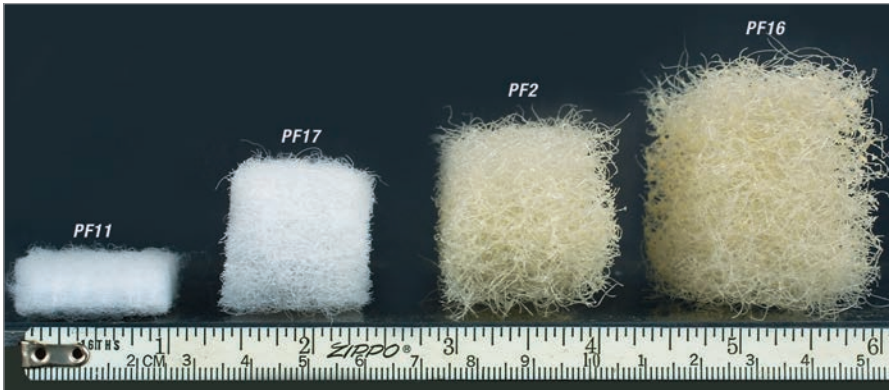


FILTRATION PRODUCTS

- 115 Filter Media
- 117 Screening/Filter Bags
- 120 Bag Filters
- 122 Sand Filters & Sand Filter Media
- 126 Canister Filters
- 127 Cartridge Filters
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- 132 Drum Filters
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- 184 Venturi Injectors/Air Dryers
- 185 Ozone Check Valves/Desiccant





Disposable Filter Media (PF8)

- Fine polyester fiber material offers high quality at a low price
- It will sustain one or two cleanings before disposal
- With no fire retardants or dyes, it is safe for fish

Enkamat® Nylon (PF4/PF5)

- A matrix of semirigid nylon monofilaments fused at their intersections
- The best reusable egg-laying material
- Useful for filter media support, biofiltration material, soil erosion control, etc.
- **PF4** has 0.020" dia. fibers, **PF5** has 0.025" dia. fibers

Enkamat® is a registered trademark of Bonar, B.V. Corp.

WASHABLE FILTER MATERIAL

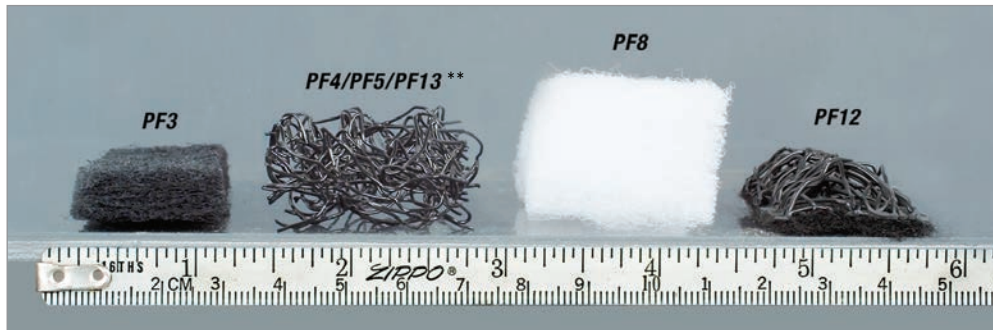
Washable polyester for repeated use. Measured by the yard (91.4 cm).

Enkamat® Poly (PF12/PF13)

- Polyethylene fibers can be used to construct DLS media for biofiltration, for soil erosion control, splash control, etc.
- **PF12** has 0.025" diameter fibers bonded to a felt underlay. **PF13** has 0.030" diameter fibers and is 1" thick
- Not UV-resistant

Carbon Filter Material (PF3)

- **PF3** filter material features polyester fibers heavily coated with activated carbon
- Provides an ideal mechanical, chemical and biological filtering media
- A fine pore material suitable for clear water applications.



| MODEL | FILTER | THICKNESS | WIDTH | LENGTH (YDS) | SHIP WT (LBS) | EACH | 4+ |
|-------|----------|-----------|-------|--------------|---------------|---------|--------|
| PF11A | FINE | .30" | 29" | 2 | 4 | \$24.16 | — |
| PF11C | FINE | .30" | 29" | 10 | 11 | 86.14 | 80.11 |
| PF17A | MEDIUM | 1" | 28" | 2 | 4 | 30.44 | — |
| PF17C | MEDIUM | 1" | 28" | 4 | 5 | 49.03 | 45.60 |
| PF2A | COARSE | 1.25" | 28" | 2 | 4 | 32.68 | — |
| PF2C | COARSE | 1.25" | 28" | 7 | 10* | 111.54 | 103.73 |
| PF16 | COARSE | 2" | 28" | 2 | 4* | 39.14 | — |
| PF16C | COARSE | 2" | 28" | 4 | 7 | 71.99 | 66.95 |
| PF8A | FINE DSP | 1" | 36" | 2 | 3 | 17.00 | — |
| PF8C | FINE DSP | 1" | 36" | 10 | 11* | 68.65 | 63.84 |

*Ships Oversize at 30-lb rate.**White color

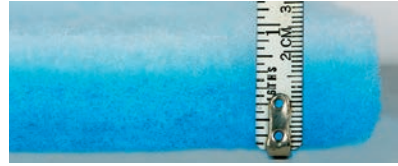
| MODEL | FILTER | THICKNESS | WIDTH | LENGTH (YDS) | SHIP WT (LBS) | EACH |
|-------|---------|-----------|-------|--------------|---------------|---------|
| PF3 | CARBON | .40" | 44" | 2 | 4 | \$33.39 |
| PF3C | CARBON | .40" | 44" | 8 | 10 | 121.90 |
| PF4A | ENKAMAT | .25" | 39" | 2 | 4 | 31.62 |
| PF4C | ENKAMAT | .25" | 39" | 8 | 6 | 107.57 |
| PF5 | ENKAMAT | .50" | 39" | 2 | 4 | 35.14 |
| PF5C | ENKAMAT | .50" | 39" | 5 | 6 | 82.52 |
| PF12A | ENKAMAT | .40" | 39" | 2 | 4* | 26.39 |
| PF12C | ENKAMAT | .40" | 39" | 6 | 7 | 65.14 |
| PF13A | ENKAMAT | 1" | 39" | 2 | 4 | 31.27 |
| PF13C | ENKAMAT | 1" | 39" | 7 | 11* | 94.29 |

JUST ASK ... AND WE WILL INCLUDE A SMALL SAMPLE ALONG WITH YOUR NEXT ORDER

BLUE BONDED FILTER PADS

Precut for small trickle filters, plate filters or for use in canister filters. Each pad measures 13" x 24" x 1" thick.

| MODEL | EACH | 6+ |
|-------------|---------------|---------------|
| BBFP | \$4.75 | \$4.28 |

**SPAWNTEX SPAWNING MAT** 

Spawntex is the spawning mat material specifically asked for by breeders of shiners, goldfish and similar shore-spawning fish. Made in USA.

- Constructed of all natural coconut fibers with a latex binder on a polyester net backing
- 1½" thickness ensures more strength for easy cleaning and exceptional durability.
- Pond installation is easy — cut the media to size, attach a wire mesh backing and place in the pond
- Another method is to simply stake the mats along the pond bank
- **SM2** sold in 24" widths, **SM3** sold in 18" widths
- Available by the linear yard or in full rolls* 11 yards long

| MODEL | SHIP WT (LBS) | EACH | 2+ |
|-------------|---------------|--------------------------|--------------|
| SM2 | 3 | \$13.65/Linear Yd | — |
| SM2R | 30 | 98.70/Roll | 92.78 |
| SM3 | 3 | 10.95/Linear Yd | — |
| SM3R | 30 | 77.54/Roll | 72.11 |

*Rolls ship Oversize at 70-lb rate.

**BLOCKSOM FILTER MATERIAL**

This high-quality 1" thick filter material is constructed of all natural coconut fibers and a latex binder on a polyester net backing. Durable and reusable, it withstands frequent cleaning. Often used in garden pond filters. Sold in 24" widths by the linear yard (2 lbs) or in full rolls of 12 yds (30 lbs). Made in USA.

| MODEL | | EACH |
|-------------|------------------|----------------|
| SM1 | 24" X 36" | \$12.63 |
| SM1R | 24" X 12-YD ROLL | 113.58 |

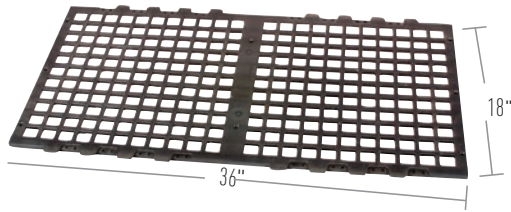
**FILTER FOAM, RETICULATED**

A great biofilter media!

This 1" thick foam is true "fish grade," long-life, reticulated foam with a pore size of 20 ppi (pores per inch). It contains no fire retardants or germicides (be careful with low-cost, air filter foam, as it can be toxic). Sold in 2' x 6' sheets (rolled) only (equal to 1 cu.ft.). Weighs 5 lbs. Made in USA.

| MODEL | EACH | 6+ |
|------------|----------------|----------------|
| PF7 | \$49.44 | \$45.98 |

Can't find what you're looking for? See it all at PentairAES.com.



◀ GRATING, 1/2" THICK

This food-grade polypropylene is molded to support filters, false tank bottoms or media. It can be used as benchtops in greenhouses. It is very easy to clean and disinfect. Each plate measures 36" L x 18" W x 1/2" H and is composed of 1" x 1" grid squares. Each piece weighs 2 lbs. Ships Oversize.

- Will hold 200 lbs if supported every 18"
- Durable, lightweight and very resistant to sagging
- Interlocking assembly is convenient for connecting grates together
- Grates are UV resistant

| MODEL | EACH | 12+ |
|-------|---------|---------|
| SPG1 | \$17.26 | \$14.66 |

STAINLESS STEEL SCREENING

304 stainless steel screening can be used for the same applications as nylon but offers better rigidity and durability. All stainless screening is 48" (121 cm) wide and sold in increments of 1 foot (30.4 cm). Each foot increment equals 4 sq.ft. (.37 m²).

| MODEL | MICRONS | INCHES | % OPEN AREA | PER FOOT | 10+ FEET |
|--------|---------|--------|-------------|----------|----------|
| MS105 | 105 | .0041 | 37 | \$25.12 | \$22.61 |
| MS125 | 125 | .0049 | 31 | 24.15 | 21.74 |
| MS180 | 180 | .008 | 32 | 18.11 | 16.30 |
| MS250 | 250 | .010 | 30 | 19.77 | 17.80 |
| MS500 | 500 | .020 | 37 | 19.77 | 17.80 |
| MS1000 | 1,000 | .039 | 48 | 18.65 | 16.79 |



MS105

MS500

MS1000

TECHNICIAN PROFILE



Ryan Karcher

Ryan received his A.S. degree in aquaculture from Hillsborough Community College. His technical experience includes ornamental hatchery management, hormone-induced spawning and aeration and recirculating system design. He also has experience in home aquarium design and maintenance.

Thank you for your very fast response and standing behind your products. I appreciate your help with issuing the order for replacement parts and again, you have wonderful customer service.

Sue Heuvelmans

October 2015

PENTAIRAES.COM

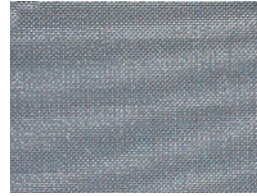


EVERYTHING YOU NEED, ON EVERY DEVICE

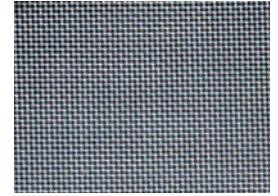
NYLON SCREENING

Nylon screening material is an excellent choice for many aquaculture and laboratory uses, including filtration of unwanted organisms; brine shrimp culture; larval fish and clam culture; pipe screens, filter bags and nets. Nylon is resistant to bacteria, cleaners, acids and insects. This screening is 36" wide and is sold by the yard length (1 yard = 36" = 91 cm). 1 linear yard = 9 ft² = 1 yd². Contains no UV inhibitors!

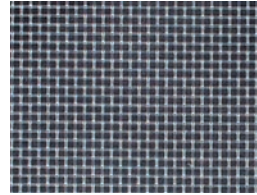
| MODEL | MESH (MICRONS) | OPENING | % OPEN AREA | PER YARD | 10+ |
|----------------|----------------|---------|-------------|----------------|----------------|
| 3-20/14 | 20 | .0008" | 14 | \$52.52 | \$47.27 |
| M35 | 35 | .0015" | 27 | 55.18 | 49.66 |
| M46 | 41 | .0016" | 31 | 65.00 | 58.50 |
| M55 | 55 | .0022" | 29 | 37.63 | 33.87 |
| M64 | 64 | .0025" | 32 | 36.54 | 32.89 |
| M75 | 75 | .0029" | 45 | 29.26 | 26.33 |
| M105 | 105 | .0041" | 36 | 24.07 | 21.66 |
| M125 | 125 | .0049" | 41 | 25.06 | 22.55 |
| M150 | 150 | .0059" | 51 | 22.36 | 20.37 |
| M200 | 200 | .0079" | 35 | 20.63 | 18.57 |
| M250 | 250 | .0098" | 37 | 19.34 | 17.41 |
| M300* | 300 | .0118" | 46 | 20.83 | 18.75 |
| M335 | 335 | .0132" | 46 | 17.43 | 15.69 |
| M400 | 400 | .0157" | 47 | 18.60 | 16.74 |
| M500 | 500 | .0197" | 49 | 18.51 | 16.66 |
| M600 | 600 | .0236" | 51 | 36.86 | 33.17 |
| M670 | 670 | .0264" | 53 | 27.69 | 24.92 |
| M750 | 750 | .0295" | 54 | 19.23 | 17.31 |
| M800 | 800 | .0315" | 55 | 22.68 | 20.42 |
| M1000 | 1,000 | .0394" | 58 | 18.74 | 16.87 |
| M2000 | 2,000 | .0787" | 53 | 36.86 | 33.17 |
| M5000 | 5,000 | .1969" | 72 | 40.98 | 36.88 |



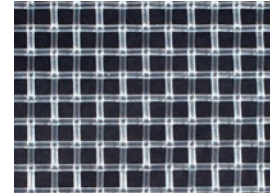
M200



M500



M1000



M5000

*Similar to the 52" x 52" twill Saran filter cloth used in fine mesh nets and inlet water filters.



FB10

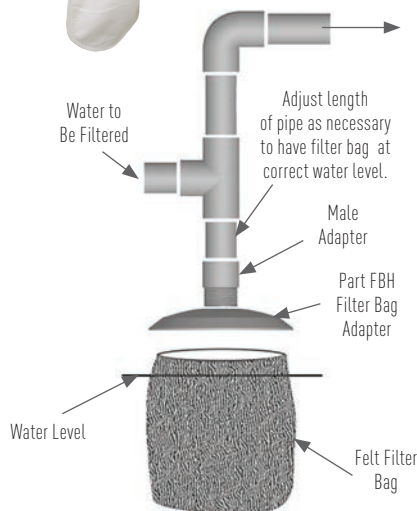
← FILTER BAGS WITH POLY RING MOUTH

Bag filters are very effective at removing organic particulate matter.

The **MONOFILAMENT** type is single-ply nylon resembling a piece of cloth or window screen. The **FELT TYPE** is polypropylene, thick and fluffy, giving it three-dimensional filtering ability. Both are washable, but the felt type should be washed gently.

All bags are 32" long with a 7" diameter mouth and polypropylene ring that fits the optional high-performance acetal resin adapter (**FBH**) perfectly. Made in USA.

Direct overflow back to tank in case bag filter becomes clogged.



Nylon Monofilament Bags, 32" x 7"

| MODEL | | EACH | 10+ |
|---------------|-------------|----------------|----------------|
| FB1N | 1 MICRON | \$61.35 | \$55.22 |
| FB5N | 5 MICRONS | 49.86 | 44.87 |
| FB10N | 10 MICRONS | 50.95 | 44.18 |
| FB20N | 20 MICRONS | 19.69 | 17.72 |
| FB40N | 40 MICRONS | 18.60 | 16.74 |
| FB75 | 75 MICRONS | 9.49 | 8.54 |
| FB100N | 100 MICRONS | 8.38 | 7.54 |
| FB200 | 200 MICRONS | 8.86 | 7.97 |
| FB300 | 300 MICRONS | 8.48 | 7.63 |
| FB800 | 800 MICRONS | 7.77 | 6.99 |

Felt Bags, Polypropylene, 32" x 7"

| MODEL | | EACH | 10+ |
|--------------|--------------------|---------------|---------------|
| FB1 | 1 MICRON | \$7.42 | \$6.68 |
| FB5 | 5 MICRONS | 5.86 | 5.27 |
| FB10 | 10 MICRONS | 6.29 | 5.66 |
| FB25 | 25 MICRONS | 5.86 | 5.27 |
| FB50 | 50 MICRONS | 5.86 | 5.27 |
| FB100 | 100 MICRONS | 6.12 | 5.51 |
| FBH | FILTER BAG ADAPTER | 24.45 | 20.01 |



PMB1L

◀ POLYESTER MESH BAGS

- Pre-filters water
- Zooplankton collector
- Ideal for collecting rotifers, *Artemia*, fish eggs and other small organisms
- Polyester mesh bags are available in 18" and 31" (46 and 79 cm) lengths and a variety of mesh sizes
- Can be used for filtering particulate matter from tank inlets and overflows
- Equipped with a stainless steel ring 7" in diameter and a cotton handle

| MODEL | | EACH | 10+ | MODEL | | EACH | 10+ |
|-------|------------|---------|---------|--------|--------------|--------|--------|
| PMB1 | 75M X 18" | \$13.34 | \$11.34 | PMB6 | 250M X 18" | \$6.25 | \$5.31 |
| PMB1L | 75M X 31" | 20.18 | 17.15 | PMB6L | 250M X 31" | 7.30 | 6.21 |
| PMB2 | 100M X 18" | 10.40 | 8.84 | PMB7 | 300M X 18" | 6.25 | 5.31 |
| PMB2L | 100M X 31" | 16.54 | 14.06 | PMB7L | 300M X 31" | 7.30 | 6.21 |
| PMB3 | 125M X 18" | 10.40 | 8.84 | PMB8 | 400M X 16" | 6.25 | 5.31 |
| PMB3L | 125M X 31" | 16.18 | 13.75 | PMB8L | 400M X 31" | 7.30 | 6.21 |
| PMB4 | 150M X 18" | 6.25 | 5.31 | PMB9 | 800M X 18" | 6.25 | 5.31 |
| PMB4L | 150M X 31" | 7.30 | 6.21 | PMB9L | 800M X 31" | 7.30 | 6.21 |
| PMB5 | 200M X 18" | 6.25 | 5.31 | PMB10 | 1,500M X 18" | 6.25 | 5.31 |
| PMB5L | 200M X 31" | 7.30 | 6.21 | PMB10L | 1,500M X 31" | 8.51 | 7.23 |

FILTER BAGS WITH DRAWSTRING

Nylon monofilament bags with a drawstring top. If you are presently using adapterheads, these bags will also fit over them. Bags are 32" long with a 7" diameter mouth. Made in USA.

- Pump bags, to increase filter area
- Removable inlet screen filters
- Discharge strainers, to prevent fish or fish egg migration
- Allows attachment directly to any open water line



BAG800

| MODEL | | EACH | 10+ |
|--------|-------------|---------|---------|
| BAG1 | 1 MICRON | \$61.60 | \$55.44 |
| BAG5 | 5 MICRONS | 49.86 | 44.87 |
| BAG10 | 10 MICRONS | 49.09 | 44.18 |
| BAG20 | 20 MICRONS | 22.00 | 19.80 |
| BAG40 | 40 MICRONS | 20.91 | 18.82 |
| BAG75 | 75 MICRONS | 9.49 | 8.54 |
| BAG100 | 100 MICRONS | 8.26 | 7.43 |
| BAG200 | 200 MICRONS | 8.71 | 7.84 |
| BAG300 | 300 MICRONS | 8.48 | 7.63 |
| BAG800 | 800 MICRONS | 7.77 | 6.99 |

| MODEL | | EACH |
|---------|------------------------|---------|
| MB01A | 500 MICRONS, 3" X 4" | \$10.70 |
| MB02 | 800 MICRONS, 3" X 4" | 10.70 |
| MB1A | 500 MICRONS, 6" X 10" | 18.72 |
| MB2 | 800 MICRONS, 6" X 10" | 14.98 |
| MB3A | 500 MICRONS, 8" X 12" | 16.53 |
| MB4 | 800 MICRONS, 8" X 12" | 16.53 |
| MB5A | 500 MICRONS, 12" X 15" | 21.28 |
| MB6 | 800 MICRONS, 12" X 15" | 21.28 |
| MB7A | 500 MICRONS, 12" X 18" | 23.78 |
| MB8 | 800 MICRONS, 12" X 18" | 23.78 |
| MB9A | 500 MICRONS, 16" X 24" | 31.27 |
| MB10-AQ | 800 MICRONS, 16" X 24" | 31.27 |



MB1A

◀ FILTER BAGS

These polyester monofilament filter bags are excellent for retaining carbon, zeolite and other media. They are perfect for placing in sumps, trickle filters, pond filters and many other uses. Bags feature drawstring closing tops. Select 500- or 800-micron mesh size. Sold in packs of 10.

BAG FILTER VESSEL AND FILTERS ★ TECH FAV

This polypropylene filter vessel is designed to allow high flowrates through a single reusable bag filter. It is rated at 75 gpm for clean water (for particulate-laden water and/or to extend time between cleanings, we recommend a design flowrate below 40 gpm). For higher flows, use two or more in parallel. To further extend time between cleaning, place a larger micron filter before a smaller micron filter in series. The vessel is made of UV-inhibited polypropylene with a threaded lid, O-ring and removable internal basket for easy bag removal. This vessel has 2" FNPT inlet and outlet and 1/4" FNPT lid vent and weighs 10 lbs. 38" H with legs x 11" D at the widest point. Optional pressure gauges for lid vent are below.

Choose from 10 levels of filtration

Bag filters are 6" dia. x 20" length with 2 ft² of surface area. They are fitted with a ring that seals directly against the filter housing, eliminating any chance of bypass. Vessels include housing, lid, retainer basket and 2 plastic leg/foot assemblies, easily cut to required height. Conical base (36049) highly recommended. Maximum pressure is 100 psi @ 110°F. Made in USA. One-year warranty.

Differential pressure gauge

Designed exclusively to supplement pressure gauges used on our **FV1** bag filter. It mounts on the mounting pad's bag vessel located on the opposite side of the inlet port. The window turns red, indicating "time to change." Requires a 3/16" drill to install portholes; use only screws provided. 2" long.

| MODEL | | EACH | |
|--------------|--|-----------------|--------------------|
| FV1 | BAG FILTER VESSEL | \$306.78 | \$276.11/6+ |
| 36049 | CONICAL BASE | 110.95 | — |
| BG15 | GAUGE, 0-15 PSI, 1/4" NPT | 16.37 | — |
| LPG30 | GAUGE, 0-30 PSI, 1/4" NPT, LIQUID-FILLED | 27.14 | — |
| BG61 | GAUGE, 0-60 PSI, 1/4" NPT | 12.29 | — |
| VF65 | GAUGE ADAPTER & AIR BLEED | 8.25 | — |
| DPG20 | DIFFERENTIAL PRESSURE GAUGE, 15-20 PSI | 26.27 | — |

REPLACEMENT PARTS

| | | | |
|--------------|-----------------------------|--------------|-----------------|
| FV1S | REPLACEMENT LID O-RING | 8.19 | 7.70/6+ |
| FVV1L | REPLACEMENT THREADED LID | 81.00 | 76.14/6+ |
| 36002 | REPLACEMENT INTERNAL BASKET | 86.68 | 81.48/6+ |
| FV1F | REPLACEMENT LEGS (2) | 36.87 | 34.66/6+ |
| VB1 | FV1 BAG FILTER (FELT), 1M | 6.89 | 6.20/10+ |
| VB5 | FV1 BAG FILTER (FELT), 5M | 6.89 | 6.20/10+ |
| VB10 | FV1 BAG FILTER (FELT), 10M | 6.89 | 6.20/10+ |
| VB25 | FV1 BAG FILTER (FELT), 25M | 6.89 | 6.20/10+ |
| VB50 | FV1 BAG FILTER (FELT), 50M | 6.89 | 6.20/10+ |
| VB100 | FV1 BAG FILTER (FELT), 100M | 6.89 | 6.20/10+ |
| VB200 | FV1 BAG FILTER (MESH), 200M | 6.89 | 6.20/10+ |
| VB300 | FV1 BAG FILTER (MESH), 300M | 6.89 | 6.20/10+ |
| VB600 | FV1 BAG FILTER (MESH), 600M | 6.89 | 6.20/10+ |
| VB800 | FV1 BAG FILTER (MESH), 800M | 6.89 | 6.20/10+ |



DPG20



FV1S



VB800

36002
Internal Basket
w/Bag Filter

XL234 BAG FILTER

The XL234 is a highly durable bag filter system. The vessel, constructed of glass-filled polypropylene with UV inhibitors, comes with a 100% polypropylene basket and Viton gasket. The filter is rated up to 85 psi @ 110°F and provides flowrates up to 160 gpm. The filter bag allows for extra dirt holding with its 5.3 ft² surface that is 20% larger than a standard size two-filter bag.

In addition to the durability and broad range capability, the XL234 is simple to use. The twist-off lid requires no tools and the EZ Loc ring on the filter bag easily snaps into the sealing groove to prevent bypass. The tripod filter legs are integrally molded to the filter body for ease of installation. A sacrificial vent grommet on the filter will vent if the lid is not closed securely, providing extra safety in operation.

The filter is available with 2" NPT inlet/outlet connections in-line side in/side out. The filter bags are available in a variety of microns and materials including polypropylene felt, polypropylene monofilament felt and polypropylene microfiber. Ship weight 38 lbs. Made in USA.

- Designed for simplicity, safety and service life
- 85 psi filter, 160 gpm flow rate
- Twist-off cap and EZ Loc ring
- 2" NPT inlet/outlet
- 53 1/2"H x 17 1/2" D at widest point
- Variety of filter bags available

| | | |
|---------------|--------------------|-------------------|
| FV234 | FILTER VESSEL | \$1,382.46 |
| FV234B | BASKET | 212.18 |
| F234G | GASKET | 33.69 |
| FV24GK | SAFETY GROMMET KIT | 22.58 |



FILTER BAGS

| MODEL | | EACH |
|---------------------------|------------|---------------|
| Polypropylene Felt | | |
| XL1 | 1-MICRON | \$8.62 |
| XL2 | 2-MICRON | 8.62 |
| XL5 | 5-MICRON | 7.42 |
| XL10 | 10-MICRON | 7.42 |
| XL25 | 25-MICRON | 7.42 |
| XL50 | 50-MICRON | 7.42 |
| XL100 | 100-MICRON | 7.71 |

| | | |
|--|------------|--------------|
| Polypropylene Monofilament felt | | |
| M100XL | 100-MICRON | 18.38 |
| M150XL | 150-MICRON | 16.57 |
| M200XL | 200-MICRON | 15.83 |
| M300XL | 300-MICRON | 15.03 |
| M600XL | 600-MICRON | 14.74 |
| M800XL | 800-MICRON | 13.71 |

| | | |
|---------------------------------|-----------|--------------|
| Polypropylene Microfiber | | |
| AXL1 | 1-MICRON | 26.69 |
| AXL2 | 2-MICRON | 28.29 |
| AXL10 | 10-MICRON | 21.34 |
| AXL25 | 25-MICRON | 20.22 |
| AXL90 | 90-MICRON | 19.20 |

TECH TALK 99

Mechanical Filtration and Biofiltration

In the world of aquaculture, mechanical filtration and biofiltration are very distinct and separate entities, and they must be treated as such. Mechanical filtration is the removal of solid waste, whereas biofiltration is the biological process that converts toxic nitrogenous wastes to low toxicity nitrate.

