



***Regenerative Blower
Operating and Maintenance Instructions
(Part Nos. S11-S73)***



Part No. _____ Serial Number _____ Date Purchased _____



AQUATIC ECO-SYSTEMS™

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Safety Messages

Safety is important to us. We have included safety messages throughout this manual and for your protection. Please read and follow all directions.

A safety message has a safety alert symbol followed by an explanation of what the hazard is, what can happen and what you should do to avoid injury. This is the safety alert symbol:



The safety alert symbol and "WARNING" or "CAUTION" will precede all safety messages:



WARNING

You will be killed or seriously injured if you don't follow instructions.



CAUTION

You can be killed or seriously injured if you don't follow instructions.



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.

Guidelines for Product Use

- Pump only clean, dry air. Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Operate at 32–104°F (0–40°C).
- Protect unit from dirt and moisture.
- Blower must be installed with the properly sized inlet (included) and in-line filters, gauges and relief valves to protect against dirt and overheating.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.

Wiring

Make sure the wiring is done by a qualified electrician familiar with NEMA MG2 safety standards, national electric code and all local safety codes. Select fuses, motor protective switches or thermal protective switches to provide protection. Fuses act as short circuit protection for the motor, not as protection against overload. Incoming line fuses help to withstand the motor's starting current. Motor starters with thermal magnetic overload or circuit breakers protect the motor from overload or reduced voltage conditions. See the wiring diagram(s) attached to the product for required electrical information.

Check that the power source is correct in order to properly operate a dual-voltage motor. All dual-voltage motors are shipped from the factory wired for 115V unless otherwise requested.

Installation

Blowers may be mounted in any orientation that doesn't block air flow over the motor. Blocking air flow in any way can cause the product to overheat. Each model, unless specified, has an automatic thermal protector that shuts the motor off if it overheats. The motor will restart without warning once the protector resets itself upon cooling.

1. Screw the air filter/muffler assembly into the inlet side of the blower (inlet and outlet are marked). Do not overtighten. If using an inlet check valve, install it first and then the filter assembly into the check valve.

Note: If your blower is equipped with an optional bleed valve assembly, please read instruction #2; otherwise, move to instruction #3.

2. a. Screw the outlet assembly into the outlet side of the blower. Do not overtighten.
b. Screw the gray-colored valve into the outlet assembly. The valve handle faces away from the blower.
c. Screw in the ceramic air bleed muffler, then adjust the assembly to a vertical position.
3. Screw the flex hose assembly into the blower outlet.
4. The blower may be located on the floor, a bench, a shelf, etc., considering that it must be reached for filter cleanings (and optional bleed valve adjustments). The air temperature in the blower location must not exceed 104°F (40°C). If your air piping system will allow water to siphon into the air lines when the blower is turned off (e.g., power failure), then you should locate the blower or a portion of the main air line above the water level of your highest tank.
5. A flexible hose and hose clamps are provided on the outlet assembly for connecting the blower to the air piping system. Designed for normal-sized PVC and steel piping, they provide ease of installation and vibration isolation.
6. Soft material may be placed under the blower in order to isolate any noise. A carpet remnant or a piece of soft foam is suitable. Bolting the blower down is usually not necessary; however, you may want to use a bolt, nail or stud through one or more mounting holes to eliminate the possibility of the blower falling off of a shelf.
7. Optional recommendation for blowers larger than 1 hp: If using a pressure gauge to monitor blower pressure and/or diffuser clogging, then order a gauge kit (**BG00**), drill an ¹¹/₃₂" hole and tap ¹/₈" NPT into the pipe near the blower (blower side of the bleed valve). Screw in the lever type valve (included). Attach a length of tubing between the valve and the gauge. Since the gauge is a delicate instrument, keep the valve in the off position and turn it on only to take pressure readings; this will greatly prolong the life of the gauge.

Rotation

From the motor side of the blower, check that the blower is rotating clockwise. Proper rotation can also be checked at the inlet and outlet. Incorrectly connecting any two power lines can reverse direction on blowers powered by a 3-phase motor.

Plumbing

Remove any foreign material (burrs, chips, welding drops, slag, pipe cuttings, excess sealant, sand or lime) from plumbing. Check motor mounting and rotation before connecting to plumbing. Inlet and outlet ports are not designed to support plumbing!

Remove plugs from the inlet and outlet ports. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. When installing two blowers in parallel, use plumbing that is two whole pipe sizes larger in diameter than that of the blower. Be sure to connect the intake and exhaust plumbing to the correct inlet and outlet ports.

Operating Temperature

This blower a totally enclosed fan-cooled (TEFC) motor that releases heat from the surface of the motor. It should feel hot enough to the touch that you generally won't be able to keep your hand on it—this is normal for all TEFC motors. Ensure that the ambient (area around the blower) temperature remains below 104°F (40°C) and that you don't exceed the maximum pressure duty of the blower. If you think you will be operating near the blower's maximum duty, then be sure to install a pressure gauge (see #7 under "Installation").

Strong forced ventilation is often necessary for larger blowers. In vacuum service the hot discharge air of larger blowers must be plumbed away to avoid overheating the area where the blower is located. Use a relief valve to discharge excess air into the atmosphere. If the blower will be operated at 50" H₂O (125 mbar) or higher, then metal pipe is required for hot exhaust air.

General Maintenance



WARNING

Electric rotating machinery and high-voltage electricity can cause serious or fatal injury if improperly installed, operated or maintained.



CAUTION

Product surfaces become very hot during operation; allow them to cool before handling.

When servicing, the blower should be de-energized and disconnected from all power sources. All rotating parts should be at a standstill. Caution should always be used when working around your blower, as high-velocity air is entering and exiting the blower and air lines.

No lubrication is necessary as all bearings are sealed. Dirt and dust should be kept off of the unit.

Always keep the air filter clean for the least amount of inlet air restriction. Clean the air filter by "swishing" it in soapy water. Gently rinse, then shake out excess water. Do not scrub or use high-pressure air as this will separate the filter fibers. You may reinstall the filter while it is still wet. We recommend keeping a replacement filter on hand.

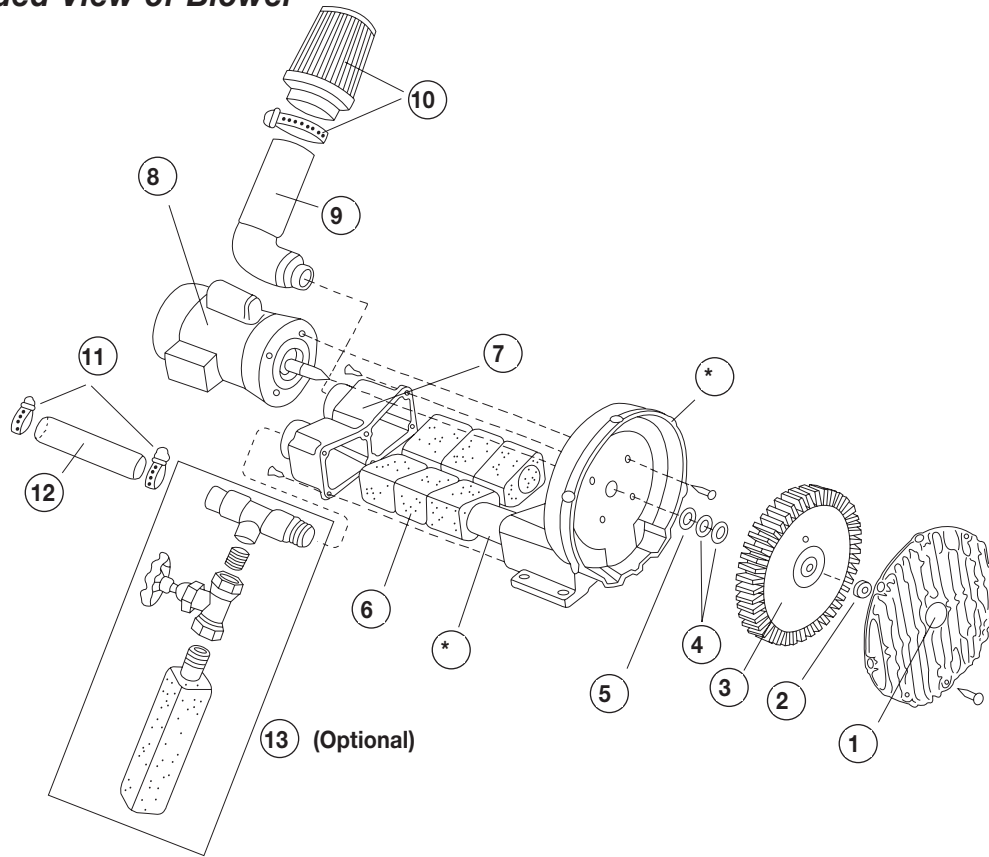
No other routine maintenance is needed. We recommend replacement of the motor bearings after three years of continuous operation to prevent unscheduled blower repair. Your local electric motor repair shop may do this using bearings they should have on hand. There is no need to return the blower to PAES for repair, but you can and we will gladly fix it for a reasonable price.

Troubleshooting Chart

| Problem | Reason | Remedy |
|--|---|---|
| Increased noise. | Noise absorbing foam is damaged. | Replace foam. |
| Excessive vibration. | Damaged impeller. Motor and/or impeller are dirty. | Replace impeller. Clean motor and impeller periodically. |
| Ambient and exhaust temperatures increase. | Motor and/or blower are dirty. Filters are dirty. | Clean motor and blower periodically. Replace filters. |
| Decreased inlet air pressure. | Inlet air filter is clogged. | Clean or replace inlet filter. |
| Unit is extremely hot. | Wrong wiring. Low voltage. Inlet air filter is clogged. Motor and/or blower are dirty. Operating at too high of a pressure or vacuum. | Check wiring. Supply proper voltage. Clean inlet filter. Replace cartridge. Clean motor and blower periodically. Install a relief valve and pressure or vacuum gauge. |
| Unusual sound. | Impeller is damaged or dirty. Bearing going bad. | Clean or replace impeller. Replace bearings. |
| Motor overload. | Low voltage. | Check power source. Check wire size and connections. |
| Unit does not start. | Incorrect electrical connection or power source. Impeller is damaged. | Check wiring diagram, circuit fusing and circuit capacity. Clean or replace impeller. Install proper filtration. |

Should you require service or repair parts, contact Pentair Aquatic Eco-Systems at 877-347-4788 from 8 AM to 7 PM Monday to Thursday and 8 AM to 5 PM Friday. Have your part and serial numbers handy, and our technical staff will gladly help you resolve any problems.

Exploded View of Blower



| Ref | Description |
|-----|--|
| 1 | Cover |
| 2 | Stopnut |
| 3 | Impeller |
| 4 | Shim Spacer(s) |
| 5 | Retaining Ring |
| 6 | Foam |
| 7 | Muffler Extension |
| 8 | Motor |
| 9 | External Muffler |
| 10 | Inlet Filter + Clamp |
| 11 | Clamps |
| 12 | Flex Hose |
| 13 | Tee, Nipple, Bleed Valve and Silencer (optional) |
| * | Not Available |

LIMITED WARRANTY

Pentair Aquatic Eco-Systems, Inc. (PAES) warrants that its products shall, at the time of delivery and for a period of twelve (12) months thereafter, except for filters, be free from defects in materials and workmanship; and, if any such product shall prove to be defective in material or workmanship under normal intended usage and maintenance during the warranty period, upon examination by PAES or its authorized representative, then PAES shall repair or replace, at its sole option, such defective products at its own expense; provided, however, that the Purchaser shall be required to ship each such defective product, freight prepaid, to PAES' designated facility. The warranty on products and/or components not manufactured by PAES, is limited to the warranty, if any, provided by the original manufacturer of said product or component. PAES sole warranty in regard to any components or products that are not manufactured by it shall be limited to the repair or replacement of the product, as set forth herein, with the condition that the Purchaser first return such defective item, freight prepaid, to PAES' designated facility. After PAES has made an inspection of the product, and has confirmed that there is a defect in the manufacture of the product, a credit will be issued to Purchaser's account. PAES HAS MADE NO AFFIRMATION OF FACT AND HAS MADE NO PROMISE RELATING TO THE GOODS BEING SOLD THAT HAS CREATED OR AMOUNTED TO AN EXPRESS WARRANTY OR THAT THE

GOODS CONFORM TO ANY AFFIRMATION OR PROMISE. PAES DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS. PAES SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

This Warranty does not extend to any Equipment that have been subjected to:

1. Damage caused by careless handling, improper repackaging, or shipping.
2. Damage due to misapplication, misuse, abuse or failure to properly operate equipment.
3. Damage caused by improper installation or storage.
4. Damage due to unauthorized product modifications or repairs.
5. Damage caused by negligence, or failure to properly maintain products.
6. Accidental damage, fire, acts of God, or other circumstances outside the control of PAES.

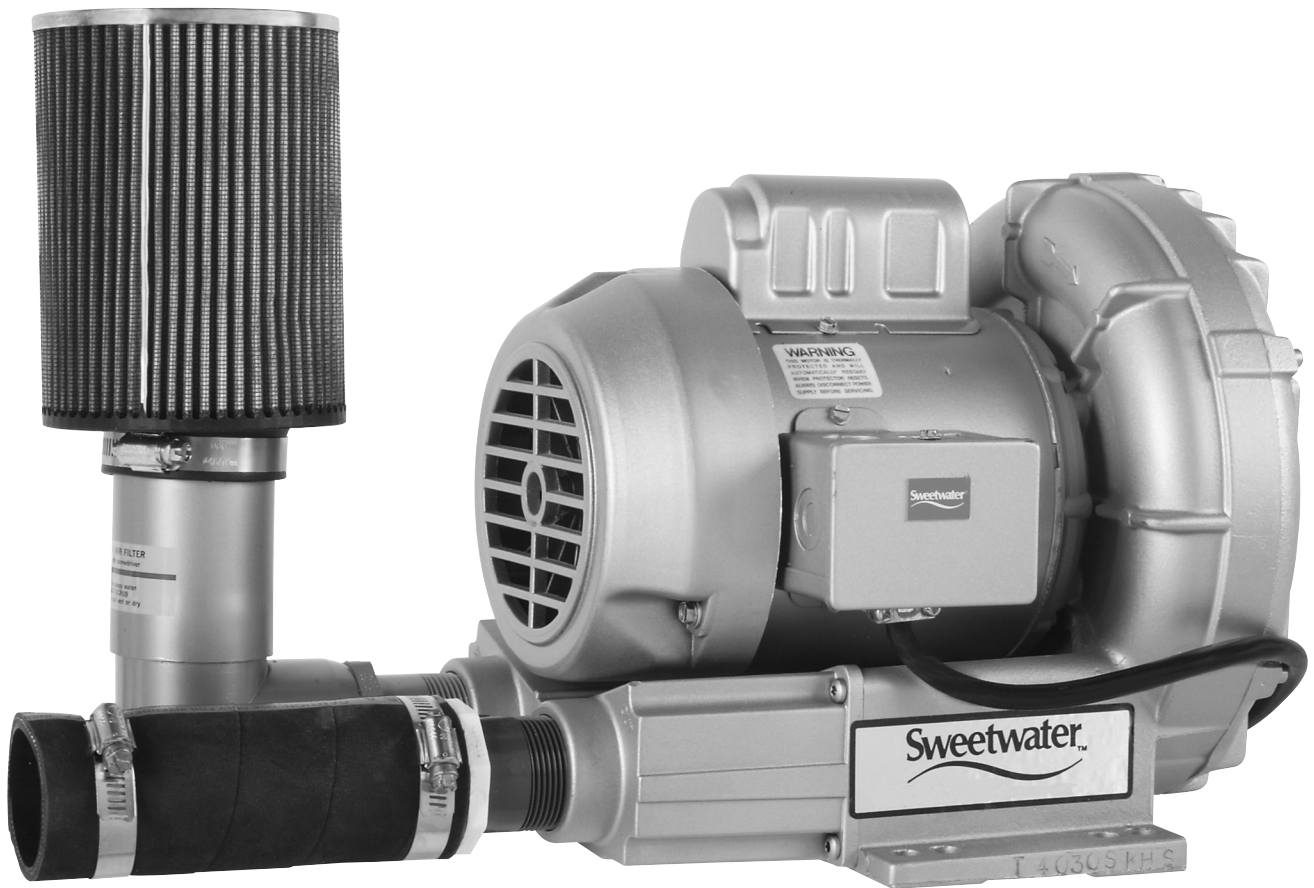


AQUATIC ECO-SYSTEMS™

Guide to Designing Air Distribution Systems for

Sweetwater[®]

Regenerative Blowers



AQUATIC ECO-SYSTEMS™

Use this guide for designing new air systems and when troubleshooting problems in an existing air distribution system. It was developed by the PAES technical staff for small-and medium-sized facilities such as tropical fish stores, bait shops, bait distribution centers, bioassay locations and most aquaculture facilities. For large facilities and/or long pipe runs (such as those used for outdoor ponds) consult the PAES technical department for pipe sizing assistance.

Insufficient Pipe Diameter Can Restrict Air Flow

Regenerative blowers are classified as low-pressure air compressors. They are most often selected for fisheries applications because they are inexpensive to operate, oilless and very dependable. Because they have limited pressure capability, it is very important that the air distribution piping not restrict the free passage of air.

Restricting the flow of air will reduce the volume of air produced, reduce the pressure available at the air outlets, increase the operating temperature of the blower (and the air) and increase the consumption of electricity. Following this guide will ensure that your air distribution system is not too restrictive. Oversizing the piping will not negatively affect performance, it will simply cost more than necessary for piping.

What Causes Resistance to Air Flow?

Air flow resistance is caused by friction. Friction is the "drag" of air on the inside walls of the air distribution system (like wind resistance on a car). Friction increases with speed. The more air you put through a pipe, the faster it must go. Friction restricts the transport of air, resulting in a loss of both pressure and volume at the more distant air outlets.

Restrictive Example: 10 cubic feet per minute (cfm) of air traveling through a 3/4" inside diameter (I.D.) pipe would flow at a speed of 28 miles per hour. The resulting friction in a 50-foot length of pipe would be equal to 10 inches of water (about 1/3 of a psi). If the Sweetwater® S21 blower were used on this 50-foot 3/4" pipe, it could only operate 120 aquarium air outlets at 25 inches of water depth.

Nonrestrictive Example: 10 cfm travelling through a 1 1/2" pipe would flow at a speed of 8 mph, resulting in only .5 inches of water pressure loss through a 50-foot length of pipe. In this example the same S21 would operate 440 aquarium outlets at 25 inches of water depth. A 2" or larger diameter pipe would provide no real benefit.

Designing Your System

After reading this entire page you will need to sketch your system on paper then divide it into convenient "segments" or "sections" as shown in the pet store illustration (p. 3). Starting with the segment farthest from the blower, calculate either the number of outlets (aquarium type) or the volume of air that will travel through it. Next, use the pipe sizing guide (above right) to find the suggested/minimum pipe size for that segment.

The piping nearest the blower will be the largest, as there is more air going through it. Those pipes most distant from the blower can be smaller.

Pipe Wall Thickness: We suggest that you use Schedule 40 PVC pipe wherever you plan to drill and tap for valves. The thin wall pipe is fine for all other air piping. Always de-burr the pipe ends prior to assembly.

PVC Pipe Cement: It may not be necessary to glue your PVC piping together if your fittings fit snugly. If you are not sure, then use PVC cement for a permanent bond.

Time-Saving Suggestion

If you are installing a lot of 1/8" NPT valves, consider this technique:

1. Install all PVC piping but do not glue on the end caps.
2. Mark all valve locations.
3. Drill an 11/32" hole at each location (BT1).

4. Using a reversible electric drill, cut threads in each hole with a 1/8" NPT tap (BNT1), screwing in the valves as you go to assure the proper depth (practice on a piece of scrap pipe before starting).
5. Turn on the blower to blow out shavings before installing end caps.
6. Run the blower for at least 2 hours to eliminate PVC cement vapors from the air lines (and the building) prior to use.

Note: The illustrated example suggests four different minimum pipe sizes (1/2", 3/4", 1" and 1 1/2"). For purchasing and installation convenience or for other reasons such as visual uniformity and pipe strength you may decide to use only two pipe sizes: 1 1/2" in place of 3/4" and 1" in place of both 3/4" and 1/2".

Pipe Sizing Guide

| Number of Aquarium Outlets* Receiving Air Through this Segment | Maximum cfm** Through this Segment | Minimum Pipe Size*** (I.D. in inches) |
|--|------------------------------------|---------------------------------------|
| Up to 25 | 1.25 | .5 |
| 26-50 | 2.5 | .75 |
| 51-100 | 5 | 1 |
| 101-175 | 8.75 | 1.25 |
| 176-300 | 15 | 1.5 |
| 301-600 | 30 | 2 |
| 601-1,000 | 50 | 2.5 |
| 1,001-1,400 | 70 | 3 |
| 1,401-3,500 | 175 | 4 |

* Assumes an aquarium air outlet is using .05 cfm. This is the volume of air that an aquarium diffuser typically uses when bubbling rapidly. Other air-using devices, such as corner filters and dirt magnets, typically use less than .05 cfm per outlet.

** The cfm used by larger air diffusers, airlifts, etc., can be calculated from the reference chart on the back page.

***You may, at any location, use a pipe size larger than that suggested; it will neither help nor hurt the performance of your system. You may elect to use a larger pipe for other reasons, such as simplicity or uniformity.

Water Depth

Not a consideration when sizing pipes, only when selecting a blower.

Air Pressure Gauge

We highly recommend an air pressure gauge for blowers larger than 1/2 hp. The gauge should either read 0-60 or 0-100" H₂O (27.7" H₂O = 1 psi).

Bleed Valve

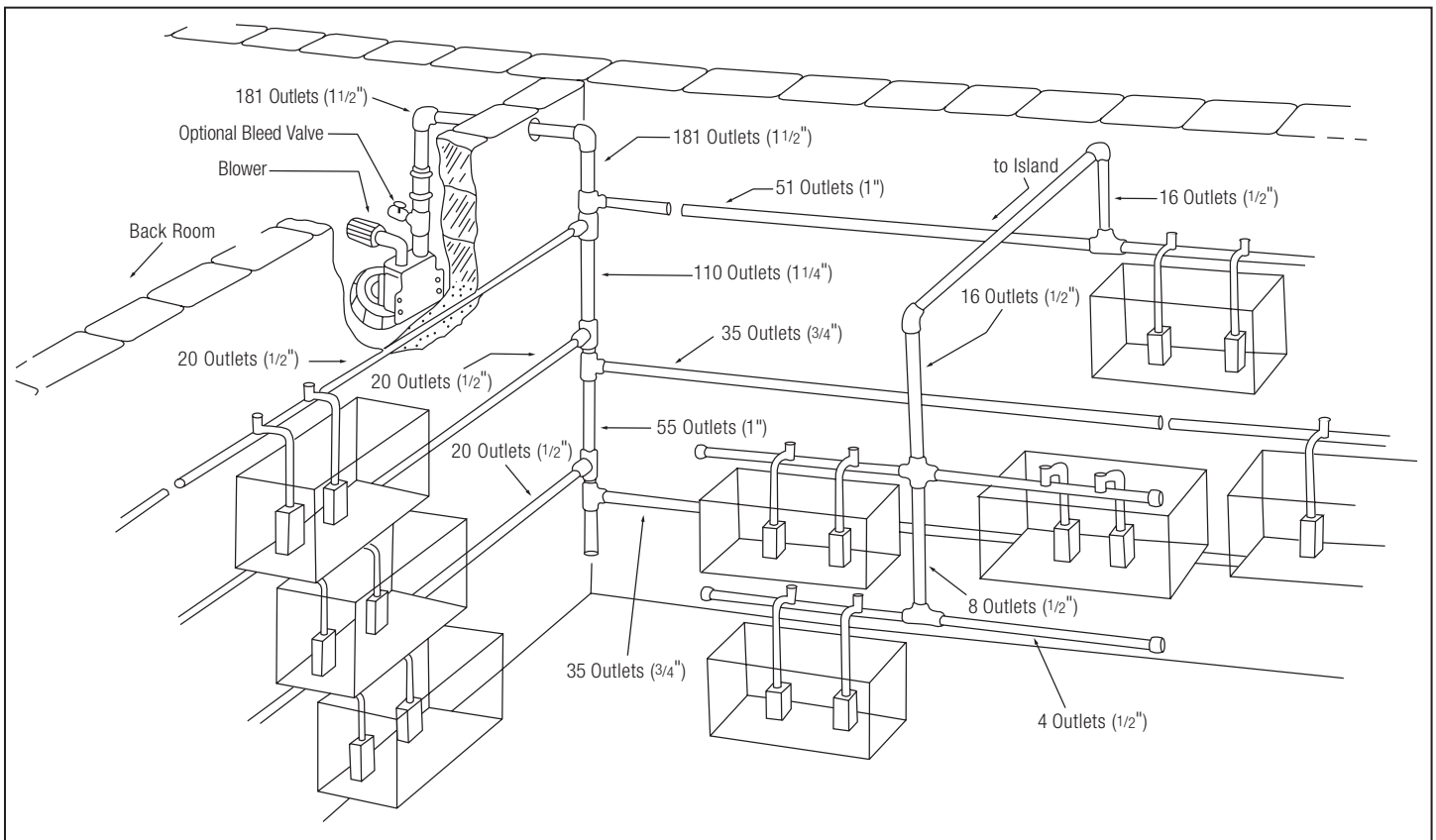
If an air bleed valve is to be used to release excess air, then it should be located near the blower, not at the end of the air system.

Air Leaks

A spray or squirt bottle with soap and water may be useful for locating air leaks. Spray the joints and valves and look for foam. Be careful not to contaminate the fish's water with soap.

Important: This guide is designed for Sweetwater® blowers only. Use of this guide for other brands of blowers may result in unacceptable blower performance. For additional information and assistance, consult Pentair Aquatic Eco-Systems' Technical Department. If you send (or fax) PAES a sketch of your system, then we will be happy to mark the suggested pipe sizes and return it to you at no charge.

Example Pet Store



| Aquarium Air System Accessories* | Part No. |
|---|-----------------|
| Air Outlet Manifold | VML8 |
| Pressure Gauge, 0-60" H ₂ O | BG60 |
| Pressure Gauge, 0-100" H ₂ O | BG100 |
| Gauge Kit | BG00 |
| Bleed Valve Assembly for S11/S21 | BV1 |
| Bleed Valve Assembly for S31 | BV2 |
| Bleed Valve Assembly for S41 | BV3 |
| Air Filter for S11/S21 | BF4 |
| Air Filter for S31 and Larger | BF6 |
| Brass Valve | VBR1 |
| Nickel-Plated Brass Valve | VN2 |
| Plastic Valve | VPL12-B |
| Drill Bit, 11/32" | BT1 |
| Tap (NPT), 1/8" | BNT1 |
| Aquarium Tubing | TP30S |
| Diffuser, 1 1/2" x 1/2" | AS10 |
| Diffuser, 1 1/2" x 3/4" | AS20 |
| Diffuser, 2" x 1" | AS3F |

| Air Use Reference List** | Cfm (Approx.) |
|---------------------------------|----------------------|
| 1" Long Aquarium Diffuser | .03 |
| 1 1/2" Long Aquarium Diffuser | .05 |
| 6" Long Aquarium Diffuser | .2 |
| 3" Long x 1 1/2" Wide Diffuser | .35 |
| 6" Long x 1 1/2" Wide Diffuser | .5 |
| 9" Long x 1 1/2" Wide Diffuser | .75 |
| 12" Long x 1 1/2" Wide Diffuser | 1 |
| Small Aquarium Filter | .03 |
| Medium Aquarium Filter | .05 |
| Large Aquarium Filter | .07 |
| 1" Circulating Air Lift | .2 |
| 2" Circulating Air Lift | 1 |
| 3" Circulating Air Lift | 3 |

** Note: Larger Sweetwater® diffusers (6" and above) are not equipped with 3/16" O.D. fittings.

Should you require service or repair parts, contact Pentair Aquatic Eco-Systems at 877-347-4788 from 8 AM to 7 PM Monday to Thursday and 8 AM to 5 PM Friday. Have your part and serial numbers handy, and our technical staff will gladly help you resolve any problems.

* Please see the Pentair AES Master Catalog for a complete list of products available through Pentair Aquatic Eco-Systems, Inc.



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