

# AQUATIC ECO-SYSTEMS™

# ARIAS™ 4000 AQUACULTURE SAND FILTER WITH MULTIPORT VALVE MODEL: A4000-35, A4000-40, A4000-60, A4000-70, A4000-80



# INSTALLATION AND USER'S GUIDE

IMPORTANT SAFETY INSTRUCTIONS READ AND FOLLOW ALL INSTRUCTIONS SAVE THESE INSTRUCTIONS

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Phone: (407) 886-3939 FAX: (407) 886-4884

Contents			
Warnings and Important Safety Precautions	i		
Section 1: Filter Overview	1		
Section 2: Installation	2		
Section 3: Operation and Maintenance	6		
Initial Start-Up	6		
Cleaning	7		
Filter and Control Valve Functions	7		
Filter Backwash Procedure	8		
Winterizing the System	9		
Technical Data and Replacement Parts	10		
Troubleshooting			

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# **IMPORTANT WARNING AND SAFETY INSTRUCTIONS**



SERIOUS BODILY INJURY OR DEATH CAN RESULT IF THIS SAND FILTER IS NOT INSTALLED AND USED CORRECTLY.

# INSTALLERS, OPERATORS AND OWNERS MUST READ THESE WARNINGS AND ALL INSTRUCTIONS BEFORE USING THIS SAND FILTER.



**IMPORTANT NOTICE** - Attention Installer: This Installation and User's Guide ("Guide") contains important information about the installation, operation and safe use of this sand filter. This Guide should be given to the owner and/or operator of this equipment. This filter is for use for aquaculture installations ONLY. Do not use with any type of swimming pool, hot tub, or spa.

#### **WARNING**

Before installing this product, read and follow all warning notices and instructions in this Guide. Failure to follow warnings and instructions can result in severe injury, death, or property damage. Call US: (877) 347-4788 INT: (407) 886-3939 for additional free copies of these instructions. Please refer to www.pentairaes.com for more information related to this product.



High Pressure from the Sand Filter can cause severe injury or major property damage due to tank separation.

Release all pressure and read instructions before working on the sand filter.

If the filter clamp is adjusted under pressure, the tank can separate, causing serious injury, death or major property damage.

### A WARNING BEFORE WORKING ON FILTER!

- (1) Stop pump.
- (2) Open air release valve.
- (3) Release all pressure from system.



#### **RISK OF ELECTRICAL SHOCK OR ELECTROCUTION:**

PUMPS REQUIRE HIGH VOLTAGE WHICH CAN SHOCK, BURN, OR CAUSE DEATH. BEFORE WORKING ON PUMP! Always disconnect power to the pump at the circuit breaker from the pump before servicing the pump. Failure to do so could result in death or serious injury to service person, users or others due to electric shock.

### SAVE THESE INSTRUCTIONS

## Section 2 Filter Overview

Your high rate sand filter is designed to produce clear water and operate for years with a minimum of maintenance when installed, operated and maintained in accordance with these instructions. Your filter uses special filter sand to remove dirt particles from the water. Dirt is collected in the filter by the sand bed as water flows through the filter. Water enters the filter through the valve on top of the filter and is distributed evenly downward across the sand bed. The dirt is removed by the sand and the clean water flows through the piping (laterals) at the bottom of the filter, up through the stand pipe, back to the valve on top of the filter, where the clean water is returned to the system through the piping or hoses.

#### **WARNING**

This filter operates under high pressure. When any part of the circulating system (e.g., clamp, pump, filter, valves, etc.) is serviced, air can enter the system and become pressurized. Pressurized air can cause the lid or control valve to separate which may result in serious injury, death, or property damage. To avoid this potential hazard, follow these instructions.

1. Before repositioning values and before beginning the assembly, disassembly, or adjustment of the clamp or any other service of the circulating system:

(a) Turn the pump off and shut off any automatic controls to ensure the system is not inadvertently started during the servicing;

(b) Open manual air relief valve; Stand clear of filter.

(c) Wait until all pressure is relieved, pressure gauge must read zero (0).

2. Whenever installing the filter clamp, follow the filter lid and clamp installation instructions exactly.

3. Once service on the circulating system is complete, follow system restart instructions exactly (see below - System Restart Procedure).

4. Maintain circulation system properly. Replace worn or damaged parts immediately (e.g., clamp, pressure gauge, relief valve, o-rings, etc.).