Solid waste is typically categorized by its size and specific gravity. Settleable solids are those solids which have a relatively high specific gravity compared to the water in which they exist. They will settle to the bottom. Suspended solids are those in a category that have a specific gravity the same as, or slightly higher than, the water. They tend to stay in suspension and will only "drop-out" over a long period of time. Dissolved solids are those which actually become a part of the water. The dissolved solids are eliminated by reverse osmosis, anion and cation resins, activated carbon, etc.

One method of removing solid waste from a round fish tank is to use a double drain. It will direct the settled solids to a separate area from the main flow. The settled solids can be directed into a small clarifier, much smaller than one sized to handle the entire flow of recirculating water. The other drain takes the suspended solids along with the nitrogenous waste.

Suspended solids can be removed by several methods. One is the bead filter, which incorporates the use of small polyethylene beads that have a positive electrostatic charge. These beads have an affinity for the negatively charged suspended solids. As the particles pass these beads, they are "statically" drawn to them. When the beads are loaded with solids, it is time to backwash them.

Suspended solids can also be removed by mechanical means such as bag filters, drum filters and vegetative filters.

Biofiltration is the aerobic (with oxygen) breakdown of dissolved nitrogenous fish waste. The process is accomplished by two or more strains of autotrophic bacteria. These bacteria are naturally occurring and will ultimately colonize the bio-media in the biofilter as well as the tank and pipe walls. The speed of this process is dependent on temperature, pH, salinity, surface area, flowrate, etc.

The autotrophic bacteria use oxygen in a two-step process to first convert the ammonia (NH₃ or NH₄⁺) to nitrite (NO₂⁻). Another strain of bacteria converts nitrite (NO₂⁻) to nitrate (NO₃⁻). Nitrate is much less toxic and typically tolerated by most cultured species until it reaches very high levels. Controlling nitrate is accomplished by diluting with clean water or by using a denitrification chamber that converts nitrate into nitrogen gas (this is an anaerobic process that uses a group of heterotrophic bacteria). A third method to keep nitrate levels in check is the use of plants. You can have a green water system (using algae), a vegetative filter or even use a hydroponic plant system to remove nitrate.

Regardless of which type of filtering equipment you decide to use, the one thing to keep in mind is to stage the filtration. It is a common mistake to design a system that relies too heavily on a single filtering device to provide all of the filtering requirements of a recirculating system. By staging filtration components, the system will perform at or near its peak.

ARIAS™ 4000 SAND FILTERS**Thermoplastic sand filter with multiport valve**

The Pentair Aquatic Eco-Systems Arias 4000 Top Mount Filters are the perfect high performance sand filters. They're incredibly simple to operate and maintain, and they're built with long-term reliability in mind. Plus, their highly efficient design provides all the filtration your system requires, year after year.

Sand filters are one of the most popular and cheap ways to filter water, and for good reason. They are simple, effective and require very little attention. Water is routed through a sand-filled pressure vessel. In this method, impurities are extracted from the water using sand to collect and attract the debris as small as 20 to 40 microns. Over time, dirt accumulates in the spaces between the sand particles causing the pressure in the vessel to rise as water finds it harder to pass through. This signals you to "backwash" the filter. Simply reverse the water flow and "knock out" the dirt.

The top-mount, 6-function 1½" multiport valve of the Arias 4000 puts all filter functions right at your fingertips—just rotate the handle to the desired position and the Arias 4000 does the rest for sure and simple operation. Features a pressure gauge and manual air relief for optimum filtration efficiency. Its internal design ensures that water is exposed to maximum sand surface area for superior filtration performance and efficient backwashing.

Features:

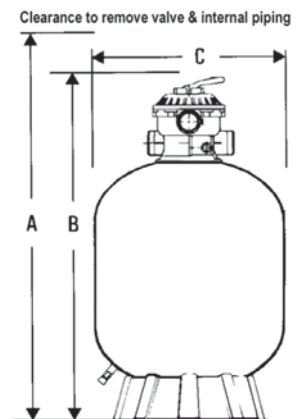
- One-piece thermoplastic tank for exceptional strength, corrosion resistance and long life
- Combination water and sand drain makes servicing fast and easy
- Special internal design maintains sand bed level for consistent performance and extended time between cleaning cycles



A4000-40-AQ

| MODEL | EFFECTIVE FILTRATION AREA (FT²) | MAX PRESSURE (PSI) | FLOWRATE (GPM) | ALL SAND REQUIRED (LBS) | DIMENSIONS | | | SHIP WT (LBS) | EACH |
|---------------------|---------------------------------|--------------------|----------------|-------------------------|------------|--------|-------|---------------|-----------------|
| | | | | | A | B | C | | |
| A4000-35-AQ | 1.4 | 30 | 35 | 100 | 37" | 33.5" | 16.5" | 22 | \$228.12 |
| A4000-40-AQ | 1.8 | 35 | 40 | 150 | 46.25" | 37.75" | 19.5" | 24 | 273.87 |
| A4000-60-AQ | 2.3 | 40 | 60 | 250 | 52.5" | 43.75" | 22.5" | 28 | 309.66 |
| A4000-70-AQ | 3.15 | 50 | 70 | 300 | 57" | 46.25" | 24" | 58 | 319.56 |
| A4000-80-AQ* | 3.5 | 50 | 75 | 350 | 65.75" | 48.75" | 26" | 76 | 344.16 |

*With 2" valve.

**TECH TALK 46****Iron Removal**

If iron is in your water, you can either move to another location or spend some effort to remove it. The presence of iron above .1 ppm is considered detrimental to most freshwater fish-keeping (.5 is lethal). Iron-bearing water, when fresh out of the ground, is usually clear because iron is in the soluble ferrous iron form. As soon as it reacts with a little oxygen (.14 ppm per part of iron), the iron is changed to the ferric state and turns brown or orange. Then, it either drops out (precipitates) or remains suspended as a colloid.

There are three general classes of iron-bearing ground water:

- Those that precipitate immediately after aeration.
- Those that do not precipitate (acid waters)
- Those that precipitate only part of the iron.

To remove iron that precipitates readily, simply aerate or spray water into the air using the well pump's pressure. Hold the water in a settling basin, followed by a slow rate sand filter of about two gallons per square foot per minute.

For removing more difficult iron, the aerated water may be passed over coarse contact media (lava, stones, coke, etc.) in a multilevel tray. The media soon becomes coated with iron hydroxide, which promotes catalytic precipitation of iron and manganese from the water.

All three classes of iron can be removed by the lime-softening process and/or the zeolite process, sometimes called greensand.



A6000-60-AQ

ARIAS™ 6000 SAND FILTERS

Fiberglass tank with multiport valve, clamp style

These Pentair Aquatic Eco-Systems sand filters have been a favorite of aquaculturists for years—a testament to their performance, value and ease of use. But not all sand filters are equal. Arias 6000 sand filters include design features that give you consistent performance and quicker cleaning cycles to keep pump operating costs low. Arias 6000 provide years of service with only periodic backwashing to remove trapped debris from the sand.

A special diffuser creates a uniform sand bed that consistently traps more dirt without impeding the water flow or letting it race through too fast—the result is more effective filtration and longer times between backwashing.

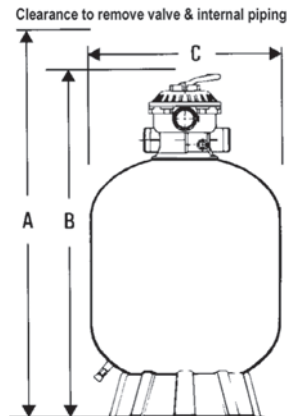
The six-position valve has a manual air relief valve and a sight glass to make inspection, routine maintenance and operation fast and easy. Model A6000-40-AQ has 1 1/2" NPT female threads on the valve itself w/ 1 1/2" female slip unions included. Model A6000-60-AQ has 2" slip connection unions ONLY (no internal threads on this valve). Model A6000-100-AQ has 2" NPT female threads on the valve itself (but the filter includes 3" NPT to female slip unions). Pressure gauge also included.

Features

- The Arias 6000 tank is constructed in one piece from fiberglass reinforced material to deliver unmatched strength and durability
- Special lateral design provides superior flow characteristics and long filter cycles for economical operation
- Combination water and sand drain makes servicing fast and easy
- A6000-40-AQ, A6000-60-AQ and A6000-100-AQ are standard with plastic clamp

| MODEL | EFFECTIVE FILTRATION AREA (FT ²) | MAX PRESSURE (PSI) | FLOWRATE (GPM) | ALL SAND REQUIRED (LBS) | DIMENSIONS | | | SHIP WT (LBS) | EACH |
|---------------------|--|--------------------|----------------|-------------------------|------------|--------|-------|---------------|-----------------|
| | | | | | A | B | C | | |
| A6000-40-AQ | 1.8 | 50 | 40 | 175 | 47" | 37" | 19.5" | 30 | \$405.14 |
| A6000-60-AQ | 3.1 | 50 | 60 | 325 | 57" | 42.5" | 24.5" | 38 | 425.80 |
| A6000-100-AQ | 4.9 | 50 | 100 | 600 | 65.5" | 47.25" | 30.5" | 78 | 652.62 |

Note: Operating limits—maximum continual operating pressure of pressure of 50 psi. Maximum operating water temperature (internal filter) is 104° F (40° C).



CHECK OUT OUR BLOG

- Resource center to learn about aquaculture
- Hub for industry news and press releases
- Customer spotlight features
- Technical talks & expert insight
- Pentair promotions
- New product announcements



PentairAES.com/learn-about-aquaculture

ARIAS™ 8000 SAND FILTERS

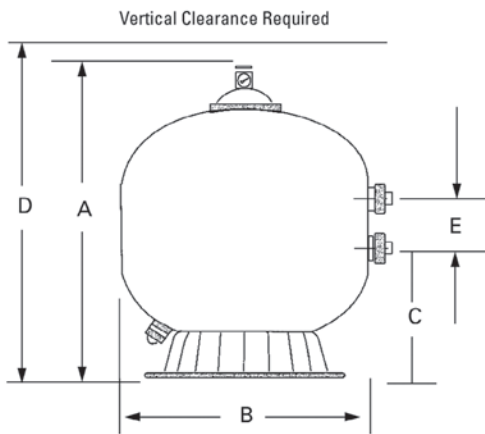
Fiberglass sand filter w/o valves

The Pentair Aquatic Eco-Systems Arias 8000 sand filters feature a process that creates a one-piece, reinforced fiberglass shell with a UV-resistant surface finish. Compatible multi-port valve available separately, refer below to part number SMV2. If you don't purchase a valve, then you will need to purchase a set of fittings listed below. 10-year tank warranty, one-year standard warranty. Ships via motor freight. Made in USA.



Filter, Valve, and Fittings Sold Separately

10 YEAR TANK WARRANTY



SMV2



271092-AQ

| MODEL | EFFECTIVE FILTRATION AREA (FT ²) | FLOW RATE (GPM) ¹ | MAX PRESSURE (PSI) | PEA GRAVEL REQUIRED (LBS) | SAND REQUIRED (LBS) | FILTER MEDIA ALL SAND REQUIRED (LBS) | DIMENSIONS | | | | | SHIP WT (LBS) | EACH |
|---------------------|--|------------------------------|--------------------|---------------------------|---------------------|--------------------------------------|------------|-------|--------|--------|------|---------------|-----------------|
| | | | | | | | A | B | C | D | E | | |
| A8000-100-AQ | 4.91 | 98 | 50 | 150 | 450 | 600 | 39.75" | 30.5" | 16.50" | 43.75" | 7.5" | 70 | \$730.56 |
| A8000-140-AQ | 7.06 | 141 | 50 | 275 | 650 | 925 | 45.25" | 36.5" | 18.75" | 49.25" | 7.5" | 82 | 1,065.23 |

¹Based on 20 gpm per ft².

OPTIONAL VALVE

| | | |
|-------------|---|---------------|
| SMV2 | MULTI-PORT VALVE, 2" FNPT ON THE VALVE ITSELF, SIDE MOUNTED | 150.00 |
|-------------|---|---------------|

OPTIONAL FITTINGS FOR INSTALLATIONS WITHOUT A VALVE

| | | |
|------------------|----------------------------------|----------------|
| 271096-AQ | 1½" & 2" SLIP ADAPTER KIT (PAIR) | \$58.42 |
| 271094-AQ | 1½" THREADED ADAPTER KIT (PAIR) | 58.42 |
| 271092-AQ | 2" THREADED ADAPTER KIT (PAIR) | 58.42 |

TECH TALK 43

Sand Filter Media

There are numerous choices of media for sand filter vessels other than sand. For instance, you can use plastic beads, granular media of mixed size or lightweight filter media for particulate removal. Activated carbon can be useful for the removal of dissolved organics, chlorine, antibiotics, ozone, etc. Be sure care to replace carbon before it becomes saturated with the material it had previously adsorbed. Sand filters can also be used with zeolite, which is an ionic exchange mineral with the ability to adsorb ammonium ions from fresh water. Regardless of the media chosen, always backwash or rinse new material prior to operation to remove dust and fines that could irritate fish or cloud the water.

Sand filter housings can also hold biofilter media and perform as pressurized biofilters. This works well when using only one pump to cycle water from the culture tank through the filters to a height appropriate for spraying or degassing and then back. Filters can be put in series where two

or more are used: one for particulates, one for dissolved organics, one for biofiltration, one for carbon, etc.

Be aware that the published maximum clean water flowrate through a sand filter is typically much too high for aquaculture sizing. A flowrate less than half of the filter's maximum is what we recommend when selecting a vessel. In aquaculture, particular attention must be paid to backflushing frequency and volume. Recirculating aquaculture water's high organic content makes most media (especially sand) stick together and usually requires backwashing two or more times per day. Remember that sand filters are designed for sand media, which has a small grain size and heavy specific gravity. The use of any other media will require experimentation to find the best backflush water volume.



◀ SINKING BEADS

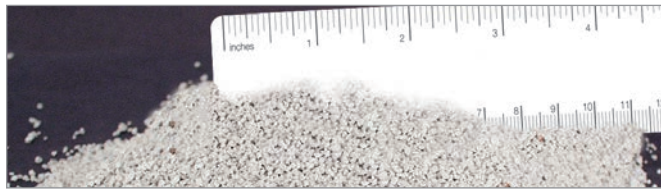
Use these sinking beads as a replacement for sand in sand filters, or use them in a fluidized bed or as inert hydroponics media. Colors may vary, sold per cubic foot. Weight is 52 lbs. Dimensions are typically 1/16" x 1/8" in an oval shape. When used in sand filters, backwash water flow should be reduced, as beads fluidize easier than sand. Beads have a specific gravity of 1.7 (sand is 2.0 to 2.8).

| MODEL | EACH | 4+ |
|-------|----------|---------|
| AB145 | \$109.00 | \$98.10 |

FLOATING BEADS

Similar to above but they float! These elliptical, polyethylene beads are about 3/16" in diameter, with a .92 density. Sold in 55-lb (1.65 cubic feet) packages. Not recommended for sand filters.

| MODEL | EACH | 4+ |
|-------|----------|----------|
| AB1 | \$111.67 | \$100.50 |



◀ LIGHTWEIGHT SAND FILTER MEDIA

Particulate removal down to the 20–40 micron range

Backflush channeling occurs when heavy sand media doesn't fluff up (bed expansion) as it should because organics and bacteria make it stick together. Our lightweight media minimizes the problem because it expands 30–50% with only 8–10 gpm per square foot backflush (if the flowrate is in excess of 10 gpm per square foot of area, a restricting valve on the backflush drain may be needed to prevent the loss of media). Weighs only 25 lbs/ft³ (sand is about 100 lbs per cu.ft.) and comes in bags. The irregular shape of the lightweight media provides more void space, resulting in less pressure loss. Made of anhydrous silicon dioxide and approved for potable water.

| MODEL | SHIP WT (LBS) | EACH | 4+ |
|-------|-------------------|---------|---------|
| JF1 | 1 FT ³ | \$42.81 | \$39.38 |

MM1 MIXED MEDIA

Our mixed media contains 4 sizes of media that will greatly enhance a filter's performance, reduce backflush frequency and prevent channeling. The coarse top layer is carbonite with sizes between 2.0 and 2.2 mm. This material can remove iron and manganese that adhere loosely to the angular carbonite particles and backwashes easily. Ratios of each media are based on years of use in other industries. Our media is premixed in 1-ft³ containers, which weigh approximately 80 lbs each.

The specific gravity of mixed media is between 1.6 and 4.2 (sand is 2 to 2.8), so the backwash pressure or volume may have to be adjusted.

| MODEL | EACH | 4+ |
|-------|---------|---------|
| MM1 | \$67.20 | \$61.15 |

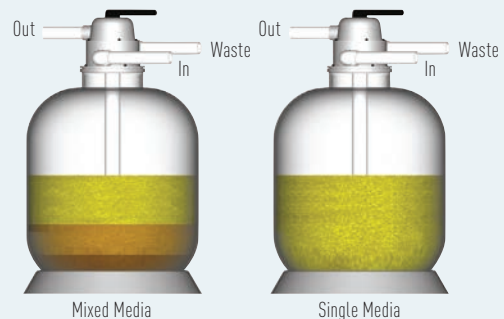


TECH TALK 136

Mixed Media

Mixed media filtration greatly surpasses the performance of single media filters. The drawback to a single media filter is that the first one inch of media is trapping most of the solids and the bottom portion is just wasted space. A sand filter that uses a single size sand grain will have an average size space between the grains that varies only slightly.

A mixed media filter uses different grain sizes to segregate solids throughout the bed. A large media is used first to "pre-filter" large solids. Beneath that is a finer size and then a very fine media on the bottom. Each media used is a different specific gravity, designed so that it will return to the ideal stratified layer after backwash. During backwash the entire media bed is expanded, "fluidized" and rinsed. Upon return to normal operation, the media that is the smallest and heaviest settles first to the bottom. The largest is the lightest and settles on top.



MECHANICAL FILTERS WITH UV STERILIZER

This filter comes in two styles. Both include a built-in 18-W ultraviolet sterilizer. **J375** uses a 25-micron pleated cartridge to mechanically filter water. **J380** includes polystrand filter pads for both mechanical and biofiltration. Both units are 22" H x 14" diameter, with 6' power cords.

FILTERS

| MODEL | | SHIP WT (LBS) | EACH |
|-------------|---------------------------------|---------------|-----------------|
| J375 | FILTER W/25-MICRON CARTRIDGE | 13 | \$337.00 |
| J380 | FILTER W/POLYSTRAND FILTER PADS | 13 | 350.00 |

REPLACEMENT PARTS

| | | |
|--------------|--------------------------------|--------------|
| J2325 | REPLACEMENT CARTRIDGE FOR J375 | 49.00 |
| J2480 | REPLACEMENT POLY PADS FOR J380 | 21.00 |
| 82380 | UV LAMP REPLACEMENT | 78.00 |
| 82381 | QUARTZ SLEEVE | 49.00 |



J318

MAX PRESSURE
16 GPM

MAX FLOW RATE
16 PSI



J2319



J2354

POLY-BEAD FILTER

This poly-bead filter traps particulates and provides surface area for nitrifying bacteria. It will handle small fish loads, so it is suitable for small koi ponds, recirculating systems, quarantine systems, etc. A grid- and funnel-shaped bottom evenly distributes water through 7 lbs (31 ft²) of polyethylene beads. The filter is self-cleaning by backwashing through the drain valve. Dimensions are 15" H x 15" W.

| MODEL | | SHIP WT (LBS) | EACH |
|-------------|------------------|---------------|-----------------|
| J354 | POLY-BEAD FILTER | 13 | \$211.00 |

| REPLACEMENT PART | | SHIP WT (LBS) | EACH |
|------------------|-------------|---------------|---------------|
| AB1 | REPL. BEADS | 55 | 111.67 |



J380

MAX PRESSURE
16 GPM

MAX FLOW RATE
16 PSI



82380

CANISTER FILTERS

The canister filter **J319** includes 205 ft² of polystrand dual filter pads and 1.25 lbs of activated carbon in a reusable nylon mesh bag. The top 100-micron pad pre-filters incoming water and the 50-micron pad provides particulate and biological filtration. Pads may be cleaned and used many times. A very cost-effective filter, suitable for ponds to 1,000 gallons or aquariums up to 150 gallons. The **J318** has 205 ft² of filter pads and no carbon.

FILTERS

| MODEL | | SHIP WT (LBS) | EACH |
|-------------|-------------------------------|---------------|-----------------|
| J318 | POLYSTRAND FILTER | 12 | \$154.00 |
| J319 | POLYSTRAND FILTER WITH CARBON | 12 | 154.00 |

REPLACEMENT PARTS

| | | |
|--------------|---|--------------|
| J2318 | REPLACEMENT FILTER PADS FOR J318 | 22.80 |
| J2319 | REPLACEMENT FILTER PADS FOR J319 | 19.25 |
| 82301 | REPLACEMENT LID | 25.00 |
| J2354 | ACTIVATED CARBON, IN MESH BAG, 1.25 LBS | 13.15 |



MAX PRESSURE
16 GPM

MAX FLOW RATE
16 PSI



CARTRIDGE FILTERS

These cartridge filters come in two styles. **J325** has a 25-micron pleated filter cartridge with a core of activated carbon (1.25 lbs included). The filter has 25 ft² of surface area. **J340** has a 40-ft² filter cartridge with a core of polystrand biomed. Shipping weight is 11 lbs.

FILTERS

| MODEL | | SHIP WT (LBS) | EACH |
|-------------|-----------------------------------|---------------|-----------------|
| J325 | MICRON FILTER, 25 FT ² | 11 | \$200.00 |
| J340 | MICRON FILTER, 40 FT ² | 11 | 209.00 |

REPLACEMENT PARTS

| | | |
|--------------|---|--------------|
| J2325 | REPLACEMENT CARTRIDGE FOR J325 | 49.00 |
| J2340 | REPLACEMENT CARTRIDGE FOR J340 | 62.00 |
| J2354 | ACTIVATED CARBON, IN MESH BAG, 1.25 LBS | 13.15 |

CHEMICAL FILTER

This chemical filter is designed to hold media that removes chemicals from water. The filter includes 7.5 lbs of premium activated carbon and a reusable nylon mesh bag. The filter can also be used with zeolite, desiccants, etc.

| MODEL | SHIP WT (LBS) | EACH |
|-------------|---------------|-----------------|
| J320 | 10 | \$179.00 |



MAX PRESSURE
16 GPM

MAX FLOW RATE
16 PSI

J325

J2325



Red Sea Ocean Clear Canister Filters

Ocean Clear filters have become popular because they are so well-designed. They don't leak, they are easy to clean and, of course, you can see what's going on inside. The Ocean Clear filters on this page all share the same clear, PVC, plastic canister. They are rated to a maximum of 16 psi. (Note: Exceeding 16 psi will void warranty and result in damage). They use a screw-off locking ring, with O-ring, as shown. They have 3/4" FPT in/out and on the bottom center-mounted drain. The drain also has a valve with MGHT and a cap. 1" and 3/4" barb elbow adapters are also included. The minimum dimensions are 11" diameter x 11" high, but with fittings in place the maximum diameter is 14". **They are all suitable for fresh and salt water.** We rate them at 16 gpm maximum flow. The inlet is near the top on the right side and the outlet near the bottom on the left side. The air vent (in lid) and gauge port (top center) are 1/4" FPT with plugs included. Made in USA.

CARTRIDGE FILTERS, LARGE

Here is a very good value on 75-sq.-ft. cartridge filters using 2" female in/outlets. The outside diameter is 8½", has an easy on/off lid, a free-standing base, a bypass option should the filter (included) become clogged, and a 100-ft², 20µ (micron) pleated, polyester filter cartridge.

| MODEL | HEIGHT | SHIP WT (LBS) | EACH | |
|--------------|--------------------------------------|---------------|------|-----------------|
| VF175 | CARTRIDGE FILTER ASSEMBLY, 75 SQ.FT. | 25" | 8 | \$179.00 |

**CARTRIDGE FILTERS**

These tall Lifeguard® Cartridge Filters were designed to pre-filter water for UV sterilizers, but they can be used anywhere. Each comes with a replaceable, 20-micron pleated filter, cartridges, 30-psi pressure gauge w/adaptor, air bleed and four female ports (**VF11** and **VF12** have two slip female ports). All PVC construction.

| MODEL | MAX FLOW (GPM) | REPL. FILTER LENGTH | NO. CART REQ'D | APPROX. DIMENSIONS (H X W X D)* | PORT SIZES | SHIP WT (LBS) | EACH |
|--------------|----------------|---------------------|----------------|---------------------------------|------------|---------------|----------------|
| VF125 | 12 | 29¼" | 1 | 39½" X 8½" X 5½" | 1¼" FPT | 8 | \$98.90 |

*Height is w/o gauge, which adds approx. 4". Width and depth are base dimensions.

CARTRIDGE FILTER ACCESSORIES

| MODEL | EACH | 12+ | |
|--------------|---------------------------------|---------------|---------------|
| UV0 | CANISTER CAP O-RING | \$2.55 | \$2.30 |
| BG15 | 15-PSI GAUGE | 16.37 | — |
| VF2 | 35-PSI GAUGE | 12.49 | — |
| VF65 | GAUGE ADAPTER & AIR BLEED | 8.25 | — |
| VF11R | REPL. FILTER CARTRIDGE FOR VF11 | 9.40 | — |





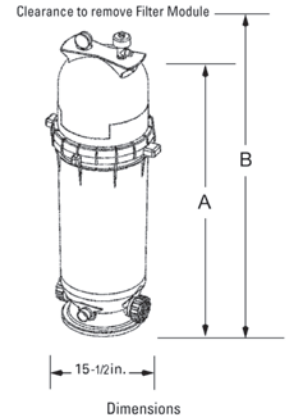
◀ SEDNA™ 1000 CARTRIDGE FILTERS

Fiberglass-reinforced cartridge filter

Get top-end filter performance with low maintenance! The single-piece base/tank is constructed of fiberglass-reinforced polypropylene for improved strength and chemical resistance. The manual air relief valve and continuous internal air relief work together to maintain optimum filtration efficiency at all times. The unit's innovative clamp ring design makes it easy to remove and rinse the cartridge, and the cartridge's surface is designed to block and trap as many solids as possible. 1½" drain and washout allow quick and convenient maintenance, and 2" plumbing provides maximum flow. One-year limited warranty.



