

Section Three Protein Skimming



Applications

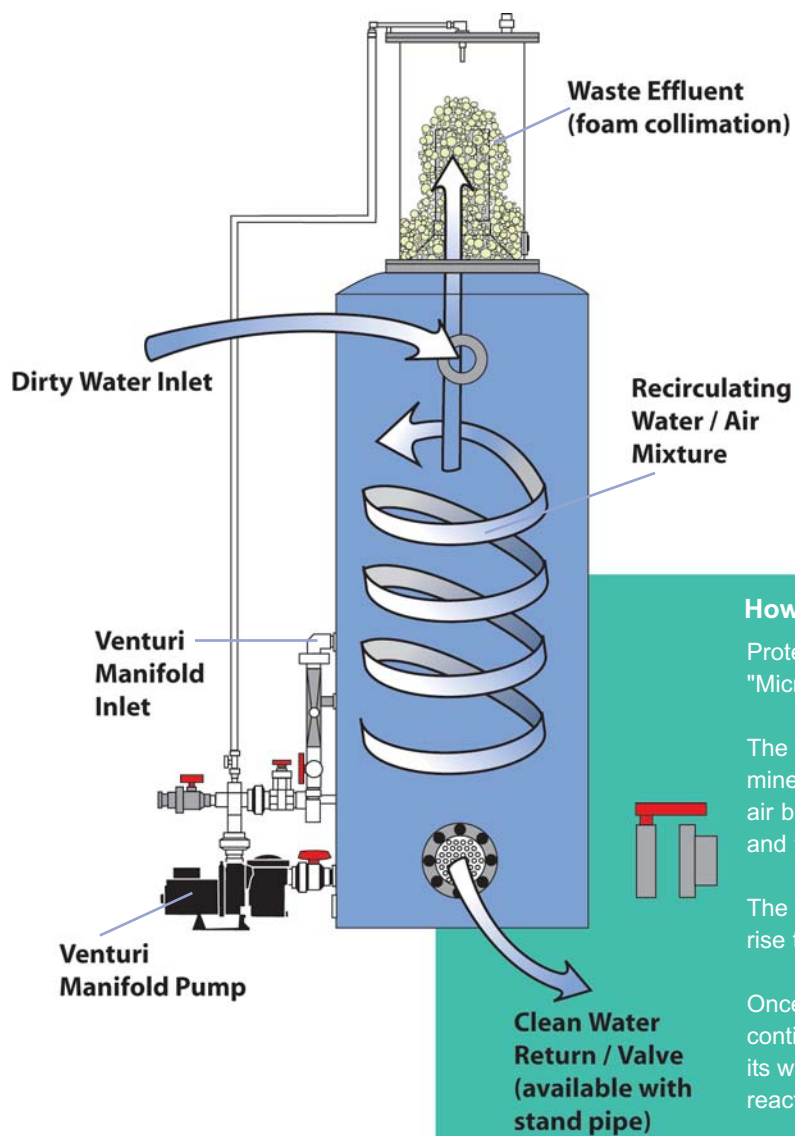
- * Aquaculture
- * Aquarium
- * Mammal/Reptile/Avian Bathing Pools

Function

- * Clarification (D.O.C. Removal)
- * Oxygenation
- * Disinfectant/Ozone Injection

AquaFoam PVC & Polyethylene Protein Skimmers

Protein Skimming, or Foam Fractionation, is a valuable mode of filtration when used with closed re-circulating systems. Both saltwater and freshwater systems can benefit from protein skimming especially with systems carrying intense fish loads.



How It Works

Protein Skimming is accomplished by injecting (with a venturi injector) "Micro-Fine" air bubbles into the water stream entering the contact reactor.

The "Water-Air" mixture is held inside the contact reactor for a predetermined retention time (60-120 seconds). During this retention time, the fine air bubbles are given the chance to accumulate dissolved organic wastes and tiny particles on their bubble walls.