5. Be sure that the filter is properly mounted and positioned according to instructions provided.

After a period of time, dirt will accumulate in the filter causing a resistance to the flow of water through the filter. This resistance results in a diminished flow of water and a rise in the pressure of the filter. Eventually the filter sand will have removed so much dirt and the filter pressure risen to such a point that it will be necessary to clean (backwash) your filter.

By setting the valve on top of the filter to the "Backwash" position, the flow of water is automatically reversed through the filter so that the flow of water is directed to the bottom of the filter, up through the sand bed, flushing the dirt and debris out through the waste line. Once the backwash procedure is complete, the valve is manually returned to its "Filter" position to resume normal filtration. The filter's function is to remove suspended matter from the water. It does not sanitize the water. For clear water, the water must be sanitized as well as balanced. Water chemistry is a specialized area, and you should consult your local service specialist for specific details.

## **System Restart Procedure**

- 1. Set valve to "Filter" position.
- 2. Ensure that the return line is open so that water may flow freely from the filter back to the body of water.
- 3. Open manual air bleeder on filter. STAND CLEAR OF FILTER and start pump.
- 4. Close manual air bleeder on filter when a steady stream of water emerges from the bleeder.
- 5. The filter has now started its filtering cycle. Verify the water is returning to the system and take note of the filter pressure.

2

- 1. Read and understand all instructions before attempting to install, operate or maintain your pump and sand filter system.
- 2. CAUTION: Provide space and lighting for routine maintenance access. Locate the filter close to the systems. Do not mount electrical controls over the filter. One needs to be able to stand clear of the filter when starting the pump. Install all electrical controls at equipment pad, such as on/off switches, timers, and control systems, etc. to allow the operation (start-up, shut-down, or servicing) of any pump or filter so the user does not place any portion of his/her body over or near the pump strainer lid, filter lid or valve closures. This installation should allow the user enough space to stand clear of the filter and pump during system start-up, shut-down or servicing of the system filter.
- 3. Remove all individual components from carton and inspect for any visible damage. If carton or parts are damaged contact seller or freight company.

#### **A**WARNING

Never work on the pump while it is running or power is still connected. High voltage can cause serious or fatal injury. A suitable ground fault interrupter (GFCI) should always be installed at the power supply source of this unit. Be sure to ground the motor before connecting to electrical AC power supply. Failure to ground the motor can cause serious or fatal electrical shock hazard. DO NOT ground to a gas supply pipe line.

- 4. The filter is ready to be moved into its final position. The system must be placed on level solid earth. When the filter is filled with sand and water it can weigh several hundred pounds.
- 5. Be certain to install the precise amount of filter sand listed on your filter name plate. You must use only No. 20 standard silica sand having a uniformity coefficient of 1.75 or less. No. 20 silica sand has a particle size of .018-.022 inches (.45 to .55 mm). Before pouring the sand into the filter, look inside and check the lower under drain for broken or loose laterals (or fingers), which may have been accidentally damaged by rough handling during shipment. Replace any broken parts if necessary.
- 6. Install the sand guide in the top of the filter and fill the tank about half full with water. Pour the sand into the top of the filter at a slow rate so that the weight of the sand does not damage the laterals. After filling to the proper level, remove and discard the sand guide. Wash away all sand around the opening at the top of the tank.



7. Be sure top of filter is free of any sand or debris and valve o-ring is in place on valve body. Install valve so that the port locations are in the desired final position. Valve ports are labeled with the location of where they should be connected i.e. pump port must go to pump discharge, waste port must go to the waste line and return port must go to the system return.



- 8. Insure that the valve is firmly pushed into the top of the tank and that the flange of the tank and the flange of the valve are contacting each other. See Figure 1.
- 9. The plastic clamp can now be installed. Place the clamp half over the valve flange and the tank flange as shown in Figure 1. Insert the clamp screws and nuts into the clamp making sure that the nuts are located in the special hexagonal retainer slots on the clamps. See Figure 2.
- 10. Tighten clamp screws firmly and visually check the valve tank and clamp assembly to insure that the joint is correctly assembled.



**High Pressure:** 

Improper tank valve assembly could cause the valve to separate and cause serious injury and/or major property damage.