20 Micron Replacement Cartridge



| MODEL | EFFECTIVE FILTRATION AREA (FT ²) | FLOWRATE (GPM) | A. DIM. | B. DIM. | SHIP WEIGHT (LBS) | EACH |
|----------------------|--|----------------|---------|---------|-------------------|-----------------|
| S1000-50-AQ | 50 | 19-50 | 18" | 30" | 15 | \$210.86 |
| S1000-75-AQ | 75 | 28-75 | 25.5" | 39" | 26 | 270.00 |
| S1000-100-AQ | 100 | 38-100 | 33" | 61" | 33 | 344.55 |
| S1000-150-AQ | 150 | 56-150 | 40.5" | 76" | 35 | 459.35 |
| S1000-200-AQ | 200 | 75-200 | 40.5" | 76" | 35 | 535.00 |
| S1000-50C-AQ | 20 MICRON REPL. CARTRIDGE FOR S1000-50-AQ | | | | 3 | 43.22 |
| S1000-75C-AQ | 20 MICRON REPL. CARTRIDGE FOR S1000-75-AQ | | | | 5 | 56.01 |
| S1000-100C-AQ | 20 MICRON REPL. CARTRIDGE FOR S1000-100-AQ | | | | 7 | 68.70 |
| S1000-150C-AQ | 20 MICRON REPL. CARTRIDGE FOR S1000-150-AQ | | | | 10 | 90.52 |
| S1000-200C-AQ | 20 MICRON REPL. CARTRIDGE FOR S1000-200-AQ | | | | 12 | 112.97 |

OPEN BLUE



We are excited to be a part of The Open Blue Revolution and support our sustainable open ocean aquaculture friends. Open Blue is dedicated to fulfilling a major void in the seafood industry and supplying a reliable, sustainable source of healthy, premium fish, raised in an open ocean natural and regulated environment. When it came time to expand Open Blue's integrated farming platform with a new hatchery, Pentair was chosen as the primary equipment provider based on our extensive product portfolio, technical expertise, field service offering and customer first philosophy.

Pentair's relationship with Open Blue extends beyond that of just an equipment provider. Kurt Lang, Pentair Aquatic Eco-Systems Technical Services Supervisor, traveled to Panama to assist with the installation and to ensure it ran smoothly. As it often goes with large projects there were some setbacks. Kurt explained, "There were a few issues to be sorted-out, but Pentair's response to these challenges has been exemplary, and our customer first approach goes a long way to satisfy our customers. Functionality and production had a few glitches in the beginning, but with their trust, we have been able to resolve these issues." Dan Farkas, Open Blue Hatchery Manager expressed his satisfaction by saying "To be able to work with one company with such a comprehensive equipment and service offering benefitted our project tremendously. Pentair has proven to be a great partner."

Read the full article on our blog at PentairAES.com.

COMMERCIAL CARBON FILTERS FW SW DESIGNED HERE **NEW!**

Pentair Aquatic Eco-Systems Sweetwater® Commercial Carbon Filters utilize beds of pure activated carbon to remove contaminants and impurities from water. These carbon filters are available in three tank sizes to allow for max flow rates ranging from 30 GPM to 125 GPM. The carbon filter can be applied to influent and effluent water treatment. Removal uses: chlorine, chloramine, organics, low molecular, volatile organics. Size is determined by flow, contaminant concentration, and time between carbon exchange. Carbon filter media sold separately, see page 131 for Proline Activated Carbon, **AC55**. Ships Ground. One-year warranty.

Design Features

- Fiberglass-reinforced plastic filter tank created with an exclusive manufacturing process that creates a seamless shell sealed with epoxy resin which is light weight and ideal for corrosive environments
- Designed with freshwater and saltwater compatible components
- Powder coated 316 Stainless Steel frame provides plumbing support
- Plumbed with gray PVC Schedule 80 pipe for heavy duty applications
- Ashcroft 4" stainless steel panel mounted differential pressure gauge, 0-160 PSI, for monitoring of inlet and outlet pressure
- Keystone Composeal Butterfly valves provide excellent corrosion resistance, bubble tight shutoff and convenient, simple operation during backwash

CALL OUR TECH SUPPORT FOR SIZING ASSISTANCE.



950002 - 70 GPM
Carbon Filter

950003 - 125 GPM
Carbon Filter

| MODEL | MAXIMUM FLOW (GPM) | MEDIA CAPACITY (FT ³ /M ³) | INLET | OUTLET | TANK SIZE | | OVERALL DIMENSIONS | | | EACH |
|--------|--------------------|---|-------|--------|-----------|--------|--------------------|-----|------|-------------------|
| | | | | | DIA. | HEIGHT | L | W | H | |
| 950001 | 30 | 7.0/0.2 | 2" | 2" | 24" | 72" | 45" | 35" | 98" | \$8,000.00 |
| 950002 | 70 | 17.6/0.5 | 2" | 2" | 36" | 72" | 59" | 40" | 99" | 9,500.00 |
| 950003 | 125 | 31.8/0.9 | 3" | 3" | 48" | 72" | 77" | 54" | 116" | 11,000.00 |

RECIRCULATING AQUACULTURE SYSTEMS (RAS) TECHNOLOGY WORKSHOP

Learn from our own industry experts
Dr. Tom Losordo and Dennis DeLong.

Topics to be Covered

- An introduction to recirculating systems
- Critical considerations before designing recirculating systems
- Component options for use in recirculating production systems
- Developing an appropriate design for your aquaculture application
- The management of recirculating systems

PentairAES.com/workshops



Dr. Thomas M. Losordo has provided consulting services on aquaculture projects around the world for over 20 years, and is a past president of both the World Aquaculture Society and the Aquacultural Engineering Society.





| MODEL | | EACH | 4+ |
|---------------|--------------|----------------|---------------|
| AC412A | 1.5-LB JAR | \$11.50 | — |
| AC412 | 15-LB BUCKET | 79.95 | 71.96 |
| AC55 | 55-LB BAG | 156.00 | 140.40 |



AC412A

◀ PROLINE® ACTIVATED CARBON

A superior, high-purity, bituminous coal-based activated carbon. Preferred by public aquariums, research centers and government fisheries. The small particle size (approximately 1/16" to 1/8") provides a large surface area for rapid uptake and reduces water travel distances to interior adsorption surfaces. Adsorbs full range of organic contaminants, pesticides, odors, colors, chlorine, dissolved organics, ozone and many heavy metals. Carbon is dry-packed.

Can be retained using window screen size mesh.

Approximately .625 m² of surface area per gram. Bulk density is approximately 24 lbs/ft³.

POND FILTER BRUSHES

Used in the ornamental pond industry for particulate filtration, biofiltration and even as substrate for egg laying. The plastic bristles are attached to the stainless steel wire core, creating a 4" diameter brush with a 7/8" diameter wire loop at one end for hanging. A brush filter media is desirable because it is easy to clean and the plastic bristles attract solids. The other end is capped with a plastic knob for safety. Used in filtration systems in fish farms, hatcheries, public aquaria, domestic fish ponds and research institutes. They last indefinitely and are the easiest to use, most efficient and most cost-effective pond filter medium you can buy.

If you are using them as a pre-filter to remove the bulk of the coarse waste, a system of single interlocked hanging brushes is best. If you want to trap an even greater proportion of the waste, the brushes need to be either vertically or horizontally double interlocked.

- Lightweight and easy to use
- Non-toxic and very easy to clean
- Never wear out
- Best medium for removing suspended particles of waste



| MODEL | | EACH | 4+ |
|----------------|------------------|---------------|---------------|
| AZ16026 | 4" ROUND X 18" L | \$7.15 | \$6.45 |
| AZ16027 | 4" ROUND X 24" L | 7.70 | 6.96 |
| AZ16028 | 4" ROUND X 30" L | 9.05 | 8.16 |

A quick note from your customer in Michigan again. Attached are before and after pictures of our pond. Your recommendations worked! It took about 4-5 weeks for the pond to completely clear up, but we are very pleased with the results and appreciate all your help. Our bog garden was only mildly impacted by the Sonar product. All the ponds beyond ours are covered in scum and duckweed while ours is clear and beautiful. I should have contacted you guys years ago.

Appreciate your advice. I would be glad to recommend your company and products to anyone who asks.

Roland Fortner



Before



After

TECH TALK 44

System Flowrate

When people say that they exchange 100% of the water in a tank every hour, they typically are not doing that at all. If a tank holds 120 gallons, they are probably pumping 2 gpm into the tank. Their math is correct, but their English is not. To "exchange" all of the water suggests that none of the original water is still there after one hour. That would only be true if all the water were drained (dry) and then refilled; otherwise, it is constantly being mixed and only about 60% is being exchanged with each equal volume of water.

Can't find what you're looking for? See it all at PentairAES.com.

PR AQUA ROTOFILTER DRUM FILTER

Rotary microscreen drum filters are ideal for the removal of fine suspended solids in recirculating systems where water reuse strategies are imperative—aquaculture systems, zoos, aquariums, greenhouses, wastewater treatment plants, and more. PR Aqua Rotofilters are trusted by facilities worldwide for critical filtration needs. Constructed of the highest-quality materials and engineered for the rigors of commercial aquaculture, PR Aqua Rotofilters provide exceptional reliability and a long service life. Designed with the needs of the commercial operator in mind, the filters are also inexpensive to operate. Rotofilters are available in two configurations; fully-enclosed or frame-mounted. With flow rate capacities from 50 to 7,000 gpm (11 to 1590 M₃/HR) and micron ratings from 11–80 (custom sizes available upon request) there is sure to be a Rotofilter that meets the requirements of your application.

BENEFITS

- Manufactured in North America with factory-direct service and spare parts.
- Removes excess feed, and other organic matter.
- Continuous filtering, even during backwashing.
- Low head gravity fed operation
- Very low operating cost and minimal backwash water consumption.
- Superior screen design for long service life.

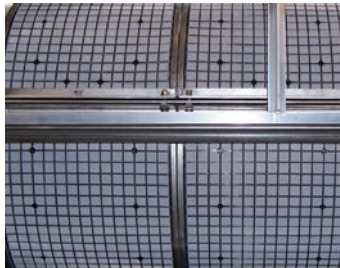
FEATURES

- Fiberglass enclosure or stainless steel frame mount, stainless steel internals, and high-quality industrial drive components.
- Injection molded, one-piece screen eliminates the potential for screen delamination and allows for plugging of small holes without downtime.
- Inlet seal maintains a continuous positive seat against the rotating drum.
- Appropriate for corrosive environments. Metals passivated for saltwater applications.



DESCRIPTION OF OPERATION

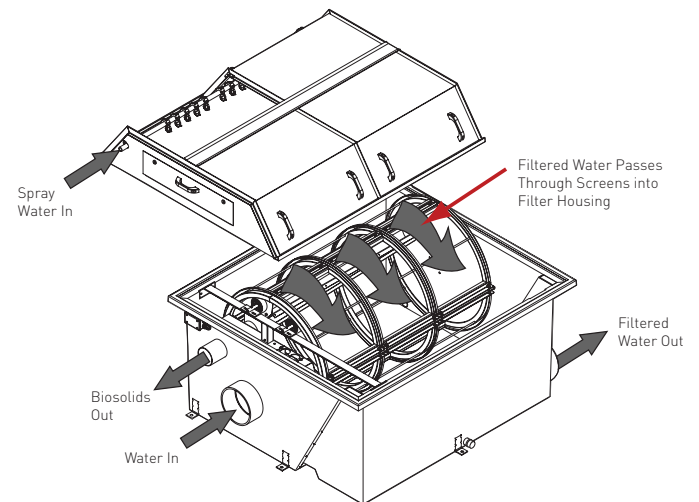
Untreated water is gravity fed or pumped into the drum, which has fine screens mounted to its periphery. Water flows through the screens while the solids adhere to the screen surface. The filtered water passes over a level control weir and then out of the filter by the use of gravity. As particles attach to the screen surface, the water level inside the drum rises. The rising water activates the automatic drum rotation and backwash system. A pressurized spray is used to clean the solids from the screen into an inclined trough. The solids flow by gravity from the filter for disposal or recovery. The cleaned screens are rotated into the water, lowering the water level. The backwash system shuts down automatically to save power and water.



Injection Molded Screens



Backwash Spray Nozzles



FOR MORE INFORMATION INCLUDING PERFORMANCE CHARTS PLEASE VISIT PENTAIRAES.COM/PRAQUA
Filter sizing varies depending on the application. Please contact a PAES Representative for proper filter selection.

FILTER DATA

| | |
|--------------------------|--|
| FLOW RANGE | 50 TO 7,000 US GPM |
| ELECTRICAL SUPPLY | VARIOUS OPTIONS AVAILABLE |
| SCREEN SIZE (MICRON) | 11, 21, 30, 37, 54, AND 80 |
| NUMBER OF SCREEN PANELS | 2 TO 50 |
| MINIMUM DRUM SUBMERGENCE | 40% |
| ROTATION | COUNTERCLOCKWISE OR CLOCKWISE (OPTION) |
| WEIGHT DRY/WET | 190 TO 1,600/435 TO 12,200 LBS |

MATERIALS OF CONSTRUCTION

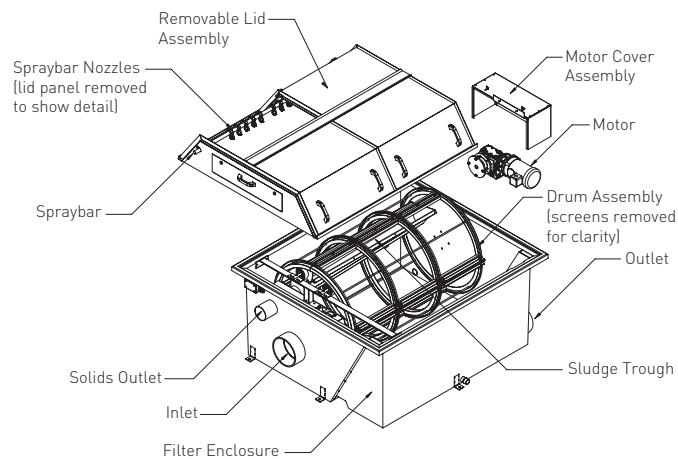
| | |
|------------------|---|
| DRUM FRAME | 304 OR 316 SS |
| DRUM SHAFT | 316 SS |
| FILTER ENCLOSURE | FIBERGLASS REINFORCED PLASTIC OR STAINLESS STEEL FRAME |
| SECTIONAL LID | MARINE GRADE ALUMINUM OR FRP |
| SCREEN PANELS | INJECTION MOLDED POLYESTER FABRIC EMBEDDED IN POLYPROPYLENE GRIDS |
| DRUM SEAL | SYNTHETIC ELASTOMER SEAL WEAR RING |

RFM MODEL—STAINLESS STEEL DRUM FULLY-ENCLOSED IN A FIBERGLASS HOUSING

Features

- Fiberglass enclosure, stainless steel internals, and high quality industrial drive components.
- Built-in overflow and water level control weir for easy process integration.
- Injection molded, polypropylene screen panels eliminate screen delamination.
- Inlet seal maintains a continuous positive seat against the rotating drum.
- Independent screen cells can be plugged with zero down-time.

CALL FOR MORE INFORMATION AND PRICING.



RFM Model Rotofilter

PLUMBING

| | |
|---------------|---|
| INLET SIZE | 4" TO 24" |
| INLET TYPE | SOC OR FLANGE (RFM) OPEN DRUM OR FLANGE (RFF) |
| OUTLET SIZE | 4" TO 24" |
| OUTLET TYPE | SOC OR FLANGE (RFM) DISCHARGES DIRECTLY INTO SUMP OR LEVEL CONTROL BASIN (RFF) |
| SOLIDS OUTLET | 4" SS PIPE |

BACKWASH SYSTEM

| | |
|--------|--|
| SUPPLY | OPERATES AT 100 PSI—BOOSTER PUMP AVAILABLE |
|--------|--|

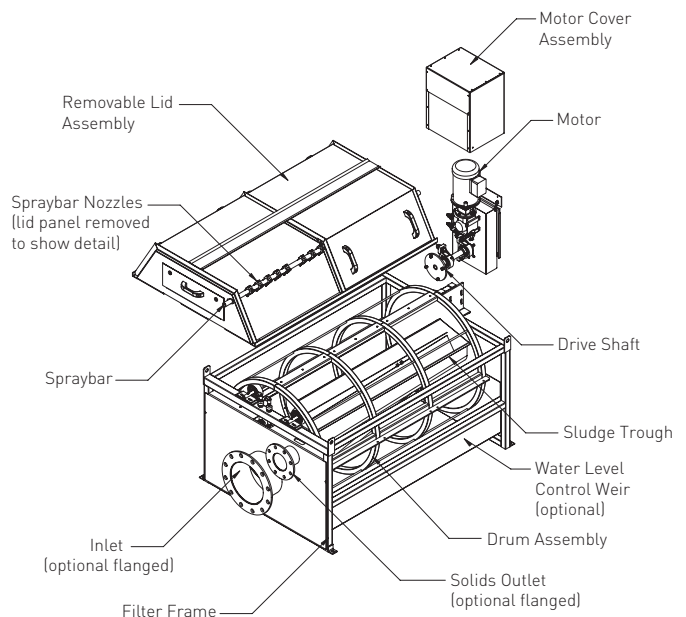
CONTROL PANEL

| | |
|------------------|--|
| ENCLOSURE | NEMA 4X |
| BACKWASH CONTROL | MANUAL AND AUTOMATIC CONTROL (BY TIMER AND LEVEL CONTROL SWITCH) |
| DRY CONTACTS | RUN, TROUBLE, AND HIGH LEVEL |

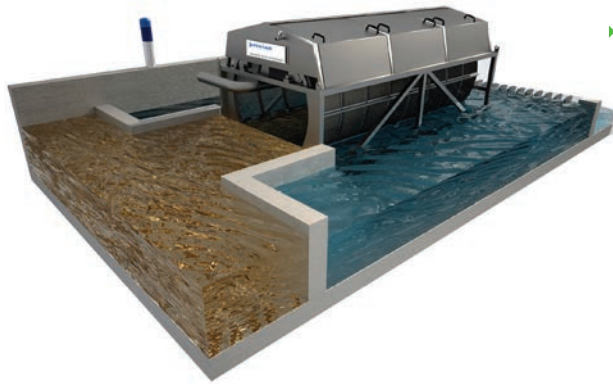
RFF MODEL—FRAME CONFIGURATION MOUNTED ON A STEEL FRAME, TYPICALLY INSTALLED IN A WET SUMP

Features

- Frame mounted for flexible integration into a variety of sump arrangements.
- Stainless steel construction and high quality industrial drive components.
- Injection molded, polypropylene screen panels eliminate screen delamination.
- Inlet seal maintains a continuous positive seat against the rotating drum.
- Independent screen cells can be plugged with zero down-time.
- Inlet and level control options available.



RFF Model Rotofilter



PC Filter in a channel installation.



DSF SERIES™ DRUM SCREEN FILTERS

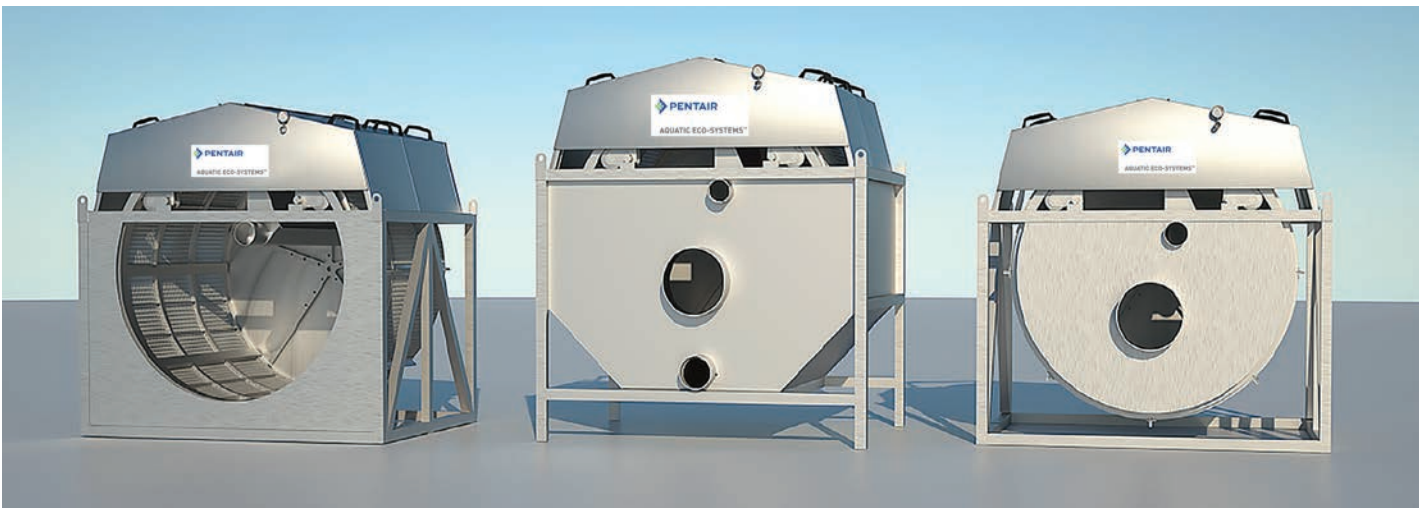
ROTARY MICRO FILTER

In demanding aquaculture applications, drum screen filters have proven to be highly efficient and reliable in removing solids from volumes of water large and small. Pentair Aquatic Eco-Systems is proud to offer our DSF Series™ line of drum screen filters, with a wide range of models, sizes and micron ratings to meet the specific needs of nearly any field application.

Featuring a field-proven design and the highest quality materials available, the DSF Series™ follow the simple, robust and time-tested principles of drum screen filter operation. Water containing solids enters the rotary drum in the front of the system. Water passes through the micro-mesh filter, which filters out solids (for increased durability, stainless steel wedge-wire filtration material is also available). As the filter mesh or wedge-wire material becomes increasingly loaded with solids, the water level within the drum increases to the point that it triggers the cleaning process. As the drum starts to rotate, the spraybar nozzles scour the filter mesh or wedge wire with high-pressure water, returning the screen to its original permeability. This allows the internal water level to drop and stop the cleaning process. Solids that are cleaned from the water are collected in a trough and transported away from the drum screen filter.



View of spraybar with top cover removed.



PC FILTER

Channel Installed

PC models are installed directly into a concrete water channel. Water flows into the center of the drum and passes through the screen material. After filtration, the water is discharged into the downstream channel. This configuration is commonly used in high-throughput, large installations, often with multiple systems in parallel.

CE FILTER

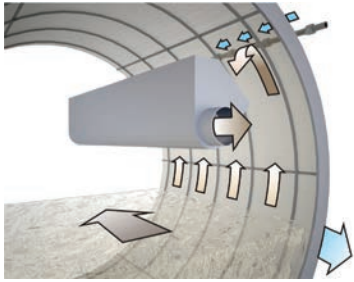
Integrated Tank with Pipe Inlet and Outlet

CE models offer integrated tanks and inlet/outlet ports for connecting directly to pipes. Water flows through a pipe as it approaches the filter, then flows into the drum where it passes through screen material. After filtration, the water is discharged into a downstream pipe. These models rest on an integrated framework, and they do not require construction of concrete channels for installation. The flexibility of these models makes them suitable for a range of applications.

PE FILTER

Hybrid Models with Pipe Inlet and Channel Outlet

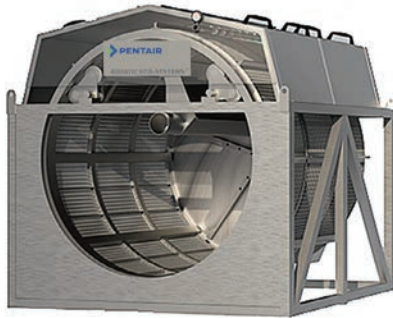
Models with pipe inlet ports and channel outlets are like a hybrid: they feature an inlet port for connecting directly to pipes, while water leaves the filter by pouring into a channel. Water flows through a pipe as it approaches the filter, then flows into the drum and passes through the screen material. After filtration, the water is discharged into the downstream channel.



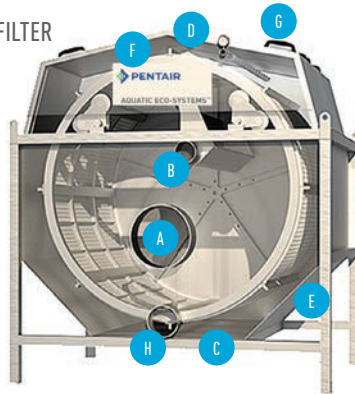
PRINCIPLE OF OPERATION

Liquid containing solids enters the rotary drum in the front of the system. Water passes through the micro-mesh filter, which filters out solids. As the mesh clogs with solids and sludge, the water level within the drum increases to the point that triggers the cleaning process. As the drum starts to rotate, nozzles scour the screen with high- pressure water, returning the screen to its original permeability. This allows the internal water level to drop and stop the cleaning process. Solids that are cleaned from the screen are collected in a trough and transported from the system for further processing.

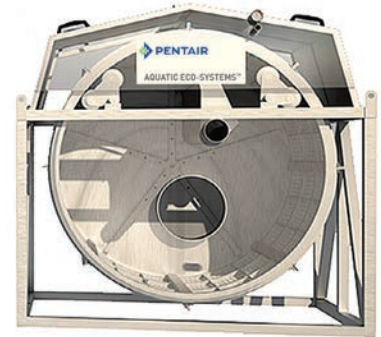
PC FILTER



CE FILTER



PE FILTER



A-Water inlet filter
B-Wash water outlet

C-Filtered water
D-Wash water inlet

E-Filtered water outlet
F-Inspection cover

G-Top cover
H-Water overflow

FOR MORE INFORMATION INCLUDING PERFORMANCE CHARTS PLEASE VISIT PENTAIRAES.COM
Filter sizing varies depending on the application. Please contact a PAES Representative for proper filter selection.

