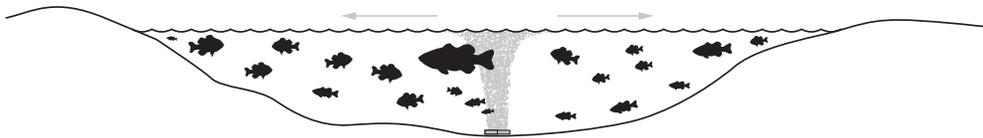




Installation, Start-Up and Troubleshooting Manual

(Part Nos. DA2B, DA2BNC, DA2BNT, DA2BW, DA2BWNC)



AQUATIC ECO-SYSTEMS™

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Safety Message

Safety is important to us. Please read and follow all directions for your protection.



ELECTRICAL SHOCK HAZARD

Disconnect electrical power at the circuit breaker or fuse box before installing this product. Install where it will not come into contact with water or other liquids and where it will be weather protected. Electrically ground this product. Failure to follow these instructions can result in death, fire or electrical shock. For complete safety info, see page 6.

Kit Contents

Inspect the equipment upon receipt. Check the invoice against the delivered items to ensure that all the components have arrived (occasionally, carriers separate shipments of more than one box, so allow another day if all the pieces have not been received. If all of the items are not received, please contact PAES). Items that should be included:

DA2B:

- Lockable aluminum cabinet w/ fan.
- **AQ201** rocking piston compressor and (2) outlet hoses (8 ft).
- (2) **P200S** 1/2" tubing (100 ft each).
- (2) **ALA4GLB** diffuser manifolds w/polyethylene underlays.
- (30) **T120R** nylon ties.
- (8) **SSA** 1/2" stainless steel clamps.
- (4) **SSAA** 1/4" stainless steel clamps.

- (2) **101A** couplings for tubing.
- (1) **ZB3858** 3/8" x 5/8" brass coupling.
- GFCI receptacle w/weatherproof cover.
- (2) lag bolts.

DA2BNC:

- **AQ201** rocking piston compressor and (2) outlet hoses (8 ft).
- (2) **P200S** 1/2" tubing (100 ft each).
- (2) **ALA4GLB** diffuser manifolds w/polyethylene underlays.
- (30) **T120R** nylon ties.
- (8) **SSA** 1/2" stainless steel clamps.
- (4) **SSAA** 1/4" stainless steel clamps.
- (2) **101A** couplings for tubing.
- (1) **ZB3858** 3/8" x 5/8" brass coupling.
- GFCI receptacle w/weatherproof cover.

DA2BNT:

- Lockable aluminum cabinet w/ fan.
- **AQ201** rocking piston compressor and (2) outlet hoses (8 ft).
- (2) **ALA4GLB** diffuser manifolds w/polyethylene underlays.
- (30) **T120R** nylon ties.
- (4) **SSAA** 1/4" stainless steel clamps.
- (1) **ZB3858** 3/8" x 5/8" brass coupling.
- GFCI receptacle w/weatherproof cover.
- (2) lag bolts.

DA2BW:

- Lockable aluminum cabinet w/ fan.
- **AQ201** rocking piston compressor and outlet hose (8 ft).
- (2) **WD2R-100** weighted tubing (100 ft each).
- (2) **ALA4GLB** diffuser manifolds w/polyethylene underlays.
- (2) **ZT120R** nylon ties.
- (6) **SSA** 1/2" stainless steel clamps.
- (2) **ZB3858** 3/8" x 5/8" brass couplings.
- GFCI receptacle.
- **62071** 3/8" barb connector.
- (2) **62021** male adapters.
- (4) **SSAA** 1/4" stainless steel clamps.
- (2) lag bolts.

DA2BWNC:

- **AQ201** rocking piston compressor and outlet hose (8 ft).
- (2) **WD2R-100** weighted tubing (100 ft each).
- (2) **ALA4GLB** diffuser manifolds w/polyethylene underlays.

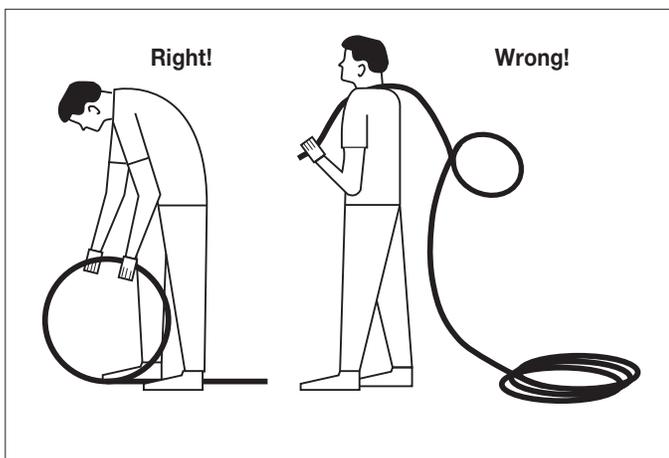
- (4) **T120R** nylon ties.
- (8) **SSA** 1/2" stainless steel clamps.
- (2) **ZB3858** 3/8" x 5/8" brass couplings.
- GFCI receptacle.
- **62071** 3/8" barb connector.
- (2) **62021** male adapters.
- (4) **SSAA** 1/4" stainless steel clamps.

Installation

Locating and Mounting the Cabinet

Some systems employ a lockable steel cabinet designed to be attached to a 4" x 4" post (it could also be mounted on a dock piling). Two lag bolts are provided for mounting the cabinet.

Located at the back center of the cabinet are two predrilled mounting holes, one of which is a slide mount. Hold the cabinet against the pole where it is to be mounted. Mark the pole with a pencil through the top mounting hole. Drill the top hole about 2 inches deep, using a 1/4" drill bit. Measure 8 inches down and drill another 1/4" hole, 2 inches deep.



Using a 9/16" wrench or socket, screw a lag bolt into the lower hole, leaving a space of 1/8" between the bolt head and the wood. Attach the cabinet by inserting the lag bolt head through the large lower hole and sliding it up into the slot. Rotate the cabinet into position so that the upper holes of the cabinet and pole align. Screw the second lag bolt in and tighten.

Diffuser Assembly Instructions

The Sweetwater® diffusers included as part of the assembly are made of glass-bonded silica, are virtually indestructible and will give many years of service. The diffuser manifold comes with a polyethylene underlay (24" x 24" x 1/4") attached to a recessed ballast plate for adding pea gravel or other weighted material to ensure proper orientation on the bottom of your pond. The manifold is equipped with a check valve to prevent backflow of water into the air line in case the compressor is turned off or temporarily loses power.

1. Completely submerge the diffusers in water. Take them out and hold them upside down to let any residue from the manufacturing process drain out. Repeat until the water leaving the diffusers is clear.
2. Screw the diffusers into the manifold by hand. Tightening should only be to the point of slight resistance—DO NOT OVERTIGHTEN.
3. The diffuser manifold has an inlet check valve to limit the amount of water entering the air line if the compressor is turned off. Ensure that the arrows on the check valve point toward the diffusers and not toward the compressor. The check valve may already have a tubing adapter attached to it.

The polyethylene underlay prevents silt from being picked up and moved through the lake. The air line is attached to the manifold by 1/2" clamps. By looping a small diameter line through the diffuser manifold, it can be lowered to the bottom. The compressor will compensate for any depth encountered, but it is important that the diffuser is flat and has the manifold above the underlay. Remove the line used to lower the manifold, and return to shore for the final connection.

Note: The line can be left attached to a float for future retrieval and maintenance if it is not a liability to boaters, fishermen or swimmers.

Unrolling Tubing

Prior to unrolling the polyethylene tubing, please read and review the following instructions.

Two basic rules must be followed for continuous, year-round operation in cold weather areas:

1. The land-based run of tubing must be buried below the area's frost depth, and the air line must be insulated between the compressor and the ground.
2. The air line must enter the water in a trench below the area's average winter ice depth.

Allow enough tubing to reach attachment point (flexible discharge hose of the compressor) and bury land-based portions prior to proceeding. This will allow an anchorage for one end of the air supply line prior to installing the water-based portion of the line. The easiest method to tie bricks and lower the air line is for two people in a row boat to work together. One person provides movement and direction while the other slowly unrolls tubing and attaches common 3-hole bricks with ties as illustrated (unnecessary for weighted tubing). When the end of the air line tubing is reached, attachment of the manifold and underlay will be required. If installing the system on a windy day, lower the diffuser first for extra weight, and work from shore out to the diffuser end. When the end of the air line tubing is reached, attachment of the manifold and underlay will be required.

Uncoiling Tubing

When uncoiling tubing, always roll the coil like a hoop. If a loop pops out during uncoiling, re-roll to return the loop to the coil to avoid kinking. NEVER lay the coil down and throw the tubing out in loops. This procedure will almost invariably result in kinking.

Attaching All Components Together

Upon returning to shore, attach the air line to the compressor discharge air line by another 1/2" stainless steel clamp (don't forget insulation of the air lines below the frost line). The compressor is equipped with a male electrical plug. A simple extension cord with a standard female termination will be adequate for an electrical source. When the compressor is plugged in, the installation is complete.

Start-Up of Aeration System in Stratified Lakes

The circulation of water by an aeration system produces two benefits. One is the thermal destratification of the lake, causing a fairly uniform temperature throughout. The second is the increasing of oxygen levels within the water column, top to bottom.

At the same time that the circulation is producing these benefits, it can be producing a problem. The circulation of the fouled bottom water up to the surface allows this water to obtain oxygen, but the water may also contain dissolved gases and by-products that are produced as a result of the anaerobic (no oxygen) condition on the bottom. These products, when mixed with the upper layers of water, may foul the surface layer, thus making it unfit for aquatic life, and could result in a fishkill.

Although a fishkill is possible, it can be prevented by exercising care when first turning on the system. A slow-start break-in period is advised.

The following are recommendations for start-up:

1. After the diffusers have been positioned and the unit is turned on, place the diffuser manifold in its final desired position and proceed with a slow-start break-in period. The first day the compressor is turned on, the boil should be observed for dark/discolored water or a rotten eggs smell. If either is present, let the compressor run for only 15 minutes the first day before turning off. The next day turn the compressor on and let run for 30 minutes, then turn off. Each successive day double the running time from the previous day until the system is running continuously, 24 hours a day (eight days). If the smell is not present, let the compressor run for one hour the first day, two hours the second day, four hours the third day and so on until the system is running 24 hours a day (six days).
2. A second approach is similar to the previous one, but instead of a slow-start break-in period, the diffusers should be moved to a shallow area of the lake. Allow the system to run in this area for a few days, thoroughly mixing this portion of the lake. Next, move the diffusers to deeper water and run them there for a few days. Continue this until reaching the desired position of the diffusers. This process should take approximately 1–2 weeks depending on the size and depth of the lake.
3. Another method to start up in a stratified condition is to lower the diffuser down via rope from a flotation device. The initial turn-on should be two feet below the low or no oxygen level, provided this area doesn't represent more than 25 percent of the total lake volume. This process should take approximately 1–2 weeks depending on the size and depth of the lake.
4. A final approach to use if multiple diffusers are needed is to run only a few diffuser manifolds until the thermocline is lowered. This will mix the water at a slower rate.

Remember: These are recommended start-up methods and times. If you are unsure about your lake in particular, please contact PAES for further assistance.

Note: If the system has been shut off for more than four weeks, the start-up procedure must be followed to prevent a fishkill.

Troubleshooting Guide

Visually check surface boils. Use binoculars, if necessary. If the airflow is reduced, remove the air filter and check the boil again to see if there is a restoration of airflow. If there is an increase, clean the inlet filter or replace it with a new one. If there is no increase, check for leaks in and around the compressor, and check for tightness. Place a wet finger over the pressure relief valve to be sure no air is escaping. Check the area around the cabinet outlet tubing between the cabinet and the water's edge for leaks. If no leaks are present, the cause of reduced airflow might be clogged diffusers. If the system has been in continuous service for less than two years, it is doubtful that the diffusers are clogged, depending upon water hardness and general biological activity.

Pull the diffuser manifold up from the bottom (while the compressor is running), and inspect by blowing into each individual diffuser. If you can blow through the diffuser, then the compressor can, indicating that the diffusers are clean.

If they are clogged, see "Maintenance of Air Diffusers" for instructions on how to properly clear them of clogging material. After the clogging material has been dissolved, rinse thoroughly with water before reuse.

Note: Under continuously running applications, diffusers should be checked at least every two years. In situations where the compressor has been left off for several months, it may be necessary to inspect, clean or replace the diffusers prior to start up.

1. If the compressor is shutting off and on, there may be a thermal overload (faulty connections causing overheating), too much pressure on the compressor or low line voltage.

2. If the compressor shuts off and stays off, check for proper voltage at the cabinet. Check the breaker; if it has tripped, reset it and it should restart.

Should the above fail to start the motor, check the cooling fan assembly for operation; if it is defective, it may allow the compressor to overheat.

Great Lakes® Aeration System

What we hope to achieve by using the synergistic airlift technique in our lake aeration system is an improvement in the overall condition of a body of water.

Prior to the installation of an aeration system, general water quality parameters should be measured for a period of time. These parameters include temperature and dissolved oxygen throughout the water column, the redox potential and phytoplankton abundance. Some of the signs that a body of water is in poor condition are distinct variations in temperature and dissolved oxygen from the surface of the water to the bottom (with the bottom dissolved oxygen being less than one ppm), a negative redox potential and an extreme over-abundance of phytoplankton. An abundance of phytoplankton is usually the result of a constant release of nutrients from the bottom sediments due to a negative redox and a very low to zero dissolved oxygen level.

How do we determine the success of one of our aeration or any type of aeration system? The result should be destratification, not just in a small area of the body of water, but in at least 90–95 percent of the total volume, depending upon the morphology.

How can it be determined if this has been achieved? First, look for a breakup in the stratification, which is identified by a minimal variation in temperature from surface to bottom. This is also identified by a minimal variation in dissolved oxygen levels from surface to bottom, with levels about 3–5 ppm at the bottom. This increase in bottom dissolved oxygen levels eventually results in a shift from a negative redox to a positive redox reading. Another result of the increased bottom dissolved oxygen level is that nutrients are now bound in the lake sediments and can't be released to feed the phytoplankton. Therefore, a decrease in the phytoplankton abundance is observed, but not necessarily totally eliminated.

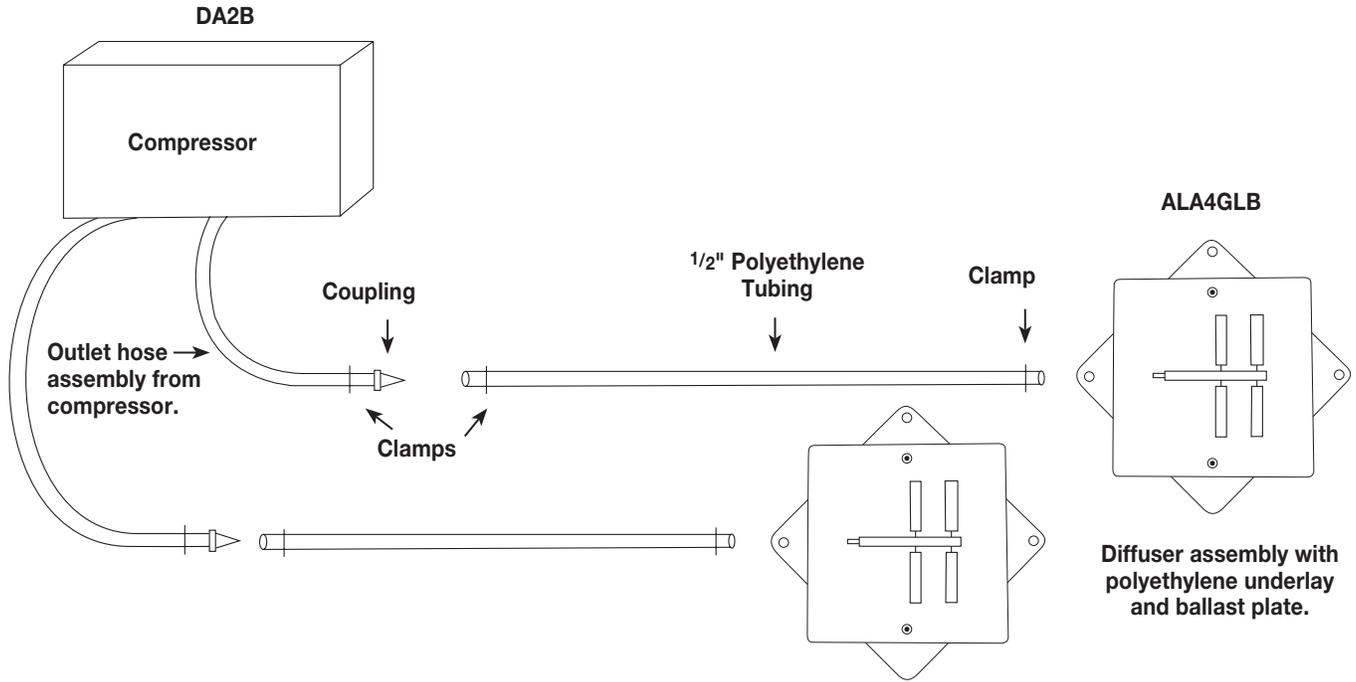
These results can only be achieved when the entire water volume (not just an isolated area) is addressed. We feel that our technique and equipment are the most efficient and cost effective method to accomplish this. Not only is the system relatively easy to install, but it is also simple to maintain.

Maintenance of Air Diffusers

The only maintenance normally required for Sweetwater® air diffusers is periodic cleaning. The frequency of cleaning will be determined by the mineral and organic content of the water in which the air diffusers are used. In clean, cold, soft water, cleaning may only be necessary every 2 or 3 years. In very hard water or water high in organics, it will be necessary more often.

1. Remove from service and blow out excess water. If fouled with barnacles or other gross foreign material, scrape or hose off.
2. Immerse the entire diffuser in undiluted muriatic acid for a sufficient time to dissolve the clogging material. This may take from one minute to eight hours in the most extreme cases. Be very careful when using acid! Wear eye, face and hand protection and have clean water available for rinsing and acid diluting in the case of an acid splash or spill.
3. After the clogging material has been dissolved, rinse thoroughly before reuse.
4. Discard the used acid after reducing its strength to a neutral pH by diluting with at least ten times as much water as acid. Add acid to water; never add water to acid.

Example of Installed Great Lakes® Aeration System



Maintenance of Great Lakes® Aeration Systems

- Visually inspect the diffuser boils in the lake periodically to ensure that the system is in operation.
- Filters should be cleaned or replaced quarterly. Check that cooling fans are operational.
- Remove leaf litter from around the bottom of the cabinet to ensure proper ventilation.
- Piston repair kit should be replaced every 18 months.
- Diffusers should be cleaned or replaced about every two years or as needed depending on the hardness of your water.

Maintenance Log

Date: _____ Notes: _____



Warning

Important safety information read and retain this document before installation and usage of the aeration product.

Before Installation:

The cabinet must be installed in a location that is 2 feet above the high water mark for the body of water being aerated. For areas subject to tidal fluctuation, use 2 feet above the highest high tide. For areas subject to flooding, use 2 feet above the prevailing high water mark or benchmark set by local authority. For floating structures without lateral movement use 30 inches above the water and not less than 12" above the level of the deck.

This product is acceptable for outdoor use.

Temporary Installations

When using an extension cord for temporary service, select cords marked as suitable for outdoor usage. Two-wire extension cords are not suitable for use with this product. Your personal safety requires that only a grounded plug, cord and receptacle be used. Care must be taken to ensure that the cord and connections are protected from water and rain.



Warning

Risk of electrical shock. Connect to properly ground outlet only.



Warning

To reduce the risk of electric shock, unplug before cleaning.



Warning

Beware of thin ice when using these products in water bodies subject to freezing. Aeration systems can and will reduce ice thickness. Extreme care must be taken before walking out onto the ice.



Warning

Cabinets designed to operate at 230 volts will require a Ground Fault Circuit Interrupter type breaker, rated at 250 volts, installed to provide protection from dangerous shock.



Warning

Cabinets designed to operate at 230 volts must be connected to suitable earth ground.



Caution

Considerable heat is generated during the compression of air. Carefully unplug the compressor and close the lid with the cooling fan running for fifteen minutes before servicing to reduce the risk of burns.



AQUATIC ECO-SYSTEMS™