The many "Micro-Fine" air bubbles, laden with organic waste, eventually rise to the top of the contact reactor where a dense foam collimates.

Once the foam collimates at the top of the reactor, it begins to slowly but continuously climb upwards into a foam collimation tube(s) where it works its way out of the reactor and into the waste collector. When foam exits the reactor, the protein skimming process is complete.

Note: Waste effluent will vary from a light colored, yellowish liquid to a dark green. A dark color effluent has less water content, representing a more concentrated waste. Dropping the water level inside the reactor and increasing the foam collimation time will produce a more concentrated waste effluent.

AquaFoam PVC Protein Skimmers

AquaFoam PVC Venturi Protein Skimmers are operated using a dedicated water pump from a centralized sump (pump not included). Our PVC constructed AquaFoam Skimmers are very durable, offering many years of dependable operation.

Available in four sizes, each model is easy to install and maintain. In addition, after years of service, they can be brought back to nearly new condition with a thorough cleaning.



Clear PVC Wash-Down Waste Collector



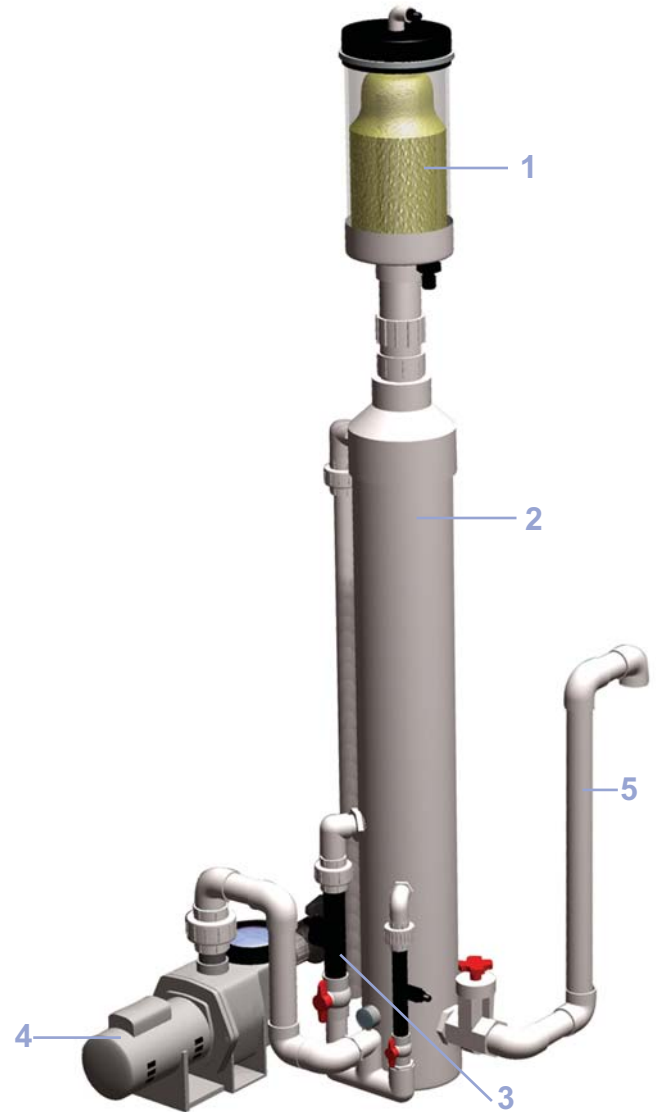
Dual Venturi Manifold



Water Pump Manifold

Advantages:

- ▶ **Clear PVC Wash-Down Waste Collector** features a removable lid, effluent waste discharge port and pig-tail wash down spray nozzle.
- ▶ **Opaque PVC Body** prevents light from entering inside the contact chamber, as well as the growth of unwanted algae. Opaque PVC is much more durable than acrylic, thus reducing shipping damage and simultaneously while increasing operating longevity.
- ▶ Our exclusive **Dual Venturi Manifold** allows for precise independent venturi adjustments which are ideal when applying ozone. This allows the operator to match the venturi vacuum to the ozone generators operating requirements.
- ▶ Optional **Water Pump** and Unionized Pump Manifold are available. The pump manifold includes a wash-down solenoid (timer-controlled) valve, gate valve and by-pass valve.
- ▶ Optional **Clean Water Outlet Stand Pipe** is available on request with your requirements.