HYDRAULIC CAPACITY - M3/H

| APPLICATION | MICRON RATING µm | CE FILTER | | | CE / PE / PC FILTER | | | | | | PC / PE FILTER | | | | |
|---|---------------------|-----------|-----|-----|---------------------|------|------|------|------|------|----------------|------|------|-------|-------|
| | | 4/1 | 4/2 | 6/2 | 6/3 | 8/3 | 8/4 | 8/5 | 8/6 | 10/5 | 10/6 | 10/7 | 10/9 | 10/10 | 10/12 |
| Water collected from a river or lake, containing a maximum of 10 mg/L suspended solids. | 18 | 47 | 94 | 141 | 211 | 282 | 376 | 469 | 563 | 587 | 704 | 821 | 1056 | 1174 | 1408 |
| | 30 | 78 | 156 | 234 | 351 | 468 | 624 | 780 | 936 | 976 | 1171 | 1366 | 1756 | 1951 | 2341 |
| | 60 | 116 | 233 | 349 | 524 | 699 | 932 | 1165 | 1398 | 1456 | 1747 | 2038 | 2621 | 2912 | 3494 |
| | 90 | 215 | 429 | 644 | 965 | 1287 | 1716 | 2145 | 2574 | 2681 | 3218 | 3754 | 4827 | 5363 | 6435 |
| | 120 | 286 | 572 | 858 | 1287 | 1716 | 2288 | 2860 | 3432 | 3575 | 4290 | 5005 | 6435 | 7150 | 8581 |
| Polished urban waste water, containing a maximum of 40 mg/L suspended solids. | 20 | 9 | 18 | 27 | 40 | 54 | 71 | 89 | 107 | 111 | 134 | 156 | 201 | 223 | 268 |
| | 25 | 14 | 27 | 41 | 61 | 82 | 109 | 136 | 163 | 170 | 204 | 238 | 306 | 340 | 408 |
| | 30 | 16 | 32 | 48 | 71 | 95 | 127 | 158 | 190 | 198 | 238 | 277 | 356 | 396 | 475 |
| | 60 | 30 | 61 | 91 | 137 | 182 | 243 | 304 | 364 | 379 | 455 | 531 | 683 | 759 | 911 |
| | 90 | 46 | 91 | 137 | 205 | 273 | 364 | 455 | 546 | 569 | 683 | 797 | 1025 | 1138 | 1366 |
| Recirculation water in aquaculture containing a maximum of 25 mg/L suspended solids. | 120 | 61 | 121 | 182 | 273 | 364 | 486 | 607 | 729 | 759 | 911 | 1063 | 1366 | 1518 | 1821 |
| | 40 | 62 | 124 | 187 | 280 | 373 | 498 | 622 | 746 | 777 | 933 | 1088 | 1399 | 1555 | 1866 |
| | 60 | 85 | 171 | 256 | 384 | 512 | 683 | 854 | 1024 | 1067 | 1281 | 1494 | 1921 | 2134 | 2561 |
| | 90 | 109 | 218 | 327 | 491 | 655 | 873 | 1091 | 1310 | 1364 | 1637 | 1910 | 2456 | 2728 | 3274 |
| | 120 | 168 | 335 | 503 | 754 | 106 | 1341 | 1676 | 2011 | 2095 | 2514 | 2933 | 3771 | 4190 | 5029 |
| RESTRICTION OF CAPACITY. CE and PE FILTER | 140 | 196 | 391 | 587 | 880 | 1173 | 1564 | 1956 | 2347 | 2444 | 2933 | 3422 | 4400 | 4889 | 5867 |
| | 160 | 223 | 447 | 670 | 1006 | 1341 | 1788 | 2235 | 2682 | 2794 | 3352 | 3911 | 5029 | 5587 | 6705 |
| RESTRICTION OF CAPACITY. CE and PE FILTER | | 113 | 177 | 177 | 281 | 452 | 707 | 707 | 707 | 1122 | 1122 | 1122 | 1122 | 1122 | 1122 |

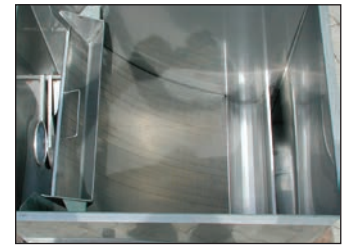
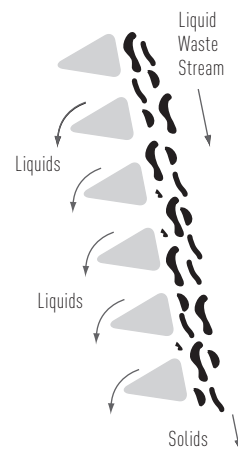
CE Filter incorporates an overflow (H) which allows the exit of the water if the internal water level exceeds the maximum level. The PC and PE Filters are designed to be installed into concrete channel or into a pond.



PARABOLIC SCREEN FILTERS FW KOI

These semi-self-cleaning filters are designed to remove solids from water with only occasional cleaning attention. They use a wedge wire, 304 stainless steel screen set in a parabolic shape to take advantage of the Coanda effect*. This wedge wire shape encourages solids-free water to drop between the screens and solids to be left on the surface. The solids are then pushed toward the waste trough and washed into a waste tank automatically. This filter is ideally suited for a gravity-flow system. It has a 200-micron, removable screen. Rubber couplings with clamps are included. Not recommended for use with salt water. Made in Germany.

| MODEL | GPM | DIMENSIONS | INLET/ OUTLET | WASTE PORT | EACH |
|-------|-----|----------------------------|------------------|-----------------|-------------------|
| 2875 | 70 | 25" X 10" X 32" + FITTINGS | 6" | 4" | \$1,876.55 |
| 2873 | 150 | 6" | 4" | 2,226.71 | |



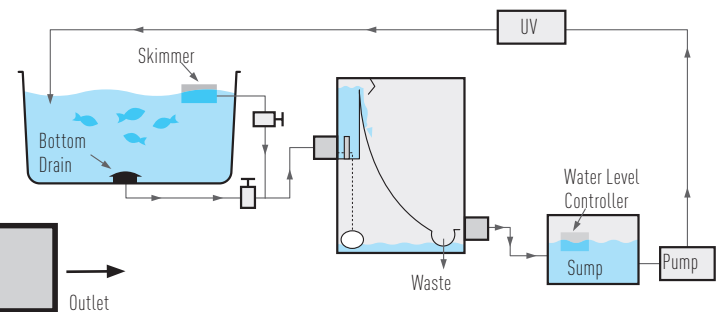
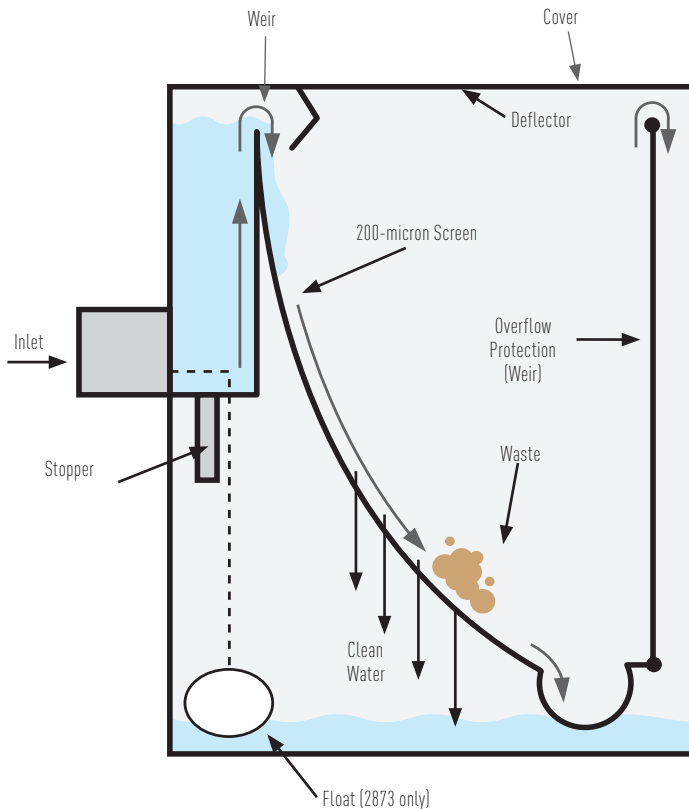
Inside of 2873.



Filtering out algae.

The parabolic shape promotes the Coanda effect*, stripping liquid from the bottom of the waste stream.

*Coanda effect: the tendency of a stream of fluid to follow a curved surface (if the angle is not too sharp) rather than follow a straight line in the original direction of flow.



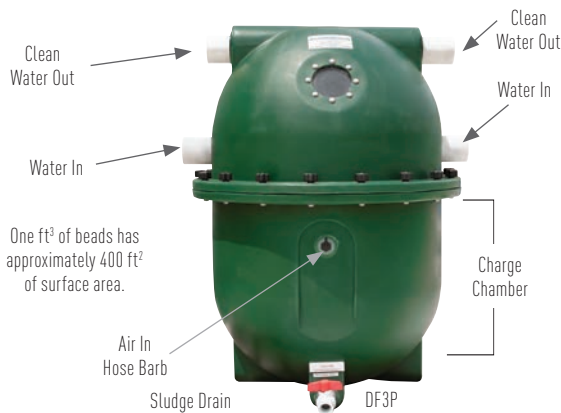
Operation: Slurry is gravity fed or pumped into headbox. It overflows weir, starts downward on screen. Most free fluid is stripped from bottom of stream on the 25° slope. More fluid is removed on the 35° slope, and solids roll downward, stopping on the 45° slope. With free draining material, practically all free fluid is removed in one pass. As the solids build up, water pushes them into the waste channel.

BUBBLE BEAD FILTERS FW SW KOI

Constructed of heavy-duty plastic (HDPE) (**BBF1, BBF2P**) or food grade fiberglass (**BBF6, BBF10**). Both will give dependable fresh or saltwater service for many years. They are well suited for koi ponds and the smaller recirculating system. They are easy to clean and require very little energy to operate. Ships from factory. Made in USA. Price includes crating/boxing fee.

| MODEL | MAXIMUM FLOWRATE | MAX PRESSURE (PSI)* | BEAD CAPACITY (FT ³) | HEIGHT | DIAMETER | INLET PIPE | OUTLET PIPE | BACKWASH WATER LOSS (GAL) | SHIP WT (LBS) | EACH |
|--------------|------------------|---------------------|----------------------------------|--------|----------|------------|-------------|---------------------------|---------------|-------------------|
| BBF1 | 16 GPM | 10 | 1 | 45" | 17" | 1.5" | 1.5" | 12 | 65 | \$1,070.00 |
| BBF2P | 30 GPM | 10 | 2 | 59" | 24" | 1.5" | 1.5" | 25 | 129 | 1,331.00 |
| BBF6 | 90 GPM | 15 | 6 | 76" | 36½" | 3" | 3" | 60 | 490 | 4,506.00 |
| BBF10 | 150 GPM | 15 | 10 | 82" | 42½" | 3" | 3" | 150 | 576 | 5,505.00 |

*Do not exceed maximum pressure.



POLYGEYSER PNEUMATIC DROP BEAD FILTERS

Automatically backwash—no moving parts or electronics!

Designed as "bioclarifiers" these filters are capable of handling biological loads 50 to 100% higher than bubble or propeller-washed bead filters. Very resistant to clogging and caking—they backwash automatically every few hours using a burst of air from the charge chamber. **PR Series** filters (pump inlet/pressurized discharge) come with plumbing to accommodate a water pump (10 psi max). **AL Series** filters (gravity inlet/airlift discharge) are set up for airlift pumping.

Water and air flow into the vessel continuously. Water goes in the lower pipe, up through the media and back to the fish. Air is pumped into the charge chamber where it accumulates to a critical volume and releases the air in a burst, knocking the debris off the media. The debris then settles to the bottom and is removed through the 2" sludge drain every 2-3 days. Nitrotech media (included) gives 50-100% better nitrification rates than standard round bead media.

An air pump is required but is not included; it must produce more pressure than the water pump/system head. A check valve (**228225**) must be used in the air line. Max pressure 10 psi. Ships via motor freight, FOB factory. One-year warranty.

| MODEL | DISCHARGE TYPE | MAXIMUM FLOW RATE | MAX PRESSURE (PSI)* | BEAD CAPACITY (FT ³) | HEIGHT | DIAMETER | INLET PIPE | OUTLET PIPE | BACKWASH WATER LOSS (GAL) | SHIP WT (LBS) | EACH | CRATING CHARGE** |
|------------------------|---|-------------------|---------------------|----------------------------------|--------|----------|------------|-------------|---------------------------|---------------|-------------------|------------------|
| DF3P | PUMP | 45 GPM | 10 | 3 | 36" | 34" | 3" | 3" | 40 | 175 | \$3,218.50 | \$47.00 |
| DF3A | AIRLIFT | 45 GPM | 10 | 3 | 36" | 34" | 3" | 3" | 40 | 175 | 3,218.50 | 47.00 |
| DF3-FLOWKIT-CFH | FLOW METER, .2-2 LPM | | | | | | | | | 5 | 114.00 | — |
| AB1 | REPLACEMENT BEADS, OVAL, APPROXIMATELY ½" X ¾" DIA., 1.65 CU.FT | | | | | | | | | 55 | 111.67 | — |

*Do not exceed maximum pressure.

**Crating charge not included in price.

TECHNICIAN PROFILE



Kristin Riddle

Kristin has a B.S. degrees in Marine Biology and Environmental Science, and a minor in Forensic Science from the University of North Carolina at Wilmington. Her undergraduate honors research focused on oyster recruitment rates in the Eastern Oyster. Her interests are in environmental marine research and wildlife rehabilitation.

Can't find what you're looking for? See it all at PentairAES.com.



PBF3



PBF10

◀ PROPELLER-WASHED BEAD FILTER

Improve the capture of small particles

Solids capture is one of the most important processes in a recirculating system. Although sedimentation/settling basins are generally effective for settleable solids larger than 80 microns, space constraints may render them impractical.

If this is your situation, then an expanded granular biofilter (EGB), specifically, a bead filter, may be the best alternative, as it reduces the retention time and improves the capture of small particles.

These bead filters can provide both filtration and biofiltration in a single device.

These bead filters employ low-density polyethylene beads (included) for their filter media in a pressurized up-flow configuration. The filter physically traps suspended solids while providing a large surface area for the growth of bacteria. Titanium-enhanced screens and automated backwash controllers available by quote.

Made from heavy-duty food-grade fiberglass, this filter will give dependable fresh or saltwater service for many years. Designed for larger recirculating aquaculture systems, the propeller-washed bead filters are easy to clean, easily automated, compact and very energy-efficient. Internal beads are cleaned by a motor-driven propeller. Prop wash models available with higher pressure capacity. Please inquire. Ships from factory. Made in USA. One-year warranty.

| MODEL | MAXIMUM FLOWRATE (GPM) | MAX PRESSURE | BEAD CAPACITY | HEIGHT | DIAMETER | INLET PIPE | OUTLET PIPE | BACKWASH WATER LOSS (GAL) | SHIP WT (LBS) | EACH | CRATING CHARGE** |
|--------------|--|--------------|---------------|--------|----------|------------|-------------|---------------------------|---------------|-------------------|------------------|
| PBF3 | 30 | 10 | 3 | 63" | 33" | 1.5" | 2" | 5-10 | 425 | \$4,080.00 | \$80.00 |
| PBF10 | 100 | 20 | 10 | 87" | 42" | 1.5" | 3" | 10-30 | 750 | 9,130.00 | 110.00 |
| PBF25 | 200 | 20 | 25 | 107" | 60" | 2" | 3" | 30-60 | 1,750 | 13,585.00 | 190.00 |
| PBF50 | 300 | 20 | 50 | 110" | 72" | 3" | 4" | 50-150 | 3,250 | 23,227.00 | 495.00 |
| AB1 | REPLACEMENT BEADS, OVAL, APPROXIMATELY 1/32" X 3/16" DIA., 1.65 CU.FT. | | | | | | | | 55 | 111.67 | — |

*Do not exceed maximum pressure.

**Crating charge not included in price.

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◀ BEAD FILTERS **NEW!**



930081



930083

Pentair Aquatic Eco-Systems Sweetwater® Bead Filters are specifically engineered to host a multitude of aquatic inhabitants in both fresh and salt water. These filters are designed to provide both mechanical and biological filtration for your mature koi pond. If separate mechanical filtration is provided upstream of your bead filter, pond size and fish capacity can as much as double when the bead filter is used for biological filtration only. Pond volume and fish load capacity numbers are nominal and sizing requirements should be determined by daily feed rate.

These filters offer high efficiency, low maintenance, mechanical and biological filtration in one package with up to 4500 ft² of biological contact surface area in a small footprint. Applications include ponds, public aquariums, zoos, hatcheries, research facilities, academics, aquaponics, quarantine and environmental biological recovery systems. The blower aggressively agitates the debris collected in the media bed and suspends it in the water column which is easily backwashed to waste. These tanks, rated at maximum 50 PSI, are molded from extra-thick polyethylene, with the very largest vessel built out of heavy-duty fiberglass. They feature a sight glass to visually monitor the clarity of water returning to your pond as well as a clear pipe to monitor waste discharge during the backwash cycle to make sure the bead filter media is cleaning properly.

Bead filters include control valve and filtration vessel mounted on a rigid plastic base, with a 115V 60 Hz blower, 2" union connections, and filter bead media. Ships Ground. One-year warranty.

- Innovative flow control protects against friction loss by eliminating unnecessary flow restrictions inside the system allowing greater water flow
- Both an excellent mechanical and biological filter
- Clear sight glasses allow you to monitor filtered effluent and waste discharge streams
- Bottom mounted sludge drain discharges heavy solids without media interference
- Bypass function isolates beneficial bacteria and media without disturbing normal water flow. Ideal for medicating the aquatic environment without killing the beneficial bacteria.
- High-output blower fluidizes and pre-washes media prior to backwash, reducing the amount of water needed to clean the system, which increases biological efficiency.

| MODEL | INLET/ OUTLET | MAXIMUM SYSTEM SIZE GAL/LITERS | FISH SUPPORTED (LBS) | BEAD MEDIA CAPACITY | DIMENSIONS | | RECOMMENDED FLOW RATE (GPM) | EACH |
|---------------|---|--------------------------------------|----------------------------|---------------------------|------------|--------|-----------------------------------|-------------------|
| | | | | | DIAMETER | HEIGHT | | |
| 930080 | 2"/1½" | 4,000/15,142 | 75 | 1.65 FT ³ | 19" | 38" | 40 - 60 | \$1,550.00 |
| 930081 | 2" | 8,000/30,283 | 165 | 3.30 FT ³ | 22" | 44" | 75 - 100 | 2,150.00 |
| 930082 | 2" | 12,000/45,425 | 330 | 4.95 FT ³ | 26" | 49" | 90-120 | 2,950.00 |
| 930083 | 2" | 24,000/90850 | 660 | 9.90 FT ³ | 36" | 52" | 100-140 | 4,750.00 |
| AB1 | REPLACEMENT FILTER BEAD MEDIA, 1.65 FT ³ , 55 LBS. | | | | | | | 111.67 |

Note: Model 930080 will ship with 2" x 1½" reducer bushings as option for 1½" plumbing installation.

BEAD FILTRATION SYSTEMS

NEW!



Pentair Aquatic Eco-Systems bead filtration systems provide complete filtration, UV treatment and circulation for koi ponds, water gardens and multi-tank culture systems. These systems are designed to provide both mechanical and biological filtration for your mature koi pond as they are self-contained units providing everything needed for a complete filtration system. These systems are available in four different configurations with performance and specifications to suit the needs of many aquatic applications. All systems include pump, filter, UV sterilizer, bead filter, valves and Schedule 80 PVC plumbing. They come assembled, plumbed and pre-mounted on a plastic skid for drop and go installations. Skid can be easily moved with a forklift or standard pallet jack. Systems ship via motor freight (crating charge not included when applicable), FOB Orlando. Made in USA. One-year warranty.

Applications:

- Koi Ponds
- Multi-tank Culture Systems
- Water Gardens
- Aquaculture Systems

Pumps

Model **930084** features a 1/2HP, 115/230V, 50/60 Hz, magnetic drive pump with single-phase TEFC motor. Models **930085** and **930086** feature Sweetwater 1/2HP, 115V, 60 Hz pumps. Our upgraded system, model **930087** is equipped with Sparus with Constant Flow Technology™ pump that delivers a constant user-defined flow rate because the motor speed self-adjusts to maintain the constant flow setting even as conditions change. Note: Flow rate setting not to exceed system designed flow rate.

Filters

These systems are supplied with Sweetwater bead filters. These filters have been specifically sized to match the requirements of the system and the flow rate of the pump. The bead filter housing is constructed of extra thick polyethylene for strength and durability. Bead filter media is included, and replacement media can be purchased separately. The bead filter tanks feature a sight glass to visually monitor the clarity of water returning to your pond as well as a clear pipe to monitor waste discharge during the backwash cycle to make sure the bead filter media is cleaning properly.

UV Sterilizers

These systems feature Pentair Aquatic Eco-Systems commercial-duty UV sterilizers that utilize ultraviolet light to effectively and efficiently inactivate potentially-harmful micro-organisms such as bacteria and algae. These UV units feature high-output (HO) T6-style lamps for a higher wattage in a shorter lamp. The UV dose is sized to be over 30,000 µW/cm² at full system flow. Replacement lamps sold separately.

Plumbing

These systems are plumbed with Schedule 80 PVC pipe. All valves are true union Asahi ball or 3-way valves plumbed throughout the system for easy service and disassembly. All filters and UV sterilizers have bypass lines to facilitate filter or lamp replacement.

CALL OUR TECH SUPPORT FOR SIZING ASSISTANCE.



| MODEL | FLOWRATE (GPM) | FILTER SIZE (FT ³) | UV (WATTS) | POND SIZE (GAL) | LBS OF FISH | INLET | OUTLET | L | W | H | EACH |
|---------------|----------------|--------------------------------|------------|-----------------|-------------|--------|--------|-----|-----|-----|-------------------|
| 930084 | 50 | 1.65 | 50 | 4000 | 75 | 1-1/2" | 1-1/2" | 40" | 32" | 42" | \$3,250.00 |
| 930085 | 80 | 3.3 | 120 | 8000 | 165 | 2" | 2" | 48" | 40" | 56" | 4,450.00 |
| 930086 | 100 | 4.95 | 150 | 12000 | 250 | 2" | 2" | 48" | 40" | 70" | 4,950.00 |
| 930087 | 100 | 4.95 | 150 | 12000 | 250 | 2" | 2" | 48" | 40" | 70" | 5,150.00 |

*Note: Pond volume and fish load capacity numbers are nominal and sizing requirements should be determined by daily feed rate.

TECH TALK 106

Biofilter Performance Standards

"AES/B" stands for absolute efficiency standard for biofilters. AES/B numbers indicate how many lbs of fish a biological filter can support in an exemplary recirculating system. They are only a quick reference for comparing our biological filters. Note that as much as 50% additional ammonia conversion occurs on other wetted surfaces like tank walls and pipes but, since these nitrification surfaces are often eliminated by cleaning and chemical therapeutants, it is unwise to count on them (see Tech Talk 95—biofilter sizing).

AES/B numbers take into account the biofilm diffusion and oxygen availability characteristics specific to the biofilter type (bead filter vs rotating biological contactor, for example). Be

aware that feed rate, feed protein content, pH, ammonia concentration, temperature, solids pre-filtration and other variables have a pronounced effect on biofilter performance. Actual field performance can stray from the AES/B number by a factor of 3 or more, based on these factors alone. Management skill and even timing are other variables, particularly for bead filters used for nitrification rather than solids removal.

AES/B numbers hold for the following conditions only:

- 1/2-lb tilapia or catfish in indoor tanks.
- Nonsoil bottoms, low algae concentrations.
- Warm water (80°F, 27°C).

- Recirculation rate of at least one system volume per hour.
- 7.2 pH.
- 3 mg/L total ammonia-nitrogen (TAN) concentration.
- 2% body weight per day feed rate, pelleted feed at 40% protein.
- Effective solids pre-filtration (except for bead filters).

COMMERCIAL FILTRATION SYSTEMS



NEW!



Bag, Cartridge, and Sand

Pentair Aquatic Eco-Systems CSK filtration systems provide complete filtration and circulation for larger recirculating applications. CSK systems are available in a range of configurations with performance and specifications to suit the needs of many aquatic applications. All systems include pump, filter, UV sterilizer, carbon filter, valves and Schedule 80 PVC pipe. They come assembled, plumbed and pre-mounted on a 40" x 48" plastic skid for drop and go installations (models 930070, 930071 and 930072 utilize two skids). Skids can be easily moved with a forklift or standard pallet jack. Systems ship via motor freight, FOB Orlando. Made in USA. One-year warranty.

Applications:

- Public aquariums
- Retail holding systems
- Research systems
- Aquaculture systems
- Multi-tank rack systems
- Seafood holding systems
- Residential systems
- Koi ponds

Pumps

These systems are available with pumps that are suitable for single-phase or three-phase electrical supply and offered in 50hz or 60hz electrical ratings, making them suitable for installation nearly anywhere in the world. Standard These systems are supplied with Sparus™ 160 Energy Efficient Aquaculture-Duty Centrifugal Pumps which are suitable for use in fresh and saltwater applications. These pumps offer extremely high water flow in a quiet, energy efficient package. Upgraded CSK systems are equipped with Sparus with Constant Flow Technology™ pumps that deliver a constant user-defined flow rate because the motor speed self-adjusts to maintain the constant flow setting even as conditions change. Note: Flow rate setting not to exceed system designed flow rate.

Filters

These systems are supplied with your choice of bag, cartridge or sand filters. These filters have been specifically sized to match the requirements of the system and the flow rate of the pump. For systems with bag filters, the polypropylene bag filter vessel is designed to allow a high flow rate through a single reusable in-line bag filter (filter bags sized from 1 to 800 microns sold separately). For systems with cartridge filters, the cartridge filter housing is constructed of fiberglass-reinforced polypropylene for improved strength and chemical resistance; pleated 20-micron cartridge included (replacement cartridges sold separately). For systems with sand filters, the sand filter housing is constructed of a one-piece, reinforced fiberglass shell for strength and durability (sand filter media sold separately). All systems include carbon filters which remove contaminants and impurities from the water (carbon sold separately).

UV Sterilizers

These systems feature Pentair Aquatic Eco-Systems commercial-duty UV sterilizers that utilize ultraviolet light to effectively and efficiently inactivate potentially-harmful micro-organisms such as bacteria and algae. These UV units feature high-output (HO) T6-style lamps for a higher wattage in a shorter lamp. The UV dose is sized to be over 30,000 µW/cm² at full system flow. Replacement lamps sold separately.

Plumbing

Systems are plumbed with Schedule 80 PVC pipe. All valves are true union Asahi ball or 3-way valves plumbed throughout the system for easy service and disassembly. All filters and UV sterilizers have bypass lines to facilitate filter or lamp replacement.

CALL OUR TECH SUPPORT FOR SIZING ASSISTANCE.



930019 - 30 GPM Bag Filter System



930054 - 60 GPM Cartridge Filter System



930070 - 100 GPM Sand Filter System

| CSK FILTRATION SYSTEMS | SPARUS W/CFT 230V 50/60HZ 1PH TEFC | | SPARUS 60HZ 1PH 115/208-230V TEFC | | SPARUS 60HZ 3PH 208-230/460V TEFC | | SPARUS 50HZ 1PH 220-240V TEFC | | SPARUS 50HZ 3PH 380-420V TEFC | |
|---|---------------------------------------|------------|--------------------------------------|------------|--------------------------------------|------------|----------------------------------|------------|----------------------------------|------------|
| | MODEL | EACH | MODEL | EACH | MODEL | EACH | MODEL | EACH | MODEL | EACH |
| 30GPM, BAG FILTER¹ | 930019 | \$5,300.00 | 930020 | \$4,950.00 | 930021 | \$4,950.00 | 930022 | \$4,950.00 | 930023 | \$4,950.00 |
| 30GPM, CARTRIDGE FILTER² | 930024 | 5,300.00 | 930025 | 4,950.00 | 930026 | 4,950.00 | 930027 | 4,950.00 | 930028 | 4,950.00 |
| 30GPM, SAND FILTER³ | 930029 | 5,300.00 | 930030 | 4,950.00 | 930031 | 4,950.00 | 930032 | 4,950.00 | 930033 | 4,950.00 |
| 45GPM, BAG FILTER¹ | 930034 | 5,570.00 | 930035 | 5,220.00 | 930036 | 5,220.00 | 930037 | 5,220.00 | 930038 | 5,220.00 |
| 45GPM, CARTRIDGE FILTER² | 930039 | 5,570.00 | 930040 | 5,220.00 | 930041 | 5,220.00 | 930042 | 5,220.00 | 930043 | 5,220.00 |
| 45GPM, SAND FILTER³ | 930044 | 5,570.00 | 930045 | 5,220.00 | 930046 | 5,220.00 | 930047 | 5,220.00 | 930048 | 5,220.00 |
| 60GPM, BAG FILTER¹ | 930049 | 5,920.00 | 930050 | 5,570.00 | 930051 | 5,570.00 | 930052 | 5,570.00 | 930053 | 5,570.00 |
| 60GPM, CARTRIDGE FILTER² | 930054 | 5,920.00 | 930055 | 5,570.00 | 930056 | 5,570.00 | 930057 | 5,570.00 | 930058 | 5,570.00 |
| 60GPM, SAND FILTER³ | 930059 | 5,920.00 | 930060 | 5,570.00 | 930061 | 5,570.00 | 930062 | 5,570.00 | 930063 | 5,570.00 |
| 100GPM, BAG FILTER¹ | 930064 | 6,340.00 | 930065* | 5,990.00 | 930066 | 5,990.00 | — | — | — | — |
| 100GPM, CARTRIDGE FILTER² | 930067 | 6,340.00 | 930068* | 5,990.00 | 930069 | 5,990.00 | — | — | — | — |
| 100GPM, SAND FILTER³ | 930070 | 6,340.00 | 930071* | 5,990.00 | 930072 | 5,990.00 | — | — | — | — |

* 208-230V 60HZ 1PH TEFC. ¹ See page 119 for filter bags. ² See page 129 for replacement cartridges. ³ See page 125 for sand media.



WAVE VORTEX FILTERS

Filters up to 150 gpm

Vortex swirl separators are popular solids filters for use with koi ponds and fish tanks. They are very good at removing heavy particles and wastes. You can gravity-flow water from a bottom drain or pump it to the vortex chamber. These stand about 5½ ft high with the 2-ft high base. 4" slip connections (except WLT24 has 3" slip).

- Sturdy double-wall base support.
- Three outlet ports allow body to be connected in any direction.
- Domed lid keeps it clean.
- Coned bottom allows complete drainage.
- Rubber connections eliminate the need to precisely align filter with pipes.
- Comes with lid, tank, stand, knife gate drain valve, rubber couplings and bulkhead fitting.

Ship motor freight or Ground (at 70-lb rate each) in two packages from factory. One-year warranty on body.

| MODEL | INCLUDES | SUGGESTED FLOW RATE (GPH) | DIA. | SHIP WT (LBS) | EACH |
|---------------|----------------------|---------------------------|------|---------------|-----------------|
| WLT24 | 24" TANK, LID, STAND | 2400 | 24" | 143 | \$679.00 |
| WLF36 | 36" TANK, LID, STAND | 6000 | 36" | 163 | 1,299.00 |
| WLF48F | 48" TANK, LID, STAND | 9000 | 48" | 183 | 1,099.00 |
| WLF36F | 36" TANK & LID ONLY | 6000 | 36" | 128 | 899.00 |

SURFACE SKIMMERS

Great for ornamental ponds

A simple method of removing leaves, scum and other surface debris while reducing surface tension. Inlet weir always floats just below the surface, so fluctuating water levels of up to 5" will not affect performance.

S750 skimmers are made from black or white ABS plastic. Internal catch basket holds about two handfuls of leaves and lifts out easily for cleaning. Skimmers work between 20 and 55 gpm. 1½" female pipe thread in the base (not included) allows for easy installation when building or retrofitting. Made in USA.

| MODEL | ABS PLASTIC | DIA. | HEIGHT | EACH |
|---------------|--------------------|------|--------|----------------|
| S750B | BLACK | 8 ½" | 10" | \$68.80 |
| S750W | WHITE | 8 ½" | 10" | 68.80 |
| S750RB | REPLACEMENT BASKET | | | 18.37 |



MULTICYCLONE PRE-FILTER

Revolutionary design greatly reduces filter backwashing and maintenance by capturing particles before they reach the filter. Easily installed on any existing filtration system—ideal as a pre-filter to extend the life of your existing filter.

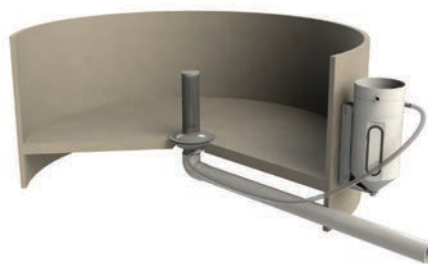
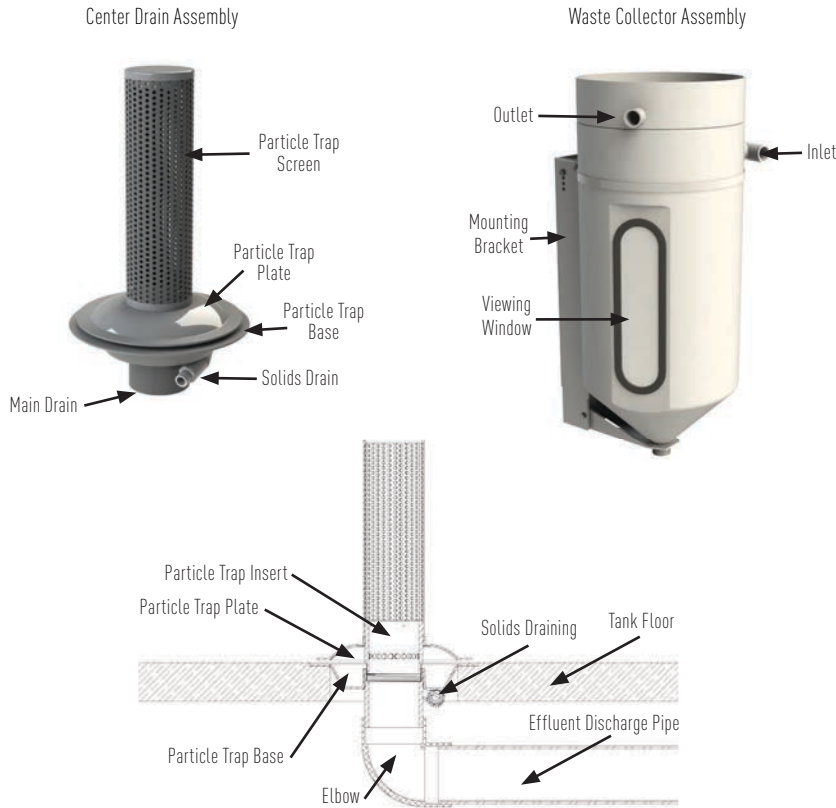
The MultiCyclone works on the basis of centrifugal water filtration. There are no moving parts to wear out and no filter media to clean. Reduces backwash frequency for sand filters and extends media life. Also reduces maintenance and extends the life of the cartridge in cartridge filtration systems. Traps sediments between 10 to 100 microns. UV-resistant and corrosionproof. 2" unions, 1" purge valve.

| MODEL | MIN FLOW (GPM) | MAX FLOW (GPM) | MAX PRESSURE (PSI) | SHIP WT (LBS) | EACH |
|-----------------|----------------|----------------|--------------------|---------------|-----------------|
| WC200370 | 13 | 132 | 58 | 25.5 | \$380.00 |

2-YEAR WARRANTY



ECO-TRAP WASTE SOLIDS REMOVAL SYSTEM **NEW!**



Cut-away view of the floor-mounted center drain assembly and the tank-mounted solids waste collector. (PVC pipe not included)



Eco-Trap System installed at PAES W.A.T.E.R.

Pentair Aquatic Eco-Systems' exclusive Eco-Trap System is an optimized design that allows for the effective and efficient removal of settleable waste solids (uneaten feed and feces) in Recirculating Aquaculture Systems (RAS). Efficient removal of solids is a critical aspect of controlling RAS water quality, and it also can reduce the operational costs of a RAS facility. Furthermore, culture water that contains fewer solids has been proven to provide an environment that positively contributes to animal health; and it may also help RAS facilities to meet increasingly stringent water discharge regulations.

Eco-Trap technology consists of a highly-optimized dual drain waste collection system. The Eco-Trap system's center main drain handles the primary water exchange for a RAS tank; while a smaller integrated solids drain provides an in-tank means for fast and efficient waste removal. Up to 50% of the waste solids can be removed from the tank within minutes of their generation. The Eco-trap system makes RAS tanks self-cleaning by pulling solids to the middle of the tank where they are automatically removed. Once collected, the Eco-Trap system moves these waste materials through a side-stream solids drain to a polyethylene waste collector that is mounted on the side of each tank. Solids are collected and concentrated in a side-stream flow consisting of approximately 5% of the total flow from the tank. Easy observation of the waste collector by the farm operator allows for reductions in feed waste to individual tanks, thus controlling one of the single largest economic inputs to RAS aquaculture. The Eco-Trap system contains no moving parts and nothing to wear out; and it has been proven in many commercial RAS installations worldwide. From an investment point of view, using Eco-Trap technology reduces the size and complexity of other associated waste solids removal technologies such as drum-screen filters and bead filters. Additionally, Eco-Trap technology can reduce the size of the biofilter required to control ammonia-nitrogen in culture water. Lastly, RAS facilities which utilize Eco-Trap systems may experience reduced labor costs; as Eco-Trap equipped RAS tanks typically require less-frequent manual cleaning operations to remove solids.

The ECO-TRAP System consists of:

Center Drain Assembly: The Eco-Trap Center Drain Assembly is constructed of grey PVC with main drain connections for Sch.80 PVC pipe. The Eco-Trap 110 model has 4" NPT main drain port and an 1.25" NPT solids collection port. The Eco-Trap 160 model has a 6" NPT main drain port and a 1.5" NPT solids collection port. Each Eco-Trap Drain Assembly has an integrated solids collection port which allows for side-stream flow of collected solids. In a RAS system, the Eco-Trap Drain Assembly is installed in the center of a circular tank floor. Once installed, the vertical standpipe segment of the of the Drain Assembly can be easily adjusted as needed to increase/decrease the height of the gap between the base plate and the upper plate. This simple adjustment allows the operator to optimize the functionality of the Eco-Trap Drain Assembly to create a cyclonic effect of water movement across the tank bottom. In a RAS tank that is equipped with an Eco-Trap, solids fall to the bottom of the tank and are drawn into the drain assembly for immediate collection and deposition into the tank-side Eco-Trap Waste Collector.

Waste Collector Assembly: The Eco-Trap 110 and 160 Waste Collectors are tank mounted and include a metal C-Channel and I-Beam mounting bracket. In a RAS tank that is equipped with an Eco-Trap system, the side-stream flow of collected solids move from the Eco-Trap Drain Assembly and into the Waste Collector's inlet port. The Waste Collector is constructed of strong polyethylene with clear impact-resistant viewing window.

Optional Metric Adaptors: Eco-Trap systems come with 4" or 6" NPT connections for Sch.80 PVC pipe, optional 110mm and 160mm Schedule 80 PVC adaptors are available for connecting the Drain Assembly in applications that utilize metric plumbing.

| MODEL | | EACH |
|---|--|-----------------|
| CENTER DRAIN ASSEMBLIES (ONE REQUIRED PER CULTURE TANK) | | |
| 930001 | ECO-TRAP 110 - DRAIN ASSEMBLY, 4" MAIN DRAIN PORT. | \$559.00 |
| 930002 | ECO-TRAP 160 - DRAIN ASSEMBLY, 6" MAIN DRAIN PORT. | 749.00 |
| WASTE COLLECTOR ASSEMBLIES (ONE REQUIRED PER CULTURE TANK) | | |
| 930073 | ECO-TRAP 110 - WASTE COLLECTOR & MOUNTING BRACKET | \$419.00 |
| 930074 | ECO-TRAP 160 - WASTE COLLECTOR & MOUNTING BRACKET | 459.00 |
| METRIC ADAPTERS | | |
| 930007 | ECO-TRAP 110 - SCHEDULE 80, 4" NPT TO 110MM. | \$69.00 |
| 930008 | ECO-TRAP 160 - SCHEDULE 80, 6" NPT TO 160MM | 109.00 |

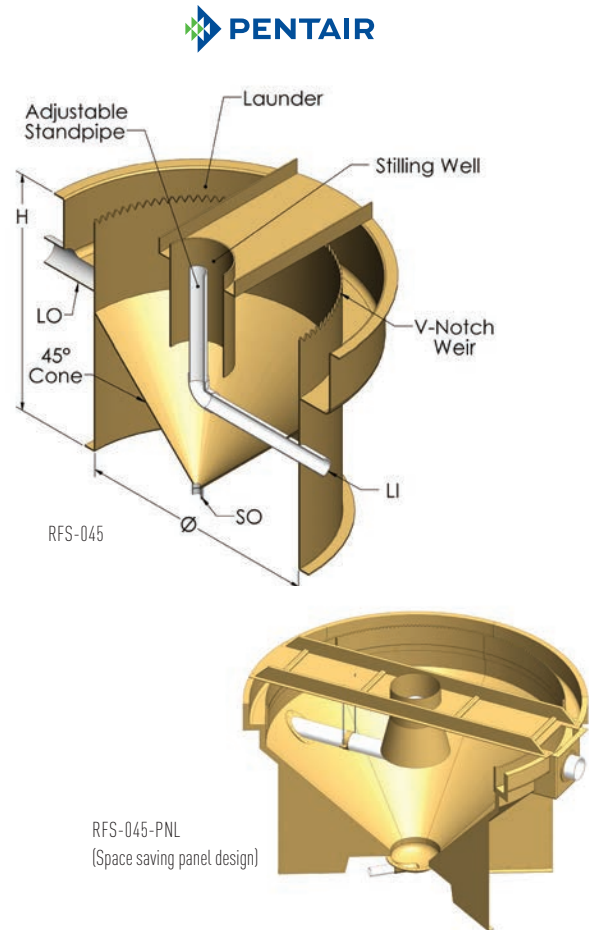
RADIAL FLOW SETTLER 45

The Pentair Aquatic Eco-Systems Radial Flow Settler (RFS) is used to remove particulates from effluent water. Effluent water enters the RFS Liquid Inlet, flows upward through the adjustable Standpipe Assembly, and back down through the Stilling Well. Solid particulates settle to the cone bottom for removal through a Solids Outlet. The filtered water flows upwards over a V-Notch Weir into the Launder, exiting through the Liquid Outlet.

Features

- Greatly reduces solids loading in a system
- Passive piece of equipment and requires no additional energy to operate
- Requires routine cleaning only - no additional maintenance or servicing required
- Available in many sizes for various flow requirements
- Designed for containerized shipping anywhere in the world

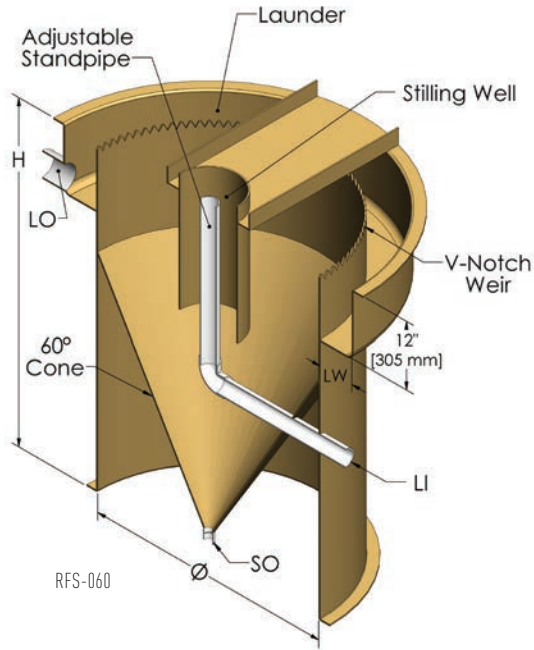
| MODEL | DIAMETER (IN.) | HEIGHT (IN.) | SHIP WT (LBS) | EACH |
|------------------|----------------|--------------|---------------|-----------|
| RFS-045-012 | 12 | 36 | 124 | \$928.0 |
| RFS-045-018 | 18 | 39 | 141 | 1,125.00 |
| RFS-045-024 | 24 | 42 | 188 | 1,628.00 |
| RFS-045-030 | 30 | 45 | 240 | 2,515.00 |
| RFS-045-036 | 36 | 48 | 297 | 2,863.00 |
| RFS-045-042 | 42 | 51 | 380 | 3,366.00 |
| RFS-045-048 | 48 | 54 | 474 | 3,943.00 |
| RFS-045-060 | 60 | 60 | 597 | 4,994.00 |
| RFS-045-072 | 72 | 66 | 719 | 6,051.00 |
| RFS-045-084 | 84 | 75 | 851 | 7,181.00 |
| RFS-045-096 | 96 | 81 | 1004 | 9,034.00 |
| RFS-045-108-5PNL | 108 | 87 | 1009 | 13,593.00 |
| RFS-045-144-6PNL | 144 | 108 | 1165 | 18,203.00 |



Radial Flow Settler 45

Technical Data

| Model Number | | RFS-045-012 | RFS-045-018 | RFS-045-024 | RFS-045-030 | RFS-045-036 | RFS-045-042 | RFS-045-048 | RFS-045-060 | RFS-045-072 | RFS-045-084 | RFS-045-096 | RFS-045-108-5PNL | RFS-045-144-6PNL |
|--|-------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------|------------------|
| | | Diameter (Ø) | in 12 | 18 | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 | 96 | 108 |
| | mm | 305 | 457 | 610 | 762 | 914 | 1067 | 1219 | 1524 | 1829 | 2134 | 2438 | 2743 | 3658 |
| Overall Height (H) | in | 36.0 | 39.0 | 42.0 | 45.0 | 48.0 | 51.0 | 54.0 | 60.0 | 66.0 | 75.0 | 81.0 | 87.0 | 108.0 |
| | mm | 1274 | 1381 | 1487 | 1593 | 1699 | 1805 | 1912 | 2124 | 2336 | 2655 | 2867 | 3080 | 3823 |
| Max OD | in | 22.5 | 28.5 | 35.5 | 41.5 | 47.5 | 54.5 | 62.5 | 74.5 | 88.5 | 100.5 | 112.5 | 126.5 | 162.5 |
| | mm | 572 | 724 | 902 | 1054 | 1207 | 1384 | 1588 | 1892 | 2248 | 2553 | 2858 | 3213 | 4128 |
| Maximum Flow @ 0.015 fps settling velocity | gpm | 2.9 | 7.2 | 11.8 | 21.0 | 28.8 | 37.5 | 46.6 | 73.1 | 105.5 | 143.9 | 188.3 | 238.6 | 425.1 |
| | l/min | 11.1 | 27.1 | 44.7 | 79.6 | 109.1 | 142.1 | 176.3 | 276.7 | 399.5 | 544.9 | 712.7 | 903.1 | 1609.3 |
| Inlet Ø (LI) | in | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 3.00 | 3.00 | 4.00 | 4.00 | 6.00 | 6.00 | 6.00 | 8.00 |
| | mm | 19 | 25 | 38 | 51 | 76 | 76 | 76 | 102 | 102 | 152 | 152 | 152 | 203 |
| Outlet Ø (LO) | in | 1.00 | 1.50 | 2.00 | 3.00 | 3.00 | 4.00 | 4.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 10.00 |
| | mm | 25 | 38 | 51 | 76 | 76 | 102 | 102 | 152 | 152 | 152 | 152 | 152 | 253 |
| Solids Outlet Ø (SO) | in | 1.00 | 1.00 | 1.50 | 1.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 | 3.00 | 4.00 |
| | mm | 25 | 25 | 38 | 38 | 51 | 51 | 51 | 51 | 51 | 76 | 76 | 76 | 101 |
| Weights & Loadings (1) | | | | | | | | | | | | | | |
| Shipping lbs | | 124 | 141 | 188 | 240 | 297 | 380 | 474 | 597 | 719 | 851 | 1004 | 1009 | 1165 |
| Floor Load lbs/sf | | 219.2 | 150.3 | 137.1 | 128.9 | 123.7 | 124.4 | 128.9 | 132.2 | 140.5 | 147.4 | 155.6 | 166.6 | 197.7 |



◀ RADIAL FLOW SETTLER 60

The Pentair Aquatic Eco-Systems Radial Flow Settler (RFS) is used to remove particulates from effluent water. Effluent water enters the RFS Liquid Inlet, flows upward through the adjustable Standpipe Assembly, and back down through the Stilling Well. Solid particulates settle to the cone bottom for removal through a Solids Outlet. The filtered water flows upwards over a V-Notch Weir into the Launder, exiting through the Liquid Outlet.

Features:

- Greatly reduces solids loading in a system
- Passive piece of equipment and requires no additional energy to operate
- Requires routine cleaning only - no additional maintenance or servicing required
- Available in many sizes for various flow requirements
- Designed for containerized shipping anywhere in the world

| MODEL | DIAMETER (IN.) | HEIGHT (IN.) | SHIP WT (LBS) | PRICE |
|-------------|----------------|--------------|---------------|-------------------|
| RFS-060-012 | 12 | 41 | 141 | \$1,266.00 |
| RFS-060-018 | 18 | 46 | 197 | 1,486.00 |
| RFS-060-024 | 24 | 51 | 272 | 1,954.00 |
| RFS-060-030 | 30 | 55 | 343 | 2,280.00 |
| RFS-060-036 | 36 | 59 | 441 | 2,605.00 |
| RFS-060-042 | 42 | 64 | 630 | 2,934.00 |
| RFS-060-048 | 48 | 68 | 751 | 3,455.00 |
| RFS-060-060 | 60 | 77 | 910 | 4,811.00 |
| RFS-060-072 | 72 | 85 | 1225 | 6,329.00 |
| RFS-060-084 | 84 | 98 | 1489 | 8,045.00 |
| RFS-060-096 | 96 | 107 | 1704 | 9,295.00 |

Radial Flow Settler 60

| Technical Data | | | | | | | | | | | | | |
|--|-------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------|
| Model Number | | RFS-060-012 | RFS-060-018 | RFS-060-024 | RFS-060-030 | RFS-060-036 | RFS-060-042 | RFS-060-048 | RFS-060-060 | RFS-060-072 | RFS-060-084 | RFS-060-096 | |
| Diameter (Ø) | in | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 | 96 | |
| | mm | 305 | 457 | 610 | 762 | 914 | 1067 | 1219 | 1524 | 1829 | 2134 | 2438 | |
| Overall Height (H) | in | 41 | 46 | 51 | 55 | 59 | 64 | 68 | 77 | 85 | 98 | 107 | |
| | mm | 1451 | 1623 | 1805 | 1947 | 2089 | 2266 | 2407 | 2726 | 3009 | 3469 | 3788 | |
| Max OD | in | 22.5 | 28.5 | 35.5 | 41.5 | 47.5 | 54.5 | 62.5 | 74.5 | 88.5 | 100.5 | 112.5 | |
| | mm | 572 | 724 | 902 | 1054 | 1207 | 1384 | 1588 | 1892 | 2248 | 2553 | 2858 | |
| Maximum Flow @ 0.015 fps settling velocity | gpm | 2.9 | 7.2 | 11.8 | 17.8 | 24.8 | 37.5 | 46.6 | 73.1 | 105.5 | 143.9 | 188.3 | |
| | l/min | 11.1 | 27.1 | 44.7 | 67.4 | 93.8 | 142.1 | 176.3 | 276.7 | 399.5 | 544.9 | 712.7 | |
| Inlet Ø (LI) | in | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 3.00 | 3.00 | 4.00 | 4.00 | 6.00 | 6.00 | |
| | mm | 19 | 25 | 38 | 51 | 76 | 76 | 76 | 102 | 102 | 152 | 152 | |
| Outlet Ø (LO) | in | 1.00 | 1.50 | 2.00 | 3.00 | 3.00 | 4.00 | 4.00 | 6.00 | 6.00 | 6.00 | 8.00 | |
| | mm | 25 | 38 | 51 | 76 | 76 | 102 | 102 | 152 | 152 | 152 | 203 | |
| Solids Outlet Ø (SO) | in | 1.00 | 1.00 | 1.50 | 1.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 | |
| | mm | 25 | 25 | 38 | 38 | 51 | 51 | 51 | 51 | 51 | 76 | 76 | |
| Weights & Loadings (1) | | | | | | | | | | | | | |
| Shipping Weight | | lbs | 141 | 197 | 272 | 343 | 441 | 630 | 751 | 910 | 1225 | 1489 | 1704 |
| Floor Load | | lbs/sf | 240.8 | 181.9 | 164.0 | 149.8 | 144.0 | 140.0 | 150.9 | 148.2 | 158.4 | 164.0 | 169.5 |

REVERSE OSMOSIS SYSTEMS, 3-STAGE

- High-efficiency 1-micron sediment pre-filter, 2-micron carbon block pre-filter
- High-flow/high-rejection TFC membrane providing excellent water purification
- 160-psi pressure gauge and clear 10" filter cartridge housings allow full system monitoring
- Quick disconnect fittings, filter wrench and hose bib attachment are included
- In-line TDS meter and shut-off valve optional
- Plus models with Chloramine Blaster filters
- Ship weight is 15 lbs
- Dolphin Series



| MAX FLOW (GPD) | STD MODEL | EACH | PLUS MODEL | EACH |
|----------------|---------------|-----------------|----------------|-----------------|
| 50 | AFX350 | \$145.00 | AFX350C | \$209.00 |
| 100 | AF3100 | 159.00 | AF3100C | 229.00 |
| 200 | AF3200 | 218.00 | AF3200C | 278.00 |
| 300 | AF3300 | 287.00 | AF3300C | 347.00 |

REVERSE OSMOSIS DI SYSTEMS, 5-STAGE

- High-efficiency 1-micron sediment pre-filter, 2-micron carbon block for VOC reduction
- High-flow/high-rejection TFC membrane and two color-changing deionization resins for the highest water purity
- 160-psi pressure gauge and clear 10" filter cartridge housings allow full system monitoring
- Quick disconnect fittings, filter wrench and hose bib attachment are included
- In-line TDS meter and shut-off valve optional
- Plus models with Chloramine Blaster filters
- Ship weight is 27 lbs
- Mako Series



| MAX FLOW (GPD) | STD MODEL | EACH | PLUS MODEL | EACH |
|----------------|---------------|-----------------|----------------|-----------------|
| 50 | AFX51 | \$275.00 | AFX51C | \$339.00 |
| 100 | AFX101 | 260.00 | AFX101C | 349.00 |
| 200 | AFX201 | 337.00 | AFX201C | 408.00 |
| 300 | AFX301 | 395.00 | AFX301C | 477.00 |



REVERSE OSMOSIS DI SYSTEMS, 4-STAGE

- High-efficiency 1-micron sediment pre-filter, 2-micron carbon block for VOC reduction
- High-flow/high-rejection TFC membrane and color-indicating deionization resin for lab grade water
- 160-psi pressure gauge and clear 10" filter cartridge housings allow full system monitoring
- Quick disconnect fittings, filter wrench and hose bib attachment are included
- In-line TDS meter and shut-off valve optional
- Plus models with Chloramine Blaster filters
- Ship weight is 18 lbs
- Barracuda Series



| MAX FLOW (GPD) | STD MODEL | EACH | PLUS MODEL | EACH |
|----------------|---------------|-----------------|----------------|-----------------|
| 50 | AFX50 | \$219.00 | AFX50C | \$279.00 |
| 100 | AFX100 | 232.00 | AFX100C | 299.00 |
| 200 | AFX200 | 284.00 | AFX200C | 349.00 |
| 300 | AFX300 | 337.00 | AFX300C | 417.00 |

REVERSE OSMOSIS DI SYSTEMS, 4-STAGE

- High-efficiency 1-micron sediment pre-filter and Chloramine Blaster filters
- High-flow/high-rejection TFC membrane and color-changing deionization resin for the highest water purity
- Microprocessor-controlled 1:1 waste-to-water ratio helps conserve water
- Booster pump increases pressure to maximize filter efficiency
- Cyclic membrane flush upon startup and shutdown prolongs DI life and prevents scaling
- 160-psi pressure gauge and clear 10" filter cartridge housings allow full system monitoring
- Quick disconnect fittings, filter wrench and hose bib attachment are included
- In-line TDS meter and high- and low-pressure kill switches
- Ship weight is 35 lbs
- Octopus Series



| MODEL | MAX FLOW (GPD) | EACH |
|------------------|----------------|-----------------|
| AFXOCT50 | 50 | \$459.00 |
| AFXOCT100 | 100 | 469.00 |
| AFXOCT150 | 150 | 479.00 |
| AFXOCT200 | 200 | 549.00 |

AquaFX the Leaders in Reverse Osmosis® is a registered trademark of Aqua Engineering & Equipment, Inc.



REVERSE OSMOSIS ACCESSORIES



AFX10C AFXBLCART AFXDI AFXCF



BP8800



FXC FX6 FXB



AFX50M PFCM

| MODEL | | EACH |
|------------------|------------------------------------|---------------|
| AFXWR | FILTER WRENCH | \$3.15 |
| AFXPG | GAUGE & TEE, 1/8" MNPT, 160 PSI | 19.00 |
| AFXTDS | TDS METER | 45.00 |
| AFXASO | SHUT-OFF VALVE | 54.45 |
| AFXBLCART | FILTER REFILL (+ MODELS) | 18.50 |
| AFX10C | REPLACEMENT CANISTER | 21.00 |
| AFXDI | REPLACEMENT DEIONIZATION CARTRIDGE | 21.10 |
| AFXCF | CARBON CARTRIDGE | 8.00 |

Reverse Osmosis Booster Pump

"Designed specifically for reverse osmosis systems, this in-line pump boosts incoming tap water pressure that is too low for optimal R/O performance. The pump adds about 50 psi to your line pressure. Pump comes with sound dampening material for quiet operation. It is 36VDC and includes a 115VAC power transformer, 1/4" quick disconnect fitting and adjustable pressure switch. Weighs 6 lbs."

| MODEL | | MAX FLOW (GPD) | EACH |
|-----------------|---------------------|----------------|-----------------|
| BP8800 | R/O PRESSURE PUMP | 200 | \$147.00 |
| ZG439052 | 3/8" X 1/4" BUSHING | 200 | 3.35 |

Filters, 10"

Our **FXC** filter housing tops are made of polypropylene with 3/4" FNPT ports and feature acrylonitrile, shatter-resistant filter housings. **FXB** has a unique bypass valve built into its top, which allows the cartridge to be changed without interrupting the flow. Both models are rated to 150 psi, accept all standard 10" filter cartridges and weigh 5 lbs each.

The canister cartridge (**FX6**) is sold empty for filling with your own media (zeolite, resin or carbon, etc.) and includes gaskets, pre-filter and post-filter. Most made in USA.

| | | EACH | 6+ |
|------------|---|----------------|----------------|
| FXC | 10" FILTER HOUSING, 3/4" FNPT WITH ADAPTERS AND GASKETS | \$29.95 | \$26.96 |
| FX6 | CANISTER, EMPTY, 10" | 9.35 | 8.42 |
| FXB | BYPASS FILTER HOUSING | 45.31 | 40.78 |

Polymicro Filters, 10"

These cartridges are made through an exclusive process that thermally bonds 100% pure polypropylene microfibers with lower density at the outside surface and progressively higher density towards the center. Made from FDA-compliant, NSF-certified materials, they are ideal as pre-filters. Fit standard 10" filter cartridges.

| MODEL | MICRON | EACH | 4+ |
|----------------|-------------|---------------|---------------|
| PFCM | 1 MICRON | \$3.66 | \$3.30 |
| PFC5M | 5 MICRONS | 3.66 | 3.30 |
| PFC10M | 10 MICRONS | 3.66 | 3.30 |
| PFC25M | 25 MICRONS | 3.66 | 3.30 |
| PFC50M | 50 MICRONS | 3.66 | 3.30 |
| PFC75M | 75 MICRONS | 3.66 | 3.30 |
| PFC100M | 100 MICRONS | 3.66 | 3.30 |

For R/O units & deionization canisters

| | | EACH | 12+ |
|----------------------------|------------|---------------|---------------|
| Wound Polypropylene | | | |
| FX1 | 1 MICRON | \$6.75 | \$6.08 |
| FX5 | 5 MICRONS | 6.75 | 6.08 |
| FX10 | 10 MICRONS | 6.75 | 6.08 |
| FX25 | 25 MICRONS | 6.75 | 6.08 |
| FX50 | 50 MICRONS | 6.75 | 6.08 |

Replacement TFC® Membranes

| MODEL | | EACH |
|---------------|---------|----------------|
| AFX50M | 50 GPD | \$45.90 |
| AF100M | 100 GPD | 49.90 |

TECHNICIAN PROFILE

**Marcela Hincapie**

Marcela has a B.S. degree in marine biology from UJTL in Colombia and an M.S. degree from the University of Maine. She has worked in the marine and freshwater aquaculture field raising different species of shrimp and fish in flow-through and recirculation systems in warm and coldwater environments. Her specialties include hatchery and growout phase.

Your customer service is superb! I had sent a message to add an additional item to an order, and was surprised to find that the order had already been shipped (just hours after I submitted it online). The customer service person made another order for the additional item, and all is well. So nice to still have a company that believes in being prompt! We look forward to doing business with you again!

Ruth Olsen

Office Assistant
U.S. Fish & Wildlife Service, Klamath Falls Fish & Wildlife Office

TECH TALK 95

Biofilter Sizing

Biofilters consist of surface-providing media for attachment of microorganisms that remove wastes from the water. The media can be commercial products like Bio Barrels, Bio Balls, Bio Strata, Bio-Fill™, Biofilm Carrier Elements and Siporax® among others. Sand, rock, shells and other natural material can be used as biofilter media. The relative amount of usable surface area (square feet surface area/cubic foot of media) and their weight are important.

In aquaculture, biofilters are used to convert ammonia to nitrite, and ultimately nitrate, through an oxidation process called nitrification. The bacteria attach to the media surfaces where they use ammonia and nitrite as energy sources and carbon dioxide as a carbon source. These bacteria are aerobic, requiring oxygen for the conversion process.

The biofilter sizing process can be roughly summarized as follows:

1. Determine the maximum expected ammonia loading rate and the allowable total ammonia-nitrogen (TAN) concentration. Ammonia loading is a function of feed loading, protein content and digestion efficiency. The TAN limit is primarily a function of culture water pH and fish tolerance for un-ionized ammonia (see Tech Talk 47).

High water replacement rates dilute culture water ammonia while impacting pH and other water

quality parameters. Mass balance analysis is essential for determining the biofilter load, if any, for these "partial recirculating" and "flow-through" systems.

2. Select the best kind of biofilter for the application. Many types of biofilters have been used in aquaculture, including rotating biological contactors (RBCs), trickling filters, submerged filters, fluidized beds, bead filters and low-space bioreactors (LSBs). One may be better than another for a given application.
3. Calibrate the biofilter standard nitrification rate to the field water quality conditions. These conditions include hydraulic loading rate, TAN concentration, oxygen availability and temperature. Poor solid waste pre-filtration will reduce biofilter performance and require a larger biofilter.
4. Calculate the biofilter size based on the biofilter surface area, projected field nitrification rate and the maximum expected ammonia load.

Biofilter surface area requirements can range from 3 to 30 square feet per lb of fish depending on the biofilter type and the factors described above. For this reason, we recommend that the AES/B Numbers (lbs of fish supported, Tech Talk 106) as well as the feed and TAN limits listed in this catalog be used for comparison purposes only and not for biofilter sizing.

TECH TALK 18

Reverse Osmosis

There are two general categories of reverse osmosis (R/O): low-pressure R/O for fresh water (less than 100 psi) and high-pressure R/O for making drinking water from seawater (over 1,000 psi). This Tech Talk discusses only the low-pressure category, which uses thin film composite (TFC®) membranes.

R/O removes dissolved ions by forcing water through a semipermeable membrane. As water flows over the membrane under pressure, about 33% passes through and exits the center as purified water, permeate or R/O water. The remaining 67% rinses the outside of the membrane and removes contaminants as concentrate. Rejection of dissolved ions is about 92% efficient if the system is in good condition. For additional filtering, the permeate can then be sent through a deionizing filter (DI) for another 6% or 7% polishing of the water. R/O is not recommended for removing viruses or bacteria since a cut in a seal or membrane could allow the organisms to pass. In addition, very small organic compounds such as trichloroethylene or trihalomethane will not be removed by this process.

Performance Checks

Source water should be at least 50°F (10°C) and 40 psi. Do not connect to hot water or pressure over 100 psi. If the pressure is below 40 psi, a booster pump is required.

A pressure gauge is essential to monitor the backpressure from your membrane and will indicate clogging. The gauge will also indicate prefilter loading, as the pressure will decrease as the prefilter becomes clogged.

Total dissolved solids (TDS) levels will affect performance of R/O units. R/O membranes require more pressure to overcome the osmotic pressure as the TDS increases. The higher the level of TDS, the shorter the membrane life.

The R/O unit is engineered to receive potable municipal water. In areas with very hard source water, a household water softener should be added to extend membrane life because the membrane rejects sodium better than either calcium or magnesium. Measure TDS to determine if the membrane has

failed. Use a TDS or conductivity meter to monitor your permeate water. For example, if the tap water reading is 100 ppm and the permeate water is 8 ppm, you know all is working well.

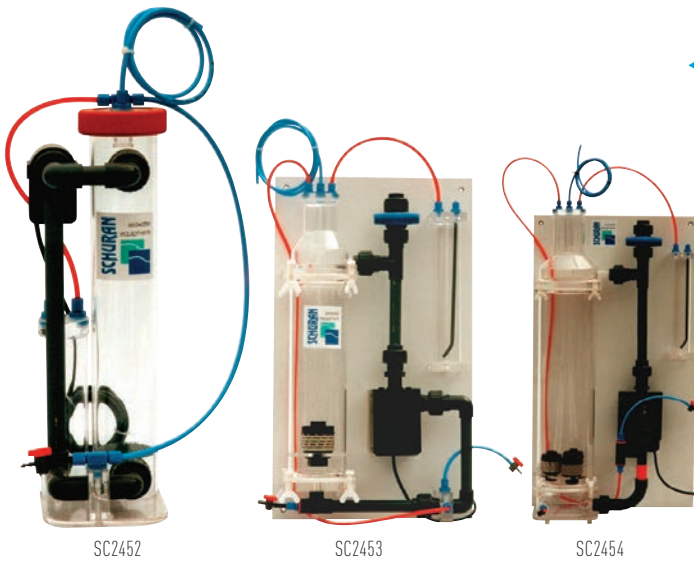
Maintenance

Membranes will clog quickly and stop producing permeate water without proper protection; usually a 1- or 5-micron (µ) pre-filter is used to remove solids and activated carbon is used to adsorb chlorine [specialty carbons must be used for chloramine removal]. When the carbon filter is exhausted, chlorine will pass through and destroy the TFC® membrane. The sediment and carbon pre-filters should be replaced every 3 months or after production of every 1,000 gallons of purified water. The TFC® membrane should be changed every 1–3 years or when TDS readings in the permeate water are above 30 ppm. After installing a new membrane, discard all permeate for the first two hours (a new membrane is coated with a solution to prevent microbiological growth and must be rinsed thoroughly). Until it is fully hydrated, a new membrane may take up to 10 days for full production. DO NOT allow it to dry out. If you are not going to use the filter for more than 4 weeks, remove the membrane, place it in a sealed bag with 2 tablespoons of filtered water and store it in the refrigerator. Membranes and pre-filters are usually interchangeable between brands.

Use and Storage

Your R/O water should be stored in food-grade containers. R/O water is so pure that it acts as a solvent and will dissolve metals like copper or brass. If it is not stored in a food-grade container, the purified water will leach the chemicals out of the container within 24 hours.

R/O water is too pure to be used by itself for fish and plants. Additives are needed to replace essential minerals. Most marine mixes contain these minerals. For freshwater systems, use an additive such as R/O Right (see PentairAES.com). The average cost to produce R/O water is 5 to 10 cents per gallon. This includes the cost of the filter and maintenance.



2-YEAR WARRANTY

◀ CALCIUM REACTORS

Jetstream Pico

Suitable for aquariums up to 158 gallons (600 liters). The reaction chamber holds .8 liters of calcium media (not included) and has a max output of 60 mL/min. Includes bubble counter. Pump required but not included—we recommend **PU181**. Two-year limited warranty.

Jetstream 1

Suitable for systems up to 800 gallons (3,000 liters). Vertically mounted on an ABS board. Reaction chamber holds 2.5 liters of coral sand (not included) and has a max output of 120 mL/min. Includes bubble counter and 115V/60 Hz pump. Two-year limited warranty.

Jetstream 2

Suitable for systems from 800 to 2,500 gallons (3,000 to 9,400 liters). Reaction chamber holds 7.5 liters of coral sand (not included). Includes bubble counter and 115V/60 Hz pump mounted on board. Two-year limited warranty.

| MODEL | | L | W | H | SHIP WT (LBS) | EACH |
|---------------|----------------|-----|----|-----|---------------|-----------------|
| SC2452 | JETSTREAM PICO | 5" | 6" | 16" | 6 | \$615.00 |
| SC2453 | JETSTREAM 1 | 13" | 6" | 24" | 14 | 850.00 |
| SC2454 | JETSTREAM 2 | 18" | 8" | 36" | 20 | 1,230.00 |

PROFESSIONAL CALCIUM REACTORS

Calcium reactors provide invertebrates in marine systems with a constant supply of calcium hydrogen carbonate, which plays a critical role in seawater buffering and coral growth. Made in Germany, the Schuran calcium reactors are considered to be the most advanced and efficient in the market today. A water pump (included) circulates water within a reactor that is filled with calcium media and saturated with carbon dioxide. The carbon dioxide creates an acidic environment that dissolves the coral media into calcium hydrogen carbonate.



JETSTREAM SERIES

The Jetstream Series of calcium reactors sets a new standard of functionality and efficiency. The gas/water separator offers the optimum use of carbon dioxide: not a single bubble of gas can leave the reactor unused. The residual gases are also dissolved, accelerating turbulence within the reaction chamber. This highly efficient reactor makes it possible to dissolve coral media with equal amounts of carbon dioxide; i.e., one kg coral sand with one kg CO₂!



Calcium media before (left) and after (right) use of 2 kg CO₂.

CO₂ REGULATOR W/BUBBLE COUNTER

Dual gauges show psi and kg/cm². The left gauge measures tank capacity and the right gauge indicates flow. Package includes a flow regulator, needle valve, electric solenoid and bubble counter. Needle valve control allows precise measurement. Solenoid valve has 5-ft power cord. CO₂ bottle not included. Six-month warranty (no warranty on right-side gauge).

| MODEL | SHIP WT (LBS) | EACH |
|--------------|---------------|-----------------|
| PR957 | 2 | \$113.00 |



CALCIUM REACTOR MEDIA

Specially made for calcium reactors, ReBorn dissolves completely—it will not break down and clog your system. Also a safe, natural way to stabilize pH and increase calcium in reef aquariums. Made of fossilized coral harvested from the Western Pacific Ocean, ReBorn replenishes calcium, carbonate alkalinity, strontium and trace elements.

| MODEL | SHIP WT (LBS) | EACH |
|---------------|---------------|----------------|
| TLRB8 | 8.8 | \$31.35 |
| TLRB44 | 44 | 130.79 |





◀ FILTER FOAM, RETICULATED

Also a great biofilter media!

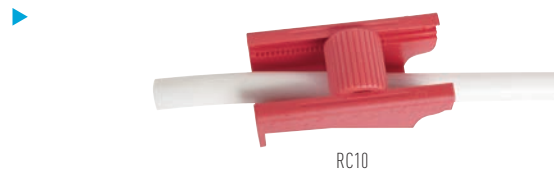
This 1" thick foam is true "fish grade," long-life, reticulated foam with a pore size of 20 ppi (pores per inch). It contains no fire retardants or germicides. Sold in 2' x 6' sheets (rolled) only (equals 1 cu.ft.). Made in USA.

| MODEL | SHIP WT (LBS) | EACH |
|------------|---------------|----------------|
| PF7 | 5 | \$49.44 |

TUBING VALVES, ROLL TYPE

Made of a polyester (PBT) that offers permanent rigidity. Autoclavable to 320°F (160°C).

| MODEL | | EACH | 25+ |
|-------------|--------------|---------------|---------------|
| RC9 | 1/8" TO 3/8" | \$7.58 | \$6.82 |
| RC10 | 1/4" TO 3/4" | 8.43 | 7.59 |



◀ SPONGE FILTER, EXTRA LARGE

This extra large sponge filter works as a biological filter and clarifies water through solids capture. A nice filter for small ponds, water gardens and fish holding tanks. The reticulated sponge is easily cleaned or replaced without tools. The 20" tall PVC chimney is sealed at the bottom and can be shortened if needed. Requires .25 cfm of air to operate and 1 lb of weight to submerge it (pour a cup of sand or gravel down the chimney). Includes 20' of 1/4" I.D. tubing and a Sweetwater® **AS3** air diffuser.

| MODEL | | | EACH | 6+ |
|-------------|---------------|--------------|----------------|--------------|
| FP3 | SPONGE FILTER | 9" X 9" X 9" | \$55.25 | — |
| FP3F | REPL. SPONGE | | 43.98 | 39.59 |

SPONGE FILTERS

HydroSponge filters are perfect for aquarium and small tank filtration. They are capable of moving more water than other sponge filters, are self-weighting and act as mechanical and biological filters. Simply attach to aquarium air line tubing, supply .05 cfm and filtering begins. For higher filtration rates, a powerhead pump may be attached. Stacking doubles filtering capacity. Easy to clean. 1" diameter tube. Overall height may be shortened by cutting tube.



TECH TALK 29

Sponge Filters

Air-powered sponge filters operate on the airlift principle to induce flow, so the taller the chimney, or lift pipe, the greater the vacuum and the flow of water.

Sponge filters do an excellent job of capturing solids. Unfortunately, a lot of these collected solids drain out of the sponge when it is lifted out of the water for cleaning.

An easy way to avoid this is to use a sponge-sized plastic bag or bucket. Gently place the sponge in it while under water, then remove the entire package. Squeeze out the fouling material, but do not clean too thoroughly because that will eliminate too much of the good, nitrifying bacteria.

| | APPROXIMATE TANK SIZE (GAL) | SPONGE DIAMETER | OVERALL HEIGHT | EACH | 6+ |
|-------------|-----------------------------|-----------------|----------------|---------------|---------------|
| HF1 | 10 | 3 3/4" | 9" | \$7.30 | \$6.57 |
| HF3 | 80 | 4 1/2" | 11 1/2" | 10.15 | 9.14 |
| HF5 | 125 | 5 3/4" | 11 1/2" | 10.85 | 9.77 |
| HF1R | SPONGE REFILL/HF1 | 3 3/4" | | 2.15 | — |
| HF3R | SPONGE REFILL/HF3 | 4 1/2" | | 3.10 | — |
| HF5R | SPONGE REFILL/HF5 | 5 3/4" | | 4.55 | — |

BIO STRATA

Black PVC sheets glued in a block form 12" x 12" x 48" long (longer when ordered in 96+ ft³ quantities). It is negatively buoyant and preferred where loose media is not acceptable. Choose 68 or 110 ft²/ft³ and 8- or 10-mil PVC thickness. Made in USA.. Custom cuts available.

- Low cost
- Submerged or trickling applications
- Degassing applications



| MODEL | PVC THICKNESS | SURFACE AREA (FT ² /FT ³) | SIZE | SHIP WT (LBS/FT ³) | MIN ORDER (FT ³) | EACH/ FT ³ | |
|---------------|---------------|--|------------------|--------------------------------|------------------------------|-----------------------|-----------------------------------|
| LS688A | 8 MIL | 68 | 4' LENGTH | 4 | 4 | \$23.81 | \$22.38/12+ |
| LS110A | 8 MIL | 110 | 4' LENGTH | 5 | 4 | 47.83 | 44.96/12+ |
| LS688 | 8 MIL | 68 | 4' SECTIONS ONLY | 4 | 96 | — | 14.46/FT³ (96+) |
| LS68 | 10 MIL | 68 | 4' SECTIONS ONLY | 5 | 96 | — | 15.21/FT³ (96+) |
| LS110 | 8 MIL | 110 | 4' SECTIONS ONLY | 5 | 96 | — | 25.78/FT³ (96+) |



BIO-FILL™

A PVC ribbon with a high surface area, Bio-Fill is our lowest cost media. It is negatively buoyant, very easy to clean and easily rinsed. Sold in 1 ft³ bags (**BF250**) and 12 ft³ (**BF250B**) boxes only. Made in USA.

| MODEL | SURFACE AREA (FT ² /FT ³) | SHIP WT (LBS/FT ³) | MIN ORDER (FT ³) | EACH/ FT ³ | |
|---------------|--|--------------------------------|------------------------------|-----------------------|---------------------|
| BF250 | 250 | 4 | 1 | \$49.00 | \$42.63/4+ |
| BF250B | 250 | 35 | 12 | — | \$367.00/BOX |

BIO-BALLS

A compact polyethylene media. Select either 98 ft² (**CBB15**) or 160 ft² (**CBB1**) of surface area per ft³. Round shape with positive buoyancy. These balls, with their small void spaces, are popular for clean water applications like tropical fish aquariums. Add an "-F" for floating or "-S" for sinking.



| MODEL | SIZE | SURFACE AREA (FT ² /FT ³) | SHIP WT (LBS/FT ³) | MIN ORDER (FT ³) | EACH/ FT ³ | 4+ |
|--------------|------|--|--------------------------------|------------------------------|-----------------------|----------------|
| CBB15 | 1½" | 98 | 12 | 1 | \$54.00 | \$46.20 |
| CBB1 | 1" | 160 | 12 | 1 | 61.72 | 52.46 |

These items are sold in large quantities for commercial purposes; most ship motor freight. Note the minimum order quantities.

SWEETWATER™ SWX BIO-MEDIA

Successful biofiltration using moving bed technology requires the use of the right media. Pentair's Sweetwater SWX Bio-Media is the ideal choice at a great price. These biofilm carrier elements are made from 100% virgin high-density polyethylene. With a surface area of 274 ft²/ft³ this proven geometric design provides an abundant amount of surface area for bacteria to colonize. Robust bacteria colonization is essential to the nitrification process of converting ammonia to nitrite and ultimately nitrate. Pentair's Sweetwater SWX Bio-Media's positively buoyant characteristic allows for continuous movement in a bio-filtration tank with the use of an air pump or blower. The constant circulating action exfoliates the older, less active bacterial layer; which eliminates the need for backwashing and allows the media to be self-cleaning.

| MODEL | SURFACE AREA | DIAMETER | LENGTH | QUANTITY | EACH |
|---------------|--------------------------------------|----------|--------|-----------------|----------------|
| BF150A | 274 FT ² /FT ³ | 7/16" | 3/32" | ONE CUBIC FOOT | \$39.50 |
| BF150B | 274 FT ² /FT ³ | 7/16" | 3/32" | ONE CUBIC METER | 1255.00 |



TECH TALK 125

Biological Filtration Basics

Biological filtration is one of the most important aspects of filtration design for aquatic animal welfare. There are actually 3 distinct processes that fall under the heading of biological filtration: mineralization, nitrification and denitrification. Nitrification is typically the most commonly discussed and widely known facet of biological filtration and is undoubtedly the most critical since it deals with the breakdown of strongly toxic animal wastes, but all aspects of biological filtration are important and must be considered when designing a functional life support system for aquatic habitats.

Mineralization is a fancy word for decomposition, where complex organic material is degraded by bacteria into its simplest parts. In aquariums and aquaculture, this organic material is typically derived from fecal material and uneaten food from the animals. Heterotrophic bacteria digest this material, preventing it from building up to unsafe levels in displays or farms. The end products of mineralization are mostly inorganic nitrogen and phosphorus. Mineralization is not the only source of nitrogen in aquatic systems. The direct production of ammonia as a waste product from fish (urine) also contributes to the nitrogen load in aquatic systems. Ammonia nitrogen can be toxic to aquatic life (some species will die at levels as low as .5 mg/L). This is why nitrification is so critical. It's important to understand that it is the un-ionized form of ammonia, NH₃, that is so toxic. By dropping the pH of a tank, it's possible to convert toxic ammonia, NH₃, to NH₄⁺, ammonium, a much less toxic compound. This is easier to do in freshwater systems with pH near or below neutral than it is in marine systems with pH in the 8 to 8.2 range. It's important to realize that pH manipulations are just a "band aid" fix for ammonia management, and a well-designed biofilter is still essential.

Several strains of bacteria can use the ammonia nitrogen for food. Nitrosomonas, Nitrosococcus and Nitrobacter are the best-known organisms responsible for this process. Ammonia is the most toxic end product of mineralization and fish metabolism. Nitrosomonas and Nitrosococcus convert the ammonia (NH₃) to a less toxic compound, nitrite (NO₂). While less toxic than the ammonia, nitrite can still be lethal to fish in very small amounts (in the 1-5 mg/L range). Finally, Nitrobacter converts the nitrite to nitrate, the least toxic form of nitrogen.

Each of these forms of nitrogen—NH₃, NO₂, and NO₃—is progressively less toxic to the animals. The final end product, NO₃, is well tolerated by fish but, unless managed, will tend to build up. This brings us to the last biological filtration process, denitrification, where bacteria remove nitrate from the system water.

While nitrate is not strongly toxic, animals don't live with elevated nitrate levels in nature, so keeping nitrate levels low is important in reproducing natural conditions for aquatic life. Historically this was done with periodic water changes in closed systems, but more recently this practice has been frowned upon by local municipalities wanting to limit the discharge of excess nitrogen into natural waterways and sanitary sewer systems.

Instead of water changes, there are two primary methods for denitrification, the carbon bed digester and the sulfur bed digester. Some strains of bacteria known as facultative anaerobes can use the oxygen in the nitrate (NO₃) for energy, converting NO₃ into atmospheric nitrogen (N₂). The carbon digesters require the addition of an organic carbon source to feed the bacteria, typically a short chain alcohol (methanol or ethanol) or a simple sugar. This method has the drawback of having to measure the addition of the carbon compound. Over- or under-dosing can upset the balance of the process or, worse yet, carry unreacted alcohol back to the tank. The sulfur-based method relies on the activity of several bacteria strains that consume sulfur and nitrate without adding other chemicals. Thiobacillus denitrificans and other similar bacteria can use the oxygen in nitrate for energy. The trend in the industry is the sulfur bed digester because of its simplicity.

The NO₃ to N₂ reaction (called "reduction") consumes alkalinity, so the sulfur is typically mixed with crushed oyster shell or aragonite (a source of carbonate for buffering) to keep the pH stable. Monitoring D.O. is especially important since the environment inside the filter should be oxygen-poor, but not oxygen-free. If too much oxygen is present, the bacteria will respire aerobically (with oxygen) and no nitrate reduction will occur, but if too little oxygen is present, the filter can go anaerobic (without oxygen) and produce toxic hydrogen sulfide.

MATALA FILTRATION MEDIA

Made of flexible fiber compounds, this filtration media is used in many applications in the aquaculture and koi pond markets. It is excellent for removing solid wastes and, unlike other filter padding, totally resists compression! The solid fibers are very resistant to sludge build-up and clogging, making cleaning easy. It also features a lot of surface area, so it is very good for biological filtration. Great for low-pressure, gravity-fed filters and skimmers, Matala is positively buoyant and may require anchoring in submersed applications. Sold in 39½" L x 24" W x 1½" H sheets only. Ships Oversize.

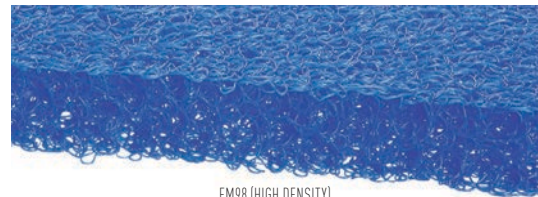
| MODEL | | SURFACE AREA (SQ.FT/CU.FT.) | FIBER DIA. (MM) | EACH | 5+ |
|-------------|-----------|-----------------------------|-----------------|----------------|----------------|
| FM97 | BLACK | 62 | 1.65 | \$31.00 | \$28.52 |
| FM96 | GREEN | 96 | .81 | \$2.00 | \$29.44 |
| FM98 | BLUE | 124 | .56 | \$3.00 | \$30.36 |
| FM99 | DARK GREY | 170 | .51 | \$8.00 | \$4.96 |



FM97 (LOW DENSITY)



FM96 (MEDIUM DENSITY)



FM98 (HIGH DENSITY)



FM99 (SUPER HIGH DENSITY)



Media not included

BIOFILTER MEDIA BAGS

You will appreciate media bags after you have to clean or relocate your biofilter! Just pour loose biofilter media into the bag and tie it off. When it is time to clean, lift them all out at once. Both bags include a drawstring at the top. Large bag measures 35" L x 23" W when flat. Small bag measures 18" x 12". Both are ¼" mesh nylon. Made in USA.

| MODEL | | EACH | 10+ |
|--------------|-------------------|---------------|---------------|
| BF165 | ¼ FT ³ | \$4.05 | \$3.65 |
| BF167 | 1 FT ³ | 11.00 | 9.53 |

BIO BARRELS

A polypropylene media available in four sizes. Remember the importance of void space with both heterotrophic fouling and degassing applications. Positive in buoyancy. Made in USA.

| MODEL | SIZE | COLOR | SURFACE AREA (FT ² /FT ³) | SHIP WT (LBS/FT ³) | MIN. ORDER (FT ³) | EACH (FT ³) | 4+ (FT ³) |
|--------------|------|---------|--|--------------------------------|-------------------------------|-------------------------|-----------------------|
| BF64A | 1" | NATURAL | 64 | 6 | 1 | \$51.17 | \$46.05 |
| BF64 | 1" | NATURAL | 64 | 6 | 20 | 44.00 | — |
| BF44A | 1½" | NATURAL | 44 | 5 | 1 | 39.56 | 35.60 |
| BF44 | 1½" | NATURAL | 44 | 5 | 30 | 30.80 | — |
| BF33A | 2" | NATURAL | 33 | 4 | 1 | 29.56 | 26.87 |
| BF33 | 2" | NATURAL | 33 | 4 | 40 | 22.00 | — |
| BF26 | 3½" | BLACK | 26 | 4 | 50 | 16.67 | — |



BF33A

BF64



◀ SWEETWATER® LOW-SPACE BIOREACTOR FILTER

Fully automatic, self-adjusting and continuously self-cleaning

This is a robust, nonpressurized biofilter that is much less sensitive to flow rate variations and power interruptions than fluidized bed sand biofilters. When operated in low-head recirculating systems, it can easily be sunk into the floor to reduce the pump pressure. When installed this way, only a few inches of head loss will occur across the LSB. Because air is used to circulate the media, the LSB both adds oxygen and strips carbon dioxide! A hood can be placed over the bioreactor to vent the CO₂ outdoors. We have colored them blue/green to prevent algae growth inside and provide the dark environment preferred by the *Nitrobacter* bacteria.

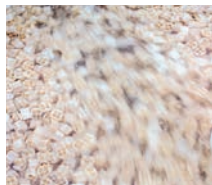
Air diffuser depth can be adjusted for compatibility with your blower/compressor. LSBs are complete with media. Compressed air connections are 1/2" slip. Air pump not included. All you need are male-threaded pipe connections. **We can also custom build larger sizes. Ship motor freight.**

- Up to 12 kg feed/m³ media (35.3 ft³)
- Non-pressurized, gravity drain
- Low head
- CO₂ stripping

PACKS A HUGE AMOUNT OF USABLE SURFACE INTO A SMALL VOLUME.



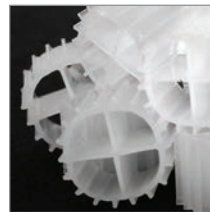
MEDIA WITH NO FLOW



MEDIA WITH WATER FLOW



MEDIA IN BIOREACTOR



BF150A

| MODEL | TANK VOL (GAL) | D X H (INCHES) | MEDIA MAX. (FT ³) | FLOWRATE (GPM) | REQ'D AIR FLOW (CFM) | IN/OUT (INCHES) | AES/B* | FEED (LBS/DAY) | SHIP WT (LBS) | EACH |
|---------|------------------------------|----------------|-------------------------------|----------------|----------------------|-----------------|--------|----------------|---------------|-----------------|
| LSB2.5 | 35 | 18 X 33 | 2.5 | 3-9 | 1 | 1.25 | 119 | 1.5-3 | 40 | \$569.16 |
| LSB3 | 40 | 18 X 36 | 3 | 3-10 | 1 | 1.25 | 142 | 2-4 | 55 | 637.50 |
| LSB5 | 70 | 23 X 43 | 5 | 7-20 | 1.5 | 2 | 236 | 3-6 | 140 | 988.38 |
| LSB7 | 94 | 21.5 X 62 | 7 | 10-30 | 2 | 3 | 339 | 4-9 | 170 | 1,218.90 |
| LSB8 | 105 | 31 X 37 | 8 | 10-30 | 2 | 3 | 376 | 5-10 | 175 | 1,269.90 |
| LSB12 | 170 | 31 X 57 | 12 | 17-50 | 3 | 3 | 576 | 7-15 | 280 | 1,716.66 |
| LSB25 | 323 | 47 X 50 | 25 | 25-90 | 4.5 | 4 | 1173 | 15-30 | 380 | 2,824.38 |
| LSB35-2 | 480 | 47 X 71 | 35 | 40-200 | 4.5 | 6 | 1730 | 20-45 | 535 | 4,382.94 |
| BF150A | BIO-MEDIA, 1 FT ³ | | | | | | | | 10 | 39.50 |

*AES/B Number is a conservative amount of fish (lbs) supported. See tech talk 106.

TECH TALK 112

Fluidized Sand Biofilters

The purpose of a biological filter is to convert ammonia to nitrate. Fish excrete ammonia in proportion to the amount of food they eat. In our catalog, you will see a "Feed per Day" rating based on a 40% protein content, 10% moisture content feed, with typical digestibility. Fluidized bed biofilters using sand media are extremely compact and very inexpensive compared to other biofilters because the media is sand. Water flows upward through the sand causing the sand grains to float or "fluidize." When the water flow is too low to fluidize the bed it is called a "collapsed bed." When the proper amount of water is flowing, the sand expands upward, a condition referred to as an "expanded bed." If too much water is flowing, the bed will over expand and the smaller grains will be carried out of the biofilter in the outflow water. There are three important aspects of fluidized sand biofilters. The first is the water inflow diffuser at the bottom. The diffuser creates a uniform, low-turbulence sand flow pattern. Excessive turbulence can erode the biofilter vessel and scour nitrifying bacteria from the sand grains. The second aspect is water flow velocity. A narrow water flow range must be maintained to keep the sand properly fluidized. Flow variations caused by pre-filters can result in collapsed or "blown-out" sand beds. The third aspect is refluidization. At start-up, a little extra pump pressure and an effective water diffuser design are required for initial fluidization.

CYCLONIC BIOREACTOR

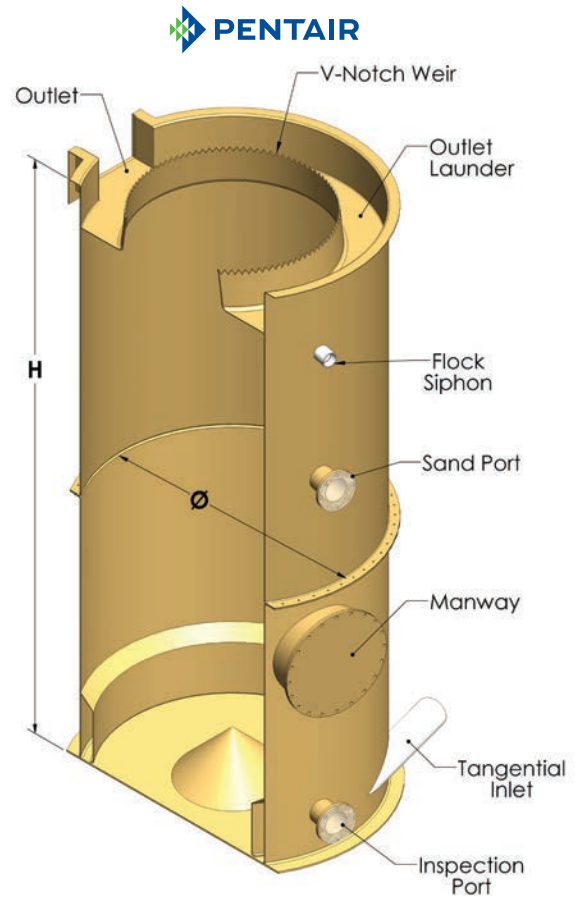
Formerly HE Group, the Pentair Aquatic Eco-Systems Cyclonic BioReactor (CBR) is a Fluidized Sand BioReactor (FSB) otherwise known as a Fluidized Sand Bio-Filter. The purpose of the CBR is to provide a vehicle for the Nitrification of Ammonia by fluidizing (or suspending in water) silica sand media. This is a two stage process where the Nitrifying Bacteria form a biofilm on the surface of the silica sand media that oxidizes Ammonia into Nitrite (Nitrosomonas) and Nitrite into Nitrate (Nitrobacter).

Features:

- Designed to maintain the highest level of system water quality with the lowest operating and maintenance cost
- A small footprint, ideal for confined spaces
- Available in many sizes for various flow requirement
- Diameters up through 84" (2134 mm) designed for containerized shipping anywhere in the world
- Multiple units can be connected in parallel for a larger flow rate

| | DIAMETER (IN.) | HEIGHT (IN.) | SHIP WEIGHT (LBS) | EACH* |
|--------------------|----------------|--------------|-------------------|-------------------|
| CBR-012-084 | 12 | 84 | 165 | \$2,871.00 |
| CBR-018-096 | 18 | 96 | 237 | 3,854.00 |
| CBR-024-096 | 24 | 96 | 311 | 4,543.00 |
| CBR-030-120 | 30 | 120 | 441 | 5,612.00 |
| CBR-036-144 | 36 | 144 | 566 | 6,554.00 |
| CBR-042-156 | 42 | 156 | 795 | 8,112.00 |
| CBR-048-159 | 48 | 159 | 924 | 9,997.00 |
| CBR-060-162 | 60 | 162 | 1311 | 14,255.00 |
| CBR-072-168 | 72 | 168 | 1640 | 16,391.00 |
| CBR-084-192 | 84 | 192 | 2320 | 20,609.00 |
| CBR-096-234 | 96 | 234 | 2726 | 23,474.00 |

*Pricing is for standard models. Customization available.



CYCLONIC BIOREACTOR TECHNICAL DATA

| MODEL NUMBER | | CBR-012-084 | CBR-018-096 | CBR-024-096 | CBR-030-120 | CBR-036-144 | CBR-042-156 | CBR-048-159 | CBR-060-162 | CBR-072-168 | CBR-084-192 | CBR-096-234 |
|---|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Diameter | Ø | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 | 96 |
| | | 305 | 457 | 610 | 762 | 914 | 1,067 | 1,219 | 1,524 | 1,829 | 2,134 | 2,438 |
| Overall Height | in | 84 | 96 | 96 | 120 | 144 | 156 | 159 | 162 | 168 | 192 | 234 |
| | mm | 2,134 | 2,438 | 2,438 | 3,048 | 3,658 | 3,962 | 4,039 | 4,115 | 4,267 | 4,877 | 5,944 |
| Tangential Inlet Ø | in | 1.5 | 2.0 | 3.0 | 3.0 | 4.0 | 4.0 | 4.0 | 6.0 | 6.0 | 6.0 | 8.0 |
| | mm | 38 | 51 | 76 | 76 | 102 | 102 | 102 | 152 | 152 | 152 | 203 |
| Outlet Configuration | | Coupling | Coupling | Coupling | Coupling | Coupling | Coupling | Coupling | Coupling | Trough | Trough | Trough |
| | Width | in | — | — | — | — | — | — | — | 36 | 36 | 42 |
| Outlet Ø | Height | in | — | — | — | — | — | — | — | 12 | 12 | 12 |
| | in | 2 | 3 | 3 | 4 | 4 | 6 | 6 | 8 | — | — | — |
| | mm | 51 | 76 | 76 | 102 | 102 | 152 | 152 | 203 | — | — | — |
| HYDRAULIC PROPERTIES OF THE CBR WITH 0.19 MM SAND | | | | | | | | | | | | |
| Flow @ 10 gpm/sf | gpm | 7.9 | 17.7 | 31.4 | 49.1 | 70.7 | 96.2 | 125.7 | 196.3 | 282.7 | 384.8 | 502.7 |
| | U/min | 29.7 | 66.9 | 118.9 | 185.8 | 267.6 | 364.2 | 475.7 | 743.3 | 1,070 | 1,457 | 1,903 |
| Flow @ 15 gpm/sf | gpm | 11.8 | 26.5 | 47.1 | 73.6 | 106.0 | 144.3 | 188.5 | 294.5 | 424.1 | 577.3 | 754.0 |
| | U/min | 44.6 | 100.3 | 178.4 | 278.7 | 401.4 | 546.3 | 713.5 | 1,115 | 1,605 | 2,185 | 2,854 |
| MEDIA REQUIREMENTS | | | | | | | | | | | | |
| Sand | Static Bed Height | in | 28 | 32 | 32 | 40 | 48 | 52 | 53 | 54 | 56 | 78 |
| | Volume | ft³ | 1.8 | 4.7 | 8.3 | 16.2 | 28.1 | 41.3 | 55.0 | 87.3 | 130.1 | 202.3 |
| WEIGHTS & LOADINGS* | | | | | | | | | | | | |
| Shipping | lbs | 165 | 237 | 311 | 441 | 566 | 795 | 924 | 1,311 | 1,640 | 2,320 | 2,726 |
| Floor Load | lbs/sf | 754 | 782 | 754 | 912 | 1,070 | 1,155 | 1,166 | 1,181 | 1,215 | 1,384 | 1,670 |

*Shipping weights are based on 25psi design thickness. Weights will change at other design pressures.

US Patent Pending, European Patent Allowed

SPINFREE SQUARE ROTARY SPRAY NOZZLE

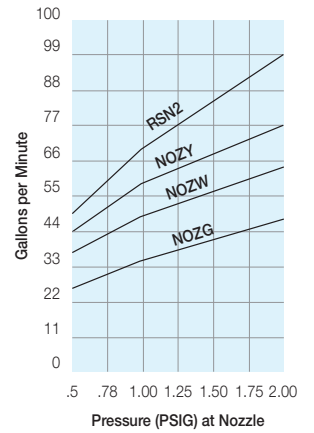
A new way to deliver water to static bed biofilters and degassing columns. Originally designed for the cooling tower industry, this all-plastic spray nozzle is extremely efficient for uniform water distribution over packed columns. It's capable of delivering a square pattern of water, so dry spots in the media bed can be eliminated in square or rectangular filter vessels. This will maximize usable surface area for gas exchange or nitrification.

Other Benefits

- Low-pressure operation
- Can be fitted with three different inserts to maintain velocity at a variety of different flowrates and delivery pressures (**RSN2** has 2" outer thread and a 1.5" orifice)
- Rotating distribution element minimizes biofouling
- Very little freeboard required. At recommended flows and pressures, only 3" of space is required between the nozzle and the media bed to obtain a 3' x 3' throwout
- Shearing action of the rotating element ensures a minimal dead zone directly beneath the nozzle



| MODEL | | EACH |
|-------------|---------------------|----------------|
| RSN2 | SPRAY NOZZLE | \$40.00 |
| NOZG | 1" ORIFICE INSERT | 5.00 |
| NOZW | 1.1" ORIFICE INSERT | 5.00 |
| NOZY | 1.2" ORIFICE INSERT | 5.00 |



SPRAY NOZZLES, HIGH FLOW

These high-flow, low-pressure nozzles distribute water uniformly and are clog-resistant. They are used in cooling towers, trickle biofilters, spray aeration and foam knockdown. CES15 models have 1-1/2" MNPT inlet, and CES2 models have 2" MNPT inlet.

| ORIFICE DIA. | ROUND CONE PATTERN | | SQUARE CONE PATTERN | |
|--------------|--------------------|---------------|---------------------|----------------|
| | MODEL | EACH | MODEL | EACH |
| 3/4 | CES15A | \$6.25 | CES2A | \$19.74 |
| 7/8 | CES15B | 6.25 | CES2B | 19.74 |
| 1 | CES15C | 6.25 | CES2C | 19.74 |
| 1 1/8 | CES15D | 6.25 | CES2D | 19.74 |
| 1 1/4 | CES15E | 6.25 | CES2E | 19.74 |
| 1 1/2 | CES15F | 6.25 | CES2F | 19.74 |

| ORIFICE DIAMETER (IN.) | 3/4 | | 7/8 | | 1 | | 1 1/8 | | 1 1/4 | | 1 1/2 | |
|--------------------------|-----|----|-----|----|----|----|-------|----|-------|----|-------|----|
| HEAD PRESSURE (FT WATER) | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 | 1 | 6 |
| CES15 (GPM) | 7 | 17 | 10 | 25 | 13 | 33 | 17 | 42 | 22 | 52 | — | — |
| CES2 (GPM) | 10 | 23 | 12 | 27 | 15 | 35 | 19 | 46 | 24 | 58 | 35 | 86 |

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- Real-time monitoring statistics
- Complete system descriptions





◀ **DEGASSING COLUMNS**

Nitrogen gas can kill fish at only 3% above saturation!

Degassing columns are used for removing nitrogen, hydrogen sulfide, carbon dioxide or other gases from water. They also add oxygen to undersaturated water. In most areas, well water (ground water) is low in oxygen and too high in nitrogen, hydrogen sulfide and carbon dioxide.

Each segment is made of heavy-duty, UV-resistant polyethylene for outdoor use. They are engineered to produce the ideal flow pattern to prevent wall channelization while exchanging air at each segment. Install just the number of segments to give the water quality needed. Each segment can receive as much as 150 gpm with excellent aeration and gas stripping results.

Each segment (16" D x 18" H) has a molded bracket that fits onto an optional hanger. The 6' H x 4" W hanger is a fiberglass I-beam, predrilled for 4 segments (bolts included). Snap the segments onto the hanger and either hang it from the ceiling, attach it to the tank wall, or to a post, so the water goes in the top and exits directly into the tank. Each segment should be filled with 0.6 cubic feet of biomedica (sold separately, see Index). We recommend **BF44A**.

| MODEL | | SHIP WT (LBS) | EACH | 6+ |
|--------------|-----------------------|---------------|----------------|----------------|
| AB12 | PACKED COLUMN SEGMENT | 5 | \$58.17 | \$52.35 |
| AB12A | OPTIONAL HANGER | 15 | 150.00 | — |

| | % Oxygen | % Nitrogen |
|-------------------------------|----------|------------|
| Inlet Water | 57 | 110 |
| Outlet Water After 1 Segment | 76 | 106 |
| Outlet Water After 2 Segments | 84 | 104 |
| Outlet Water After 3 Segments | 89 | 103 |
| Outlet Water After 4 Segments | 92 | 102 |
| Outlet Water After 5 Segments | 94 | 101 |

% refers to % of saturation. Nitrogen varies with season, so we suggest designing for the worst case. As low as 103% nitrogen can kill fish. **AB12** results are from a formal study conducted by the Canadian government.

AQUAPONICS TECHNOLOGY AND DESIGN WORKSHOP

Learn from our industry experts
Dr. James Rakocy & Dr. Wilson Lennard

Topics to be Covered

- UVI Aquaponic System & Pentair's Aquaponic System
- Fish & Plant Production
- Marketing & Economics
- Classroom & Hands-on Sessions
- Facility Tours

PentairAES.com/workshops



"Teaching at the aquaponics course sponsored by Pentair Aquatic Eco-Systems was a real treat for me because their employees have an incredible depth of experience and knowledge that they share with their students as they guide them through all phases of constructing and operating an aquaponic system to establish a successful hobby or business."

Dr. James Rakocy
"Father of Aquaponics"



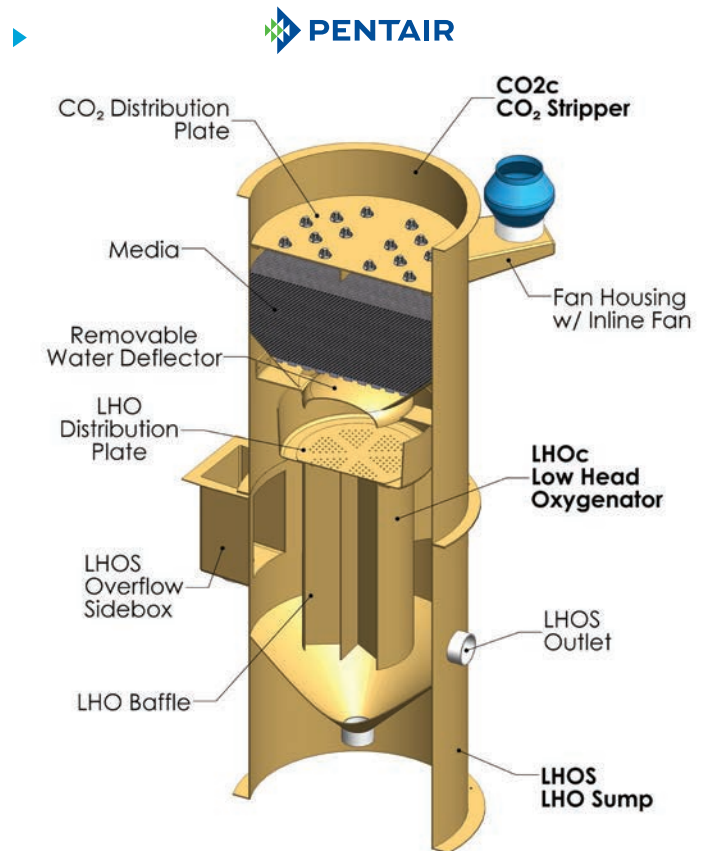
GAS CONTROL COLUMN

Formerly a product of HE Group, the Pentair Aquatic Eco-Systems the Gas Control Column (GCC) is used to maintain proper balance of dissolved gases in reuse process water. The GCT is comprised of three sections: the CO₂ Stripper (CO₂) and the Low Head Oxygenator (LHO) and the LHO Sump (LHOS).

Features:

- Designed to maintain the highest level of system water quality with the lowest operating and maintenance costs
- Customized configurations with optional components available to meet specific site requirements
- Easy access for cleaning and maintenance
- Designed for containerized shipping anywhere in the world

| MODEL | GPM | HEIGHT (IN.) | SHIP WT (LBS) | EACH |
|--------------------|-------|--------------|---------------|-------------------|
| GCC-024-018 | 157 | 156 | 754 | \$7,052.00 |
| GCC-030-024 | 245 | 159 | 888 | 8,046.00 |
| GCC-036-030 | 353 | 162 | 1029 | 9,136.00 |
| GCC-042-036 | 421 | 168 | 1179 | 10,294.00 |
| GCC-048-042 | 628 | 192 | 1499 | 12,089.00 |
| GCC-060-048 | 982 | 234 | 1891 | 14,670.00 |
| GCC-072-054 | 1,414 | 234 | 2463 | 16,823.00 |
| GCC-084-060 | 1,924 | 264 | 2914 | 20,257.00 |



TECH TALK 34

Removing Carbon Dioxide

Did you know that for every 1 lb of oxygen consumed by fish they exhale 1.38 lbs of carbon dioxide? Carbon dioxide does cause problems in recirculating systems without aeration or degassing. This can be the case, for example, where pure oxygen is used in place of aeration. Carbon dioxide must be removed, or it can build up to dangerous levels...dangerous to the fish and to humans if the fish are raised in a closed building.

Here are some numbers to keep in mind. Oxygen is about 20.9% of the air and, because it is only slightly soluble in water, it becomes saturated at a level of about 9 ppm at 68°F (20°C). Carbon dioxide is .033% of the air and is saturated in water at about .5 ppm (the ratio is higher because it is more soluble than oxygen). The comparative concentration of these two gases in blood is similar to that of water. Therefore, a lot of carbon dioxide in the water means there will also be a lot of carbon dioxide in the blood of the fish. An excess of 5 ppm carbon dioxide in the water will affect the ability of the fish to breathe.

If intensive aquaculture operations are being conducted outdoors, a splash aerator or aeration with air diffusers will drive the carbon dioxide into the air. If the operations are in a closed building, very high levels of carbon dioxide can accumulate in the air (we've seen levels exceeding 4,000 ppm in the air in closed aquaculture facilities!). It then has to be removed from the building. Air ventilators can also remove a lot of heat along with the carbon dioxide.

We suggest that carbon dioxide be stripped with a degassing column that is ventilated to the outdoors. Outdoor air can be drawn directly into the bottom of the degassing tower, forced up through the downflowing liquid, then directed back outdoors separate from the inlet. In cold weather, there will be a significant cooling effect on the water because it is being degassed through cold, dry air. A simple air-to-air heat exchanger will help.

GAS CONTROL COLUMN TECHNICAL DATA

| MODEL NUMBER | | | GCC-024-018 | GCC-030-024 | GCC-036-030 | GCC-042-036 | GCC-048-042 | GCC-060-048 | GCC-072-054 | GCC-084-060 |
|-------------------------------|----------------------------------|--------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Design Flow Range | gpm | | 126-157 | 196-245 | 283-353 | 385-481 | 503-628 | 785-982 | 1,131-1,414 | 1,539-1,924 |
| | lpm | | 476-595 | 743-929 | 1,070-1,338 | 1,457-1,821 | 1,903-2,378 | 2,973-3,716 | 4,281-5,351 | 5,827-7,283 |
| GCC—CO ₂ STRIPPER | | | CO2C-024-096 | CO2C-030-096 | CO2C-036-096 | CO2C-042-096 | CO2C-048-096 | CO2C-060-096 | CO2C-072-096 | CO2C-084-096 |
| Diameter | CO2-Ø | in | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 |
| | | mm | 610 | 762 | 914 | 1,067 | 1,219 | 1,524 | 1,829 | 2,134 |
| Height | CO2-H | in | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| | | mm | 2,438 | 2,438 | 2,438 | 2,438 | 2,438 | 2,438 | 2,438 | 2,438 |
| HLR Range | gpm/ft ² | | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 |
| | gpm/m ² | | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 |
| Inlet Configuration | | | Coupling | Coupling | Coupling | Trough | Trough | Trough | Trough | Trough |
| Width | in | | — | — | — | 36 | 36 | 42 | 42 | 42 |
| | Height | | — | — | — | 12 | 12 | 12 | 12 | 12 |
| Inlet Ø | in | | 6 | 6 | 8 | — | — | — | — | — |
| | mm | | 152 | 152 | 203 | — | — | — | — | — |
| Depth | in | | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| | mm | | 914 | 914 | 914 | 914 | 914 | 914 | 914 | 914 |
| Required Air Flow | SCFM | | 168-210 | 263-328 | 378-473 | 515-643 | 672-840 | 1,050-1,313 | 1,512-1,890 | 2,058-2,573 |
| | m ³ /min | | 5-6 | 7-9 | 11-13 | 14-18 | 19-24 | 29-37 | 42-53 | 58-72 |
| Fan G:L | | | 10:1 | 10:1 | 10:1 | 10:1 | 10:1 | 10:1 | 10:1 | 10:1 |
| Weights | Shipping | lbs | 314 | 377 | 450 | 526 | 679 | 844 | 1,182 | 1,389 |
| | Operating | lbs | 372 | 490 | 620 | 776 | 1,011 | 1,386 | 1,984 | 2,500 |
| GCC—LOW HEAD OXYGENATOR (LHO) | | | LHOC-018-060 | LHOC-024-060 | LHOC-030-060 | LHOC-036-060 | LHOC-042-060 | LHOC-048-060 | LHOC-054-060 | LHOC-060-060 |
| Diameter | CO2-Ø | in | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| | | mm | 457 | 610 | 762 | 914 | 1,067 | 1,219 | 1,372 | 1,524 |
| Height | LHO-H | in | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | | mm | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 |
| HLR Range | gpm/ft ² | | 72-89 | 63-78 | 58-72 | 54-68 | 52-65 | 63-78 | 71-89 | 78-98 |
| | gpm/m ² | | 2,897-3,622 | 2,546-3,183 | 2,347-2,933 | 2,218-2,773 | 2,129-2,661 | 2,546-3,183 | 2,897-3,622 | 3,194-3,993 |
| Chambers | qn | | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 8 |
| | Height | in | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| Submergence | in | | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| | mm | | 610 | 610 | 610 | 610 | 610 | 610 | 610 | 610 |
| Inlet Gas Ports (316sst) | qn | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | Ø | | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ |
| Weights | Shipping | lbs | 215 | 248 | 288 | 316 | 404 | 462 | 594 | 648 |
| | Operating | lbs | 183 | 221 | 258 | 296 | 384 | 445 | 580 | 640 |
| GCT SUMP | | | LHOS-024-060 | LHOS-030-063 | LHOS-036-066 | LHOS-042-072 | LHOS-048-096 | LHOS-060-138 | LHOS-072-138 | LHOS-084-168 |
| GCC Sump Diameter | in | | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 |
| | mm | | 610 | 762 | 914 | 1,067 | 1,219 | 1,524 | 1,819 | 2,134 |
| GCT Sump Height | in | | 60 | 63 | 66 | 72 | 96 | 138 | 138 | 168 |
| | mm | | 1,524 | 1,600 | 1,676 | 1,829 | 2,438 | 3,505 | 3,505 | 4,267 |
| Operating Liquid Level | | in | 48 | 51 | 54 | 57 | 60 | 66 | 72 | 78 |
| Outlet/Overflow Ø | in | | 4 | 4 | 6 | 6 | 8 | 8 | 10 | 10 |
| | mm | | 102 | 102 | 152 | 152 | 203 | 203 | 254 | 254 |
| Side Box | Width | in | 16 | 16 | 18 | 18 | 24 | 24 | 30 | 30 |
| | Depth (dimension from tank wall) | in | 12 | 12 | 14 | 14 | 16 | 16 | 18 | 18 |
| | | Height | in | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| Cone Drain | in | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | mm | | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 |
| Weights | Shipping | lbs | 225 | 263 | 321 | 376 | 486 | 685 | 817 | 1,037 |
| | Operating | lbs | 708 | 922 | 1,178 | 1,553 | 2,637 | 5,220 | 6,510 | 9,800 |
| GCC ASSEMBLY | | | | | | | | | | |
| Overall Height | OAH | in | 156 | 159 | 162 | 168 | 192 | 234 | 234 | 264 |
| | | mm | 3,962 | 4,039 | 4,115 | 4,267 | 4,877 | 5,944 | 5,944 | 6,706 |
| WEIGHTS & LOADINGS | | | | | | | | | | |
| Floor Load—Flooded | Empty | lbs | 634 | 768 | 909 | 1,059 | 1,379 | 1,771 | 2,343 | 2,794 |
| | lbs/sf | | 497.8 | 416.6 | 366.6 | 342.7 | 386.5 | 417.9 | 375.3 | 387.4 |

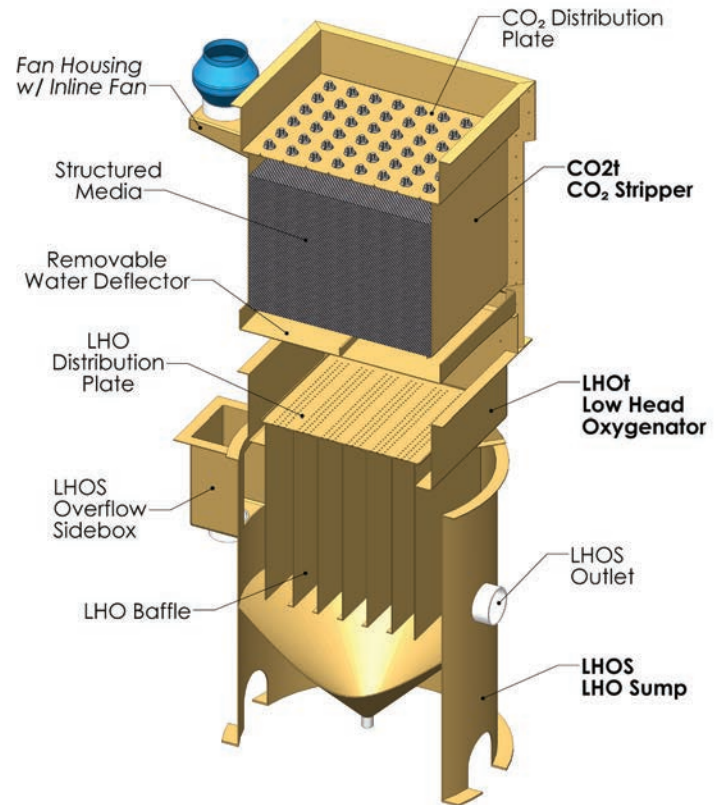
GAS CONTROL TOWER

Formerly a product of HE Group, the Pentair Aquatic Eco-Systems Gas Control Tower (GCT) is used to maintain proper balance of dissolved gases in reuse process water. The GCT is comprised of three sections: the CO₂ Stripper (CO₂) and the Low Head Oxygenator (LHO) and the LHO Sump (LHOS).

Features

- Designed to maintain the highest level of system water quality with the lowest operating and maintenance costs
- Customized configurations with optional components available to meet specific site requirements
- Easy access for cleaning and maintenance
- Designed for containerized shipping anywhere in the world

| MODEL | GPM | HEIGHT (IN.) | SHIP WT (LBS) | EACH |
|-------------|------|--------------|---------------|--------------------|
| GCT-024-018 | 200 | 159 | 827 | \$10,871.00 |
| GCT-030-024 | 313 | 162 | 987 | 12,439.00 |
| GCT-036-029 | 450 | 168 | 1131 | 14,006.00 |
| GCT-042-033 | 613 | 192 | 1498 | 15,409.00 |
| GCT-048-039 | 800 | 234 | 1865 | 18,593.00 |
| GCT-060-048 | 1250 | 234 | 2304 | 23,631.00 |
| GCT-072-054 | 1800 | 264 | 2916 | 29,711.00 |
| GCT-084-060 | 2450 | 264 | 3335 | 33,831.00 |



TECHNICIAN PROFILE



Matthew Dawson

Matt graduated from the University of Miami with a B.S. in Marine Science and Biology and later received his M.S. in Marine Science from the University of North Carolina Wilmington. His experience includes managing small and large-scale recirculating systems in both the aquaculture and aquarium industries. Matt has also completed work in finfish nutrition and production of live feeds.

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GAS CONTROL TOWER TECHNICAL DATA

| MODEL NUMBER | | | GCT-024-018 | GCT-030-024 | GCT-036-029 | GCT-042-033 | GCT-048-039 | GCT-060-048 | GCT-072-054 | GCT-084-060 | |
|--|---------------------|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----|
| Design Flow Range | gpm | | 160-200 | 250-313 | 360-450 | 490-613 | 640-800 | 1,000-1,250 | 1,440-1,800 | 1,960-2,450 | |
| | lpm | | 606-757 | 946-1,183 | 1,363-1,703 | 1,855-2,318 | 2,422-3,028 | 3,785-4,731 | 5,450-6,813 | 7,419-9,273 | |
| GCT—CO ₂ STRIPPER | | | CO2T-024-072 | CO2T-030-072 | CO2T-036-072 | CO2T-042-072 | CO2T-048-072 | CO2T-060-072 | CO2T-072-072 | CO2T-084-072 | |
| Width | CO2-W | in | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 | |
| | | mm | 610 | 762 | 914 | 1,067 | 1,219 | 1,524 | 1,829 | 2,134 | |
| Depth | CO2-D | in | 24 | 30 | 36 | 42 | 48 | 60 | 72 | 84 | |
| | | mm | 610 | 762 | 914 | 1,067 | 1,219 | 1,524 | 1,829 | 2,134 | |
| Height | CO2-H | in | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | |
| | | mm | 1,829 | 1,829 | 1,829 | 1,829 | 1,829 | 1,829 | 1,829 | 1,829 | |
| HLR Range | gpm/ft ² | | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | 40-50 | |
| | gpm/m ² | | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | 1,630-2,037 | |
| Inlet Configuration | | | Coupling | Coupling | Coupling | Coupling | Trough | Trough | Trough | Trough | |
| Width | in | | — | — | 26 | 30 | 36 | 42 | 42 | 42 | |
| | mm | | — | — | 660 | 762 | 914 | 1,067 | 1,067 | 1,067 | |
| Height | in | | — | — | 12 | 12 | 12 | 12 | 12 | 12 | |
| | mm | | — | — | 305 | 305 | 305 | 305 | 305 | 305 | |
| Inlet Ø | in | | 6 | 8 | — | — | — | — | — | — | |
| | mm | | 152 | 203 | — | — | — | — | — | — | |
| Depth | in | | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | |
| | mm | | 914 | 914 | 914 | 914 | 914 | 914 | 914 | 914 | |
| Structured Media, Splash Plate, No Media | | | | | | | | | | | |
| Fan G:L | | | | | | | | | | | |
| Weights | Shipping | lbs | 333 | 399 | 437 | 670 | 772 | 955 | 1,237 | 1,445 | |
| | Flooded | lbs | 543 | 749 | 949 | 1,385 | 1,711 | 2,445 | 3,404 | 4,412 | |
| GCT—LOW HEAD OXYGENATOR (LHO) | | | LHOT-018-060 | LHOT-024-060 | LHOT-029-060 | LHOT-033-060 | LHOT-039-060 | LHOT-048-060 | LHOT-054-060 | LHOT-060-060 | |
| Width | LHO-W | in | 18 | 24 | 29 | 33 | 39 | 48 | 54 | 60 | |
| | | mm | 457 | 610 | 737 | 838 | 991 | 1,219 | 1,372 | 1,524 | |
| Depth | LHO-D | in | 18 | 24 | 29 | 33 | 39 | 48 | 54 | 60 | |
| | | mm | 457 | 610 | 737 | 838 | 991 | 1,219 | 1,372 | 1,524 | |
| Height | LHO-H | in | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| | | mm | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | 1,524 | |
| HLR Range | gpm/ft ² | | 71-89 | 63-78 | 62-77 | 65-81 | 61-76 | 63-78 | 71-89 | 78-98 | |
| | gpm/m ² | | 2,897-3,622 | 2,546-3,183 | 2,511-3,139 | 2,640-3,300 | 2,469-3,086 | 2,546-3,183 | 2,897-3,622 | 3,194-3,993 | |
| Chambers | qn | | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 8 | |
| | Height | in | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | |
| Submergence | in | | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | |
| | mm | | 610 | 610 | 610 | 610 | 610 | 610 | 610 | 610 | |
| Inlet Gas Ports (316sst) | qn | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| | Ø | | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | ¾ x ½ | |
| Weights | Shipping | lbs | 231 | 277 | 328 | 362 | 428 | 552 | 661 | 742 | |
| | Flooded | lbs | 331 | 487 | 642 | 784 | 1,027 | 1,480 | 1,845 | 2,212 | |
| GCT SUMP | | | LHOS-030-063 | LHOS-036-066 | LHOS-042-072 | LHOS-048-096 | LHOS-060-138 | LHOS-072-138 | LHOS-084-168 | LHOS-096-168 | |
| GCT Sump Diameter | in | | 30 | 36 | 42 | 48 | 60 | 72 | 84 | 96 | |
| | mm | | 762 | 914 | 1,067 | 1,219 | 1,524 | 1,829 | 2,134 | 2,438 | |
| GCT Sump Height | in | | 63 | 66 | 72 | 96 | 138 | 138 | 168 | 168 | |
| | mm | | 1,600 | 1,676 | 1,829 | 2,438 | 3,505 | 3,505 | 4,267 | 4,267 | |
| Operating Liquid Level | | | in | 51 | 54 | 57 | 60 | 66 | 72 | 78 | |
| Outlet/Overflow Ø | in | | 4 | 6 | 6 | 8 | 8 | 10 | 10 | 12 | |
| | mm | | 102 | 152 | 152 | 203 | 203 | 254 | 254 | 305 | |
| Side Box | Width | in | 16 | 18 | 18 | 24 | 24 | 30 | 30 | 36 | |
| | | Depth (dimension from tank wall) | in | 12 | 14 | 14 | 16 | 16 | 18 | 18 | 20 |
| | | Height | in | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| Cone Drain | in | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| | mm | | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | |
| Weights | Shipping | lbs | 263 | 311 | 366 | 466 | 665 | 797 | 1,017 | 1,148 | |
| | Flooded | lbs | 1,167 | 1,472 | 1,896 | 3,029 | 5,710 | 7,098 | 10,486 | 12,559 | |
| GCT ASSEMBLY | | | | | | | | | | | |
| Overall Height | OAH | in | 159 | 162 | 168 | 192 | 234 | 234 | 264 | 264 | |
| | | mm | 4,039 | 4,115 | 4,267 | 4,877 | 5,944 | 5,944 | 6,706 | 6,706 | |
| WEIGHTS & LOADINGS | | | | | | | | | | | |
| Shipping | lbs | | 827 | 987 | 1,131 | 1,498 | 1,865 | 2,304 | 2,916 | 3,335 | |
| | Floor Load—Flooded | lbs/sf | 416 | 383 | 362 | 414 | 430 | 390 | 409 | 382 | |

OXYTOWER™ GAS TREATMENT SYSTEM

PR Aqua's OxyTower Gas Treatment Systems for culture water deliver maximum value, performance, and security to aquaculture operators. One rugged, compact unit removes carbon dioxide and oxygenates water. The cost-effective design can be used in partial reuse systems, in recirculating aquaculture systems, or in flow-through systems.

Designed for optimal gas transfer performance, the OxyTower System delivers energy efficiency through precise pump sizing and low head oxygenation. Blowers are used to strip carbon dioxide. An optional alarm system is easily integrated.

Water enters the vessel from the top orifice plate and cascades down through a Carbon Dioxide Stripper. Blowers, sized specifically for desired flow rates and carbon dioxide removal, force fresh air across water droplets. This process drives off carbon dioxide and absorbs oxygen until the dissolved gases are close to saturation. Treated water flows into a stilling chamber and is delivered to the top of the LHO chamber where water is supersaturated with oxygen.

The OxyTower System, with integrated controls, can be installed into existing facilities and requires:

- Simple plumbing and electrical connections on site
- A pump, header tank, oxygen flow meter, and oxygen source

Key Advantages

- Combines carbon dioxide removal and oxygenation into one space-saving, energy-efficient unit
- Lowers energy costs by reducing pumping requirements
- Reuses 50 to 70% of water within a tank system
- Increases fish production without increasing water consumption
- Improves fish health by optimizing water quality
- Installs easily into raceways or tank culture systems
- Allows conversion of a flow-through system into a partial reuse system to significantly reduce water usage
- Treats flows of 100 to 2,000 gpm—seven models available
- Provides durability—aluminum construction
- Offers improved security with built-in blower redundancy
- Integrates with optional components for complete reuse packages

CALL FOR MORE INFORMATION AND PRICING.



Online Orders: PentairAES.com | Phone Orders and Tech Advice: 877.347.4788



VACUUM DEGASSERS

The PR Aqua Vacuum Degasser is an open bottom column designed to be installed in a header tank containing water to a required depth. Water enters the vessel through a sealed top and cascades down into the vessel. A vacuum pump or blower creates lower pressure within the vessel thereby releasing gases from the water into the atmosphere. Stripped water is discharged into a header tank and is ready for further treatment if required.

Key Advantages

- Reduces TGP to below saturation
- Simplifies operation and maintenance
- Installs easily into a retrofit or into a new system
- Removes potentially harmful gases like hydrogen sulfide
- Offers rugged construction—stainless steel, aluminum, fiberglass or concrete with metal fittings
- Allows for addition of oxygen
- Includes sight tube for easy measurement of vacuum level within vessel

CALL FOR MORE INFORMATION AND PRICING.



◀ CARBON DIOXIDE STRIPPER

PR Aqua Carbon Dioxide Strippers are ideal for water reuse and recirculating aquaculture systems. Pentair offers seven sizes for flow rates up to 2,000 gpm. Excess carbon dioxide in culture water can be toxic to fish, and removal of excess carbon dioxide is critical. The Carbon Dioxide Stripper simultaneously removes carbon dioxide and aerates water.

Water enters the vessel from the top and cascades inside the column. A blower, sized specifically for the desired flow and carbon dioxide removal, forces fresh air across the water droplets. Carbon dioxide is driven off and oxygen is absorbed until the dissolved gases are close to saturation. Treated water drops into the header tank and is ready for distribution.

Key Advantages

- Uses forced air to strip elevated carbon dioxide from culture water
- Reduces total gas pressure (TGP) when necessary
- Can use excess elevation from biofilter, which reduces pumping requirements
- Includes built-in blower redundancy

CALL FOR MORE INFORMATION AND PRICING.

LOW HEAD OXYGENATORS

The PR Aqua Low Head Oxygenator (LHO) System supersaturates water with oxygen without using high pressure pumps or compressed oxygen typical of other oxygenation equipment. Pentair customizes LHOs to meet desired oxygenation results, footprint restrictions, and flow rate requirements.

Water with a low dissolved oxygen concentration is distributed across an orifice plate at the top of the LHO. Water droplets fall evenly into chambers where oxygen (and/or ozone) is injected at one side of the vessel and passes through each chamber in series. Oxygen is driven into the water while nitrogen is forced out. The oxygen depleted gas mixture escapes by bubbling out of the burp tube.

Key Advantages

- Minimizes overall water consumption
- Installs easily into raceways, header tanks, or centralized treatment modules
- Efficiently distributes oxygen by using internal baffle design
- Requires minimal maintenance
- Uses gravity fed supply water to allow for low head requirement—no high pressure pumps
- Achieves up to 200% oxygen saturation with low pressure oxygen supply (less than 5 psi when using an oxygen generator)
- Offers durability—aluminum or stainless steel construction
- Uses either bulk or generated oxygen and can be used to dissolve ozone into water
- Allows for adjustment of burp tube depth to suit hydraulic loading rate

CALL FOR MORE INFORMATION AND PRICING.





◀ EV SERIES PROTEIN SKIMMERS

The AquaC protein skimmers employ a “spray injection system” that draws in much more air than any other on the market. The more air, the more work that gets done. This injection system is coupled with a compact mixing box that has an internal baffling system—increasing contact time and removing more waste from the water. The skimmers are designed to run in sumps without being raised, and the output valve is at a height of 9” (EV120–EV180 models), which means that as long as the sump level is 9” or lower it will eliminate water level fluctuation effects on skimming. EV240–EV2000 can sit in water as deep as 10”. The “Twist-Lock” collection cup and cap creates a secure, quick-release connection. Skimmers are very quiet and include precision airflow valves. All skimmers come with a JG Guest fitting for ozone or to bleed off excess CO₂ from a calcium reactor. Units also have outlet gate valves. Pump is not included.

| MODEL | HOSE INLET | OUTLET GATE VALVE | TANKS SIZE (GAL) | DIMENSIONS L X W X H | FLOW @ 2 PSI (GPM) | SHIP WT (LBS) | EACH | OPTIONAL PUMP MODEL |
|--------|------------|-------------------|------------------|----------------------|--------------------|---------------|-----------------|---------------------|
| EV120 | 3/4" | 1" | 40–150 | 8.5" X 5" X 18" | 5 | 10 | \$324.00 | MD5 |
| EV180 | 3/4" | 1" | 60–200 | 9" X 6" X 20" | 7 | 11 | 374.00 | MD7 |
| EV240 | 3/4" | 1 1/2" | 80–350 | 11" X 7" X 26" | 12 | 16 | 429.00 | MD12 |
| EV400 | 3/4" | 1 1/2" | 100–450 | 11" X 7" X 32" | 16 | 18 | 499.00 | PM26 |
| EV1000 | 1" | 1 1/2" | 300–1,000 | 12" X 9" X 32" | 24 | 28 | 699.00 | PM27 |
| EV2000 | 1" | 1 1/2" | 500–2,000 | 12" X 9" X 42" | 34 | 32 | 839.00 | PM28 |

TECH TALK 78

Protein Skimmer/Foam Fractionator

Ammonia, feces and carbon dioxide are not the only waste products in a recirculating fish system. There are also complex organic substances from decomposing feed, urea, fish slime and metabolic by-products. Added to that are algae, phenols and saprophytic bacteria that irritate the fish's gills, affect growth rate and increase disease susceptibility. These dissolved and suspended materials make up the biochemical oxygen demand (BOD), color, odor, taste, turbidity, etc., that a foam fractionator can remove.

Foam fractionation (also referred to as protein skimming and protein fractionation) works best in salt water where foam production is easier, but it can be done and is becoming more popular in freshwater systems (call for details).

The process uses air bubbles from a fine bubble diffuser or venturi to create the foam. The foam adsorbs and entraps the above pollutants, along with the surface active compounds that make foam production possible, all of which are then expelled through a discharge tube or into a holding chamber.

The use of ozone can enhance this process. It will also aid in the control of bacteria, protozoa and viruses. In general, a protein skimmer should be sized to give a time of residence between thirty seconds and two minutes in the contact chamber. Longer periods are needed to remove smaller particles.

In general, the higher the pH and salt level, the better they work. We offer no guarantee on these and they are not returnable because we have no control over your water's ability to produce foam. Learn a lot more from the book *Recirculating Aquaculture* (WQB109).

SALTWATER PROTEIN FRACTIONATORS

All RK2 fractionators are built of high-quality, long-lasting, salt water and ozone compatible materials. They feature dedicated venturi manifold pumps, ozone-resistant PVDF injectors, washdown sprayers with electronic interval timers, EPDM flange gaskets, level control valves and unions or flanges at all ports. Motors available with any electrical configuration. AC models have clear bodies. PE models have high-density polyethylene (HDPE) bodies. All have clear acrylic collector chambers. Ozone systems (with air dryers and oxygen generators) are sold separately. Ship motor freight, FOB California. Crating charge is included in price. One-year limited warranty. Made in USA.



RK75PE

RECOMMENDED OZONE GENERATORS

| Part No. | Technical Info | Includes | Compatible Protein Fractionator(s) |
|----------|---|---|------------------------------------|
| 6004 | 300 mg/hr @ 1.3% by weight at 6 scfh. 115V/60 Hz, 2.7 amps. | ORP controller with probe and mount. No air prep. | RK10AC, RK25PE |
| 6009 | 1,000 mg/hr @ 1.3% by weight at 4 scfh. 115V/60 Hz, 2.7 amps. | ORP, temperature and pH controller, probes and mounts. Built-in air dryer. | RK50PE, RK75PE |
| 6014 | 2,500 mg/hr @ 3% by weight at 8 scfh. 115V/60Hz, 3.1 amps | ORP, temperature and pH controller, probes and mounts. Built-in air dryer. | RK75PE-HF, RK300PE, RK300PE-HF |
| 6016 | 4 g/hr @ 3% by weight at 4 scfh through external oxygen concentrator (included). 115V/60 Hz, 4.6 amps. | ORP, temperature and pH controller, probes, mounts and oxygen concentrator. | RK150PE-HF, RK300PE, RK300PE-HF |
| 6017 | 8 g/hr @ 3% by weight at 8 scfh through external oxygen concentrator (included). 115V/60 Hz, 5.0 amps. | ORP, temperature and pH controller, probes, mounts and oxygen concentrator. | RK600PE |
| 6024 | 15 g/hr @ 6% by weight at 6 scfh through external oxygen concentrator. (included). 115V/60 Hz, 7.6 amps. | ORP, temperature and pH controller, probes, mounts and oxygen concentrator. | RK1000