top of the tank. When water exits the air release valve then the tank is full. Now turn off the pump.

4. The tank is again filled with water. Now repeat step #2 and 3 above. This will again agitate the beads and force the dirty water out of the tank. You can repeat this step as many times as you would like. You are only using the volume of the tank minus the volume of the beads to wash the beads each time. This will use much less water than a hydraulic backwash.
5. When you are done with the above steps, fill the tank as above and do a rinse on beads. Run the water until clear and then go back to filter mode. You are done and saved many gallons of water

**\*Note\*** If you leave you filter unbackwashed for two or more weeks, it is a good idea to do an extra long blower treatment on the beads.

**\*Word of Caution\*** If you leave you filter unbackwashed for extended periods of time, and you live in an area with relatively soft water, you may want to buffer your pond water. The bacteria in the filter can consume enough alkalinity in the water to cause a dangerous pH drop. Total alkalinity should be kept above 80ppm to avoid potentially dangerous shifts. To increase alkalinity, add sodium bicarbonate, change the water, or add a commercially prepared pH Buffer.

## **INTERNAL INSPECTION**

We recommend that twice a season you inspect the output laterals, backwash laterals, and the condition of the beads.

1. Backwash your filter then turn off the pump and leave the valve in the backwash position. Also open the drain plug at base of the filter and open the sludge drain valve.
2. Open the air release valve at the top of the filter. You will notice air rushing into the filter. This represents water draining out of the filter.

Or you can turn on the blower with the sludge drain valve open and the Multiport valve in the rinse position, this will force the water out of the tank.

3. When air stops being sucked into the filter, most of the water has drained out of the filter. Using the Hexagonal wrench that came with the filter unscrew the top cap and remove.

4. **Now inspect the beads. Do they look clean after the backwash? Are there areas of caked beads? If you find areas of dirty beads or caked beads, you may need to adjust the length of time that you use the blower, or increase the backwash time, or possibly the backwashing frequency. If you find caked beads, now is the time to break them apart. Using your hand or a stick, stir the beads and break up any clumps that you might find.**
5. **Wipe any beads stuck to the output laterals off and inspect them. Make sure that they clear of any obstructions. If there is material inside the laterals, they can be unscrewed and removed. A baby bottle brush cleaner works well for removing internally trapped solids. Replace when done.**
6. **Next, inspect the backwash laterals. They will need to be removed. This can be done by reaching down in the filter and unscrewing the union that holds the backwash lateral in place. When loose inspect them for debris. Clean if needed then replace when done.**
7. **Replace the top cap using the wrench and make sure that it is secure. Pay attention to the position of the air release valve so that it is pointed in the direction you wish.**
8. **When the top cap is back on, with the air release valve open, move the filter valve to the rinse position and turn on the pump. When water comes out of the air release valve, close the valve and perform another backwash and rinse cycle before going back to filtration. Now your done.**

## **MEDICATING YOUR POND**

**Sometime during your career as a pond keeper you may need to medicate your pond with chemicals that will harm the bacterial colonies on the filter media. To insure that they are not damaged follow these simple steps:**

1. **Do a good backwash on the filter then turn off the pump.**
2. **Move the valve to the "recirculate position". This will cause the water to bypass the filter while your treating your pond. Turn your pump back on.**
3. **Open the drain plug at the bottom and the sludge drain valve of the filter and then the air release valve at the top of the filter. Water will start draining out of the filter without loss of any beads. The bead pack will now be surrounded with air instead of water. This will prevent any bacterial loss from lack of oxygen. The beads will stay moist for several days.**
4. **When the medication period is over, close the drain plug and sludge drain valve, but leave the air release valve open. Turn off the pump and move the handle to the**

rinse position. Now turn on the pump. You will notice air "whistling" out of the air release valve as the tank refills with water. When water sprays out of the air release valve turn off the pump. Do a quick backwash and rinse, then go to filter mode.

**\*Note\*** Depending on the chemicals used, it is advisable to do a 50% water change before starting the filter back up. Check with your dealer.

## **WINTERIZING YOUR FILTER**

If you live in an area where you experience hard freezing, you may decide to shut your filter down for the winter. Do the following:

- 1. Do a good backwash of the filter. Move the multiport valve to the "winter" position.**
- 2. Turn off your pump and open the drain plugs on the pump strainer basket.**
- 3. If you have a Turbovortex on your system, open the drain plug at the base of the filter and open the priming port at the top of the tank, to drain the water from the tank. Loosen all connections so that any remaining water can drain out.**
- 4. Open the drain plug and the sludge drain valve at the base of the main filter and then the air release valve at the top of the filter. Water will drain out of the filter, but no beads will be lost.**
- 5. Loosen all connections and drain exposed pipes, so that no water will be trapped. This is especially important for your UV lights!**

**In the Spring:**

- 1. Tighten all the connections that you loosened in the Fall.**
- 2. Close the drain plug on the Turbovortex and the pump strainer basket. Fill the Turbovortex half full of water. Replace the Bio-Balls and replace the lid being careful to not over-tighten the lock ring. Prime the Turbovortex and the pump strainer basket. When full close.**
- 3. Move the multiport valve to the rinse position and open the air release valve at the top of the filter and close the drain plug. Turn on the pump. When water comes out of the air release valve at the top of the filter, shut it and turn off the pump. Now do a good backwash and rinse before going to the filter mode.**

**\*Note\*** The bacterial colony on the beads in the filter will take some time to get back up to full capacity. During the first few weeks of operation in the spring, it is a good idea for the pond owner to do frequent checks of the ammonia and nitrite levels.

# **Trouble Shooting**

## **Decrease in water flow**

**1. If you notice that your water flow is decreasing the most likely cause is that the filter needs to be backwashed. The bead filter is designed to trap solids and does it very well. When fully loaded with solids, the filter may restrict flow. Perform a backwash and rinse.**

**2. If after backwashing the filter the water flow is still low, next check the strainer basket on the pump. Be sure that it is clean and replace.**

**3. If you have a TURBOVORTEX on your system. Perform a backwash. Pay attention to the amount of water flow available while backwashing the TURBOVORTEX. This water is coming straight from the pond. If there is little flow, then you have a supply problem, meaning that the bottom drain, return line, or the skimmer is in need of cleaning. If these are clean and clear then check the impellers on the pump to make sure that there are not any objects trapped that would decrease their rpm. If there is plenty of flow while backwashing the TURBOVORTEX, then the flow restriction is after the pump.**

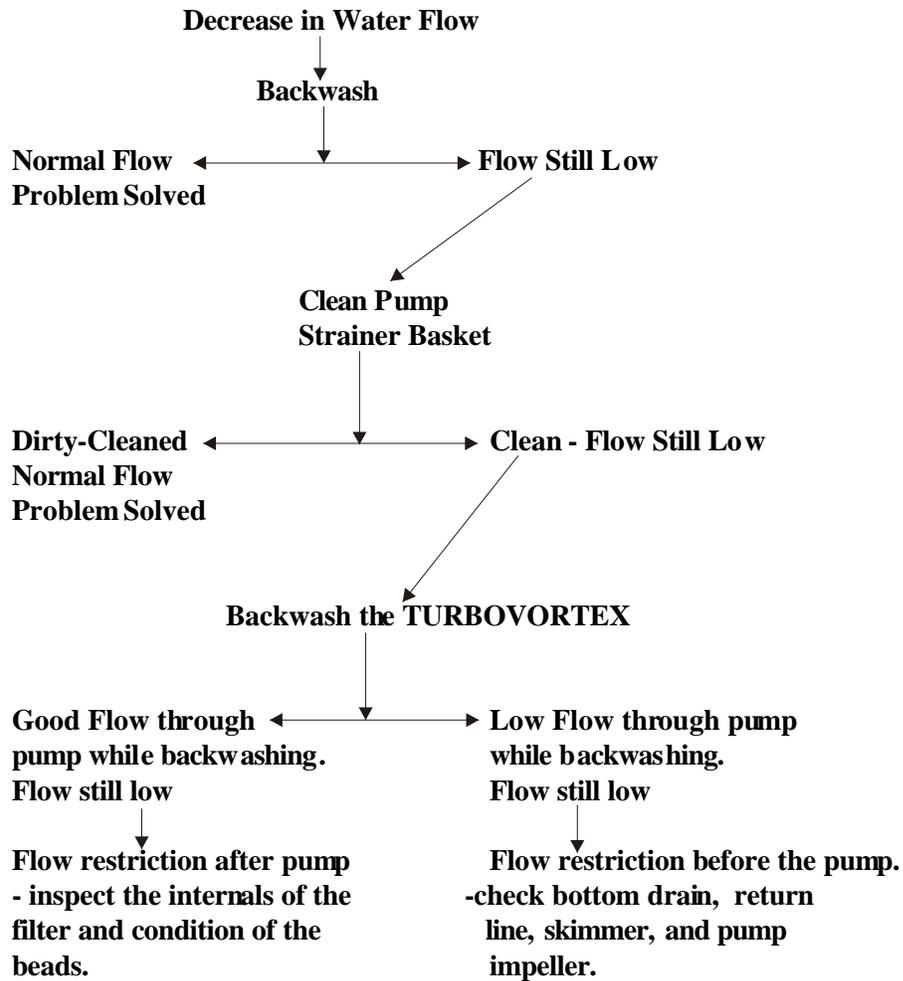
**4. If flow is still low after backwashing the TURBOVORTEX and there was plenty of flow through the pump, then you need to inspect the internals of the filter.**

**Check to see if the laterals are clear of obstruction and that the beads are not caked into large clumps. When the bead pack gets "gelled" they are hard to break apart with backwashing and doing a blower treatment. They may need to be manually broken apart. When the beads are gelled they tend to cause "Channeling," which means that the bead pack is totally clogged and water will follow paths of little resistance through or around the bead pack. When channeling is occurring you will notice that after backwashing the filter quickly clogs and flow slows in intervals that used to take 1-2 weeks, now flow slows in 2-3 days. Follow the directions in the internal inspection section of the filter operation section of the manual.**

**5. If you follow the above steps and your flow is still low, PLEASE, call us at 1-888-499-3852**

**6. See the following page for a quick flow chart of the above directions**

# Trouble Shooting



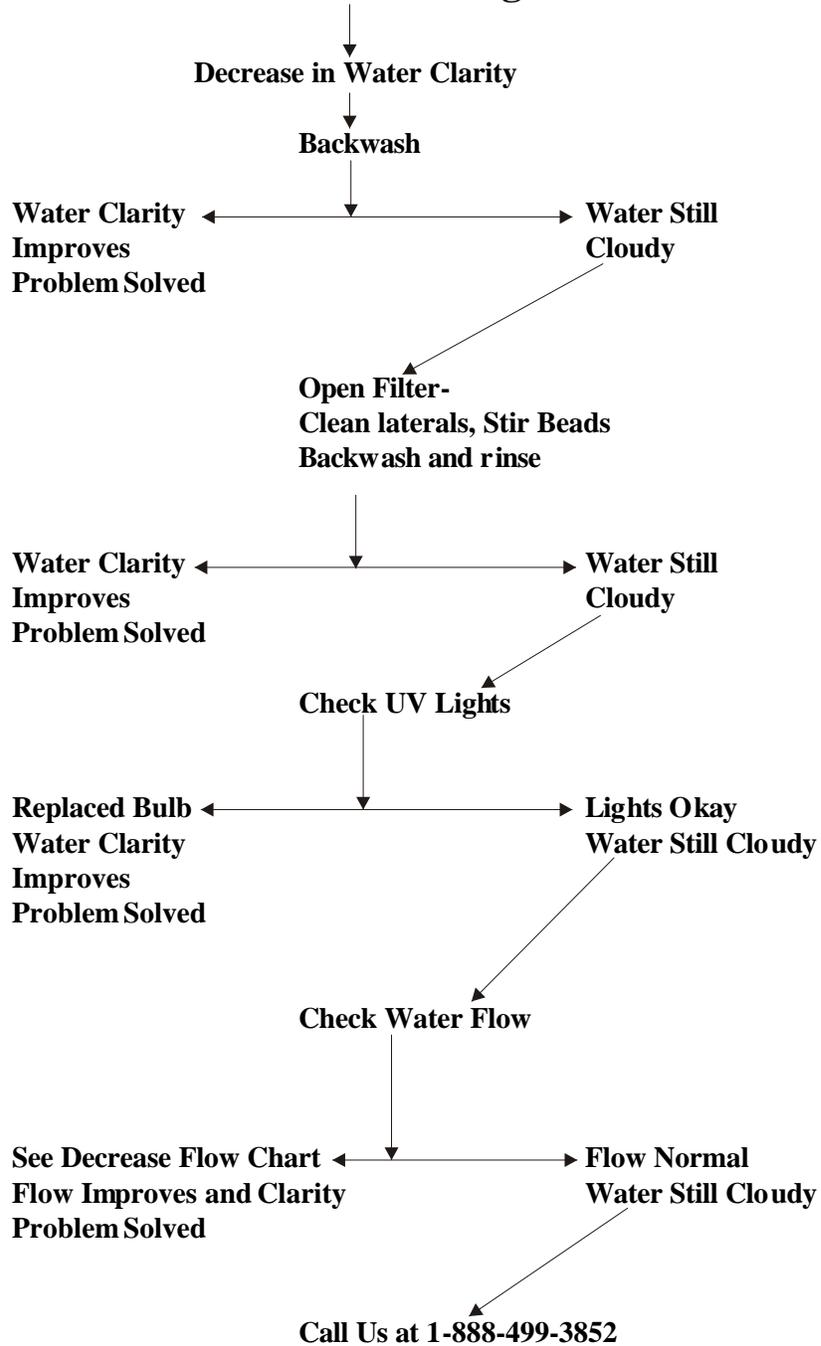
**Flow Still Low**  
**Call Us - 1-888-499-3852**

# **Trouble Shooting**

## **Decrease in water Clarity**

- 1. If your filter has a mature bacterial colony, which could take up to 4-6 weeks at temps. above 60-65 degrees F., and your water quality and clarity have been good then decreases, the first thing to do is a good backwash and rinse. Spend an extra amount of time with the blower agitation of the beads.**
- 2. If you clarity does not improve or improves then decreases quickly, open the filter and inspect the internal condition of the laterals and the beads. If the beads are gelled and channeling is occurring, then the water will bypass most of the bead pack and no mechanical filtration will occur. Manually break up the beads and make sure the laterals are clear of obstruction.**
- 3. If your water clarity does not improve, and you have UV-lights on the system, check to see if the bulbs are still working. Depending on the bulb, some UV-light bulbs will only have killing power for six months of continuous run. Others will last for a year or more. Check to see when they were last changed and replace if needed. They should be changed at least once a season.**
- 4. If your clarity does not improve, check the water flow out of the system. The entire pond water volume should be turned over through the filter system at least 3-4 times per day. If turn over time is slow then the amount of solids that the filter can capture will decrease. Check to make sure that there are no flow restrictions. Follow the low flow trouble-shooting chart. Also make sure that your pump is large enough to move the amount of water needed for enough turn overs through the filter.**
- 5. If after following the above suggestions and the clarity is still off, PLEASE call us at 1-888-499-3852 or your dealer.**

# Trouble Shooting



## **Trouble Shooting**

### **High Ammonia and Nitrite with previously stable state**

**If your pond has been up and running at warm temperatures (60-70 F) for six or more weeks and your ammonia and nitrite levels have been previously controlled, but you experience a spike in the ammonia level try the following:**

- 1. Perform an extra long blower treatment on the bead pack and an extra long backwash. If the bead pack becomes totally clogged with solids, the available surface area for bioconversion drops significantly. Backwashing will open up the active surface area and bioconversion will resume.**
- 2. If after backwashing the ammonia levels are still high, open the filter. Check the laterals to make sure they are clear, stir the beads to break up any gelled areas and then backwash.**
- 3. If ammonia levels are still high, consider how much food is being fed to the fish. One cubic foot of mature beads can handle around one pound of 35% protein food per day. Check to see how many cubic feet of beads are in your filter and compare that with how much food your feeding.**
- 4. If ammonia levels are still high, check the flow rate through the filter. The entire volume of the pond should be turned over through the filter 3-4 times per day. If the flow is down for some reason, bioconversion of ammonia will also slow. If you find the flow is in fact down, follow the troubleshooting flow chart for correcting low flows.**
- 5. If all the above are found to be in good condition, consider the fish load on the pond. This actually also relates to the above discussion about amount of food fed. If you have a heavily stocked pond you will also be feeding more to the fish and thus adding more nitrogen to the pond water that will have to be bioconverted. Again, consider your filter size and what your asking it to do.**
- 6. If the ammonia levels are still high, call us at 1-888-499-3852**

# Trouble Shooting

High Ammonia and Nitrite-- Previously Stable