1. PVC Wash-Down Waste Collector
2. Opaque PVC Body
3. Dual Venturi Manifold
4. Water Pump
5. Clean Water Stand Pipe

AquaFoam PVC Series Specifications Chart

Model No.	Dimensions Diam. x Height	Venturi style / Inlet Port Size	Outlet style / Port Size	Water Flow Rate	
				1.5 Minute Dwell Time	Venturi Manifold Pump (optional)
COM3006	7" x 94"	Dual / 1"	Base / 1.5"	11 GPM	340036
COM3008	9" x 96"	Dual / 1.5"	Base / 1.5"	22 GPM	340036
COM3010	11" x 120"	Dual / 1.5"	Base / 2"	34 GPM	340038
COM3012	13" x 120"	Dual / 2"	Base / 2"	55 GPM	340039

- Features: Heavy-Wall PVC Waste Top, Dual Venturi Manifold, and Waste Wash Down
- Base = Outlet Port located at the base of the filter, positioned 90 degrees to the right of the inlet

AquaFoam Poly Protein Skimmers

The AquaFoam Polyethylene Venturi Protein Skimmers have a "Flow-Through" Design requiring the system water to be re-circulated through the unit. A dedicated pump constantly re-circulates water in the skimmer's contact chamber via the pump/pump manifold/Dual Venturi Manifold.



PVC Wash-Down Waste Collector



Dual Venturi Manifold



Water Pump Manifold

Advantages:

- ☛ **"Robust" Clear PVC Wash-Down Waste Collector**, standard with all AquaFoam Poly Models features a removable lid, conical foam collimation assembly and waste effluent discharge port.
- ☛ Our unique **Vessel-Waste Collector Flange** creates a dependable watertight seal while maximizing durability.
- ☛ **Wash-down Pig Tail Nozzle** and Wash-down Spray Port knock off solid waste that has accumulated on the foam collimating tube and acrylic sight tube.
- ☛ **Exclusive "Dual Venturi Manifold"** allows precise air/ozone injection adjustments. This dual venturi arrangement allows both injectors to be adjusted independently. Inlet Pressure Gauge identifies pressure prior to the venturi injectors, which is critical for making accurate operating adjustments.
- ☛ All AquaFoam Poly Models come with a **Dedicated Water Pump** that includes a **Unionized Pump Manifold**. The pump manifold includes a wash-down solenoid (timer-controlled) valve, gate valve and by-pass valve.
- ☛ Optional **Clean Water Outlet Stand Pipe** is available on request with your requirements.



Grey or white bodies.

1. PVC Wash-Down Waste Collector
2. Pig-tail "Full Cone" Spray Nozzle
3. Dual Venturi Manifold
4. Unionized Water Pump Manifold
5. Outlet w/valve, Standpipe available
6. Polyethylene Body

Polyethylene Series Specifications Chart

Model No.	Dimensions Diam. x Height	Venturi style / Inlet Port Size	Outlet style / Port Size	Water Flow Rate		Venturi Manifold Pump
				1.5 Minute Dwell Time	Auto Wash-down	
COM3020-NP	20" x 75"	Single / 1.5"	S.P. / 2"	50 GPM	Option	Option
COM3020	20" x 80"	Single / 1.5"	S.P. / 2"	50 GPM	Yes	340036
COM3024	24" x 105"	Dual / 2"	S.P. / 3"	80 GPM	Yes	340036
COM3028-2004	28" x 110"	Dual / 2"	S.P. / 3"	100 GPM	Yes	340036
COM3031	31" x 130"	Dual / 3"	S.P. / 4"	150 GPM	Yes	340036
COM3036	36" x 130"	Dual / 3"	S.P. / 4"	225 GPM	Yes	340037
COM3045	45" x 105"	Dual / 4"	S.P. / 6"	300 GPM	Yes	340038
COM3046	46" x 170"	Dual / 4"	S.P. / 6"	375 GPM	Yes	340038

Available in eight sizes with a maximum retention time of 375 GPM @ 90 seconds.

* COM 3020-NP does not include venturi manifold pump or auto-wash down valve.

Using Protein Skimming ...in Freshwater with Ozone

The benefits of protein skimming are well known...no other form of filtration removes dissolved organic wastes (fats/phenols) while at the same time re-oxygenating the water. In the past, the protein skimming process was thought to be only possible in heavier saltwater not in freshwater; however, this is a misconception.

Protein Skimming used with a smaller freshwater home aquarium is probably impractical; however, when applied to commercial re-circulating systems, the benefits are quite extraordinary. Consider the waste production of a single 10,000 gallon tilapia recirc system. Now consider the color of the water; enormous amounts of both solid and dissolved organic waste are constantly being produced.

Removing solid waste is easily accomplished with separators and screens, but fine solids and dissolved organic material are different. On a large scale, there are essentially two choices, namely--large water changes to dilute or protein skimming to remove.

Combining a small amount of ozone with protein skimming enhances its performance in freshwater by oxidizing the available organic contaminant's which ultimately enhances flocculation and absorption onto the bubble wall.

When considering the use of ozone, always think about the condition of the air, preferably oxygen, that supplies the ozone generator. The feed gas to the ozone generator ultimately establishes the efficiency and operating longevity of the equipment.

Managing ozone dosing can be achieved by implementing an ORP (Oxygen Reduction Potential) Meter.



Custom Equipment

EA, Inc. is very capable of customizing equipment to your specific application, using your specifications. Whether your requirements are integrated ozone injection with controls or specific port sizes or dimensions, simply supply us with a shop drawing to follow.



Delzone Corona Discharge Ozone Generators

Features include 20 kHz frequency, ceramic tube dielectric ozone generator cells for consistent, reliable ozone production. Delzone models CD-2 to CD-45 feature configurable feed gas options, multiple safety features and sturdy reliable construction.

Delzone Ozone Generator Specifications

Model No.	Ozone Output g/hr	Ozone Concentration	Voltage Required	Power Required	Ambient Operating Temp.	Oxygen Feed Flow	Cooling Water	Inlet Temp.	Inlet Pressure	Enclosure Material	Enclosure Finish
CD - 2	2 g/hr	2.5% by wt.	115V - 50/60Hz	3.5 A	40 - 100 ° F	2.5 SCFH	N/A	N/A	N/A	Steel, 14 gauge	White
CD - 5	5 g/hr	2.0% by wt.	115V - 50/60Hz	4.5 A	40 - 100 ° F	6 SCFH	N/A	N/A	N/A	Steel, 14 gauge	White
CD - 7	7g/hr	2.5 - 3.0% by wt.	115V - 50/60Hz	5.5 A	40 - 100 ° F	7 SCFH	N/A	N/A	N/A	Steel, 14 gauge	White
CD - 15	15g/hr	3.5% by wt.	115V - 50/60Hz	7.0 A	40 - 100 ° F	13 SCFH	0.10 GPM	50 - 90 ° F	15 - 40 PSI	Steel, 14 gauge	White
CD - 25	25g/hr	3.5 - 4.0% by wt.	115V - 50/60Hz	7.5 A	40 - 100 ° F	18 SCFH	0.40 GPM	50 - 90 ° F	15 - 40 PSI	Steel, 14 gauge	White
CD - 45	45g/hr	4.0% by wt.	115V - 50/60Hz	18.0 A	40 - 100 ° F	30 SCFH	0.20 GPM	50 - 90 ° F	15 - 40 PSI	Steel, 14 gauge	White