11. The filter unit has a maximum operating pressure listed on the filter name plate. DO NOT OPERATE this unit above the maximum operating pressure of the valve or the filter. Never connect the filter and valve unit to a pump which can generate a pressure that exceeds the operating pressure of the filter or valve.

- 12. Use sealant on all tapered male connections of pipe and fittings. Use only sealant compounds suited for plastic pipe. Support pipe to prevent strains on filter, pump or valve. DO NOT USE PETROLEUM BASED PRODUCTS. NOTICE: All valve internal threads are tapered except the air bleeder connection. Do not over tighten tapered thread connections.
- 13. Install pressure gauge in 1/4"NPT port directly across from the pump port of the valve.
- 14. Never store chemicals within ten (10) feet of your sand filter, pump or valve. Chemicals should always be stored in a cool, dry, well ventilated area.

A WARNING Chemical fumes and/or spills can cause serious corrosion to the filter and pump structural components. Structurally weakened components can cause filter, pump or valve attachments to separate and could cause serious bodily injury or property damage.

**WARNING** The system's centrifugal pump operates with electrical voltage, and can generate both vacuum and pressure in the water system. When properly wired and plumbed, this pump will operate in a safe manner.

15. Avoid over tightening the pipe threads when connecting fittings to the pump or valve. Proper procedure is to apply a pipe sealant to the thread and then install hand tight plus one turn. **DO NOT OVER TIGHTEN**.

#### Section 3 Operation and Maintenance Initial Start-Up

- 1. Be sure the correct amount of silica filter sand is in the tank and that all connections have been made and are secure.
- 2. Verify the backwash is open so that water is free to flow from the system and out the backwash line. Set the control valve to "Backwash" position.



This filter operates under pressure. With the valve clamped properly and operated without air in the system, this filter will operate in a safe manner. Air entering the filter and the valve not clamped correctly can cause the valve to separate, which could cause serious personal injury and/or property damage.

Always turn pump off before changing valve positions. Changing valve positions while the pump is running can damage the control valve, which may cause serious injury or property damage.

3. Check the valve clamp on the filter for proper installation.

#### For valve clamp installation instructions, see Section 2: Installation on page 2.

- 4. Open the manual air bleeder (See Figure 3 for air bleeder location). STAND CLEAR OF FILTER. Prime and start the pump according to the pump instructions allowing the filter tank to fill with water. Close the air bleeder on the filter when a steady stream of water emerges.
- 5. Once the water flow is steady out the waste line, run the pump for at least two minutes. This initial backwashing of the filter is recommended to remove any impurities of fine sand particles in the silica sand media.
- 6. Turn the pump off and set valve to "Rinse" position. Ensure that all suction and return lines are open so that the water is free to flow from the system to waste. STAND CLEAR OF FILTER and start the pump. Run the pump for at least two minutes.
- 7. Turn the pump off and set valve to "Filter" position. Be sure that all system suction and return lines are open so that water is free to flow from and to the system.
- 8. Open the manual air bleeder on the filter. STAND CLEAR OF FILTER and start the pump.
- 9. Close the air bleeder on the filter when a steady stream of water emerges.
- The filter has now started its filtering cycle. Verify that water is returning to the sytem and take note of the operationg pressure. The original starting pressure is \_\_\_\_\_ psi with the filter clean.
- 11. Check the system for water leaks. If a leak is found, shut pump off before correcting the leak.
- 12. As the filter removes dirt and impurities from the system water, the accumulation will cause the filter pressure to rise and flow to diminish. When the pressure gauge reading is
   10 PSI higher than the clean filter reading noted above, it is time to backwash the filter.



#### Maintenance

Proper care and maintenance of the pump and sand filter system will add many years of life to the equipment. Follow these suggestions for long trouble free operation.

- 1. To clean the exterior of the pump and sand filter system of dust and dirt, wash with mild detergent and water and then hose off. Do not use solvents.
- 2. If internal filter maintenance is required, sand may be removed by removing the entire drain spigot from the bottom of the filter and flushing with a garden hose.
- 3. The filter is a pressure vessel and should never be serviced while under pressure. Always stop the pump, open the air bleeder and relieve all tank pressure before attempting to service filter.
- 4. When restarting the filter always open the manual air bleeder on the filter and STAND CLEAR OF FILTER.
- 5. The strainer basket in the pump should be inspected and cleaned twice each week. Remove the clear lid and the basket, and clean debris from basket. Inspect the lid o-ring if damaged, replace. The pump seal requires no lubrication. The pump motor should only be serviced by a motor service center.

#### Cleaning

1. The filter on a new system should be backwashed and cleaned after the first 48 hours of operation to clean out construction debris. There are three different ways to identify when the filter needs backwashing:

a. The most accurate indicator on systems with a flow meter is to backwash when the flow decreases 30% from original (clean filter) flow. For example, if the original flow was 60 GPM, the filter should be backwashed when the flow is reduced by about 20 GPM (or 30%) to 40 GPM.

b. A more subjective and less accurate indicator is to observe the amount of water flowing from the system return lines. The filter should be backwashed once it is detected that the flow has been reduced.c. The most commonly used, but least accurate indicator is to backwash when the filter gauge reading increases to 10 psi over the initial (clean filter) reading.

2. It is important not to backwash the filter solely on a timed basis such as every three (3) days. It is also important to note that backwashing too frequently actually causes poor filtration. Factors like weather conditions, heavy rains, dust or pollen and water temperatures all affect the frequency of backwashing.

#### **Filter and Control Valve Functions**

**FILTER:** From pump, through valve, downward through filter sand bed, up through center pipe to valve return port, and back to the system for normal filter action and vacuuming system through filter.

**BACKWASH:** From pump, through valve, down through center pipe, up through filter sand to valve, and out wasteport. This position is used for cleaning filter by reversing flow.

**RINSE:** From pump, through valve, downward through filter sand, up through center pipe to valve and out waste port. This position is used for start up cleaning and resettling filter bed after backwashing.

**WASTE:** From pump, through valve, bypasses filter and goes to wasteport. This position is for vacuuming directly to waste, lowering system level, or draining the system.

CLOSED: NO FLOW IN THIS POSITION - DO NOT USE THIS SETTING WHILE PUMP IS OPERATING.

**RECIRCULATE:** From pump, through valve, bypasses filter and goes to return port and back to system. This position is for circulating water without going through filter.

WINTERIZING: Valve position for a winterized filter, see page 9.

#### Filter Backwash Procedure

**A**WARNING To prevent equipment damage and possible injury, always turn pump off before changing valve position.

- 1. Stop the pump.
- 2. Ensure that the suction and backwash lines are open so that water is free to come from the system and flow out the backwash line. Set control valve to "Backwash" position.
- 3. STAND CLEAR OF FILTER and start pump.
- 4. Backwash filter for approximately three (3) minutes or until backwash water is clean.
- 5. Stop pump and set valve to "Rinse" position.
- 6. STAND CLEAR OF FILTER and start pump.
- 7. Rinse filter for approximately 30 seconds.
- 8. Stop pump and set valve to "Filter" position.
- 9. Ensure that return line is open so that water may flow freely from the filter back to the body of water.
- 10. Open manual air bleeder on filter. STAND CLEAR OF FILTER and start pump.
- 11. Close manual air bleeder on filter when a steady stream of water emerges from the bleeder.
- 12. The filter has now started its filtering cycle. Verify the water is returning to the systems and take note of the filter pressure.
- 13. The filter pressure in Step 12 above should not exceed the pressure originally observed on the filter when it was initially started. If after backwashing, the pressure is 4 to 6 PSI above the start condition it will be necessary to chemically clean the sand bed.

#### **Chemical Cleaning**

- 1. Mix the solution following the manufacturer's instructions on the label.
- 2. Backwash the filter with the valve as described above.
- 3. If the filter is below water level, switch pump off and close the appropriate valves to prevent draining the system.
- 4. Switch off pump, open filter drain and allow filter to empty. Place valve in "Backwash" position.
- 5. After the filter has drained, close the filter drain and remove the pump strainer pot lid.
- 6. Be sure the backwash lines are open.
- 7. Switch the pump on and slowly pour the cleaning solution into the pump strainer with the pump running. If filter is below water, open shut off valve slightly to allow pump to run.
- 8. Continue adding solution until the sand bed is saturated with cleaning solution.
- 9. Switch off the pump and leave filter in "Backwash" position. Allow the filter to stand overnight (12 hours).
- 10. Replace the pump lid and follow backwash procedure as described above.
- 11. Do not allow cleaning solution to get into the system.

# Allowing water to freeze in the system will damage the system and may cause water damage/flooding and property damage.

- 1. In areas that have freezing winter temperatures, the equipment must be winterized to protect it from damage.
- 2. Backwash the filter. Switch off the pump and set the control valve to the "Winterize" position.
- 3. Remove the drain port cap at the bottom of the filter. IMPORTANT NOTE: Remove drain port cap only for draining water from filter. Removing the entire fitting will allow sand to drain also. The filter will drain slowly. Leave the drain port cap off and store it during the time the system is shut down.
- 4. Drain all appropriate system piping.
- 5. It is recommended that the pump and filter be covered with a tarpaulin or plastic sheet to inhibit deterioration from the weather. DO NOT wrap the pump motor with plastic.
- 6. In installations where the pump cannot be drained a 40% Propylene Glycol 60% water solution will protect to -50° F (-45.5° C)

Note: Do not use anti-freeze solutions except Propylene Glycol; as other anti-freeze are highly toxic and will damage the pump.

	The valve should be left in the "Winterize" position during the shutdown season so that the
	rubber seal of the valve diverter has no pressure on it. Failure to do so can damage the valve diverter seal which can cause property damage from leaking water.

## **Technical Data and Replacement Parts**

Item	Part Number	Description	Quantity
1	262506	Valve, 1-1/2 Inch, 6-Way, 16", 19"	1
		22", & 24" Tanks	
1	262525	Valve, 2 Inch, 6 -Way, 26" Tank	1
2	272541	O-Ring Valve Body	1
3	152165	Clamp Assembly	1
4	152229	Piping Assembly – 16" Tank	1
4	152228	Piping Assembly – 19" Tank	1
4	152227	Piping Assembly – 22" Tank	1
4	152000	Piping Assembly – 24" Tank	1
4	152238	Piping Assembly – 26" Tank	1
5	150084	Lateral – 16" & 19" Tanks	6
5	150085	Lateral – 22", 24", & 26" Tanks	6
6	145400	Assembled Tank w/Drain – 16" Tank	1
6	145401	Assembled Tank w/Drain – 19" Tank	1
6	145402	Assembled Tank w/Drain – 22" Tank	1
6	145403	Assembled Tank w/Drain – 24" Tank	1
6	145404	Assembled Tank w/Dra in – 26" Tank	1
7	154711	Sand Drain	1
8	154715	Gasket (Sand Drain)	1
9	154712	Drain Cap	1
10	154926	Foot, 16" Tank	1
10	154520	Foot, 19", 22", 24", & 26 " Tanks	1
11	190059	Pressure Gauge	1



### Troubleshooting

Problem	Cause	Action
Water not sufficiently clean.	<ol> <li>Chemistry not adequate to inhibit algae growth.</li> <li>Too frequent a backwash cycle.</li> <li>Improper amount or wrong sand size.</li> <li>Inadequate turnover rate.</li> </ol>	Maintain chemistry or consult service technician. Allow pressure to build to 10PSI above clean filter condition before backwashing. Check sand bed depth and sand size or consult service technician. Run system for longer time or consult dealer or service technician.
Higher filter pressure.	<ol> <li>Insufficient backwashing.</li> <li>Sand bed plugging with mineral deposits.</li> <li>Partially closed valve or restriction.</li> </ol>	Backwash until effluent runs clear. Chemically clean filter. Open valve or remove obstruction in return line.
Short filter cycles.	<ol> <li>Improper backwashing.</li> <li>Chemistry not adequate to inhabit algae growth.</li> <li>Plugged sand bed.</li> <li>Flow rate too high.</li> </ol>	Backwash until effluent runs clear. Maintain chemistry or consult service technician. Manually remove top 1" surface of sand bed and chemically clean as required. Restrict flow to capacity of filter.
Return flow to system diminished, low filter pressure.	<ol> <li>Obstruction in the pump hair and lint pot.</li> <li>Obstruction in pump.</li> <li>Obstruction in suction line to pump.</li> </ol>	Clean basket in strainer. Disassemble and clean pump. Remove obstruction in lines. Open valves in suction line.
Sand returning to system.	<ol> <li>Broken underdrain lateral.</li> <li>Backwash rate too high.</li> </ol>	Replace broken or damaged laterals. Reduce backwash flow rate.

Notes

#### Notes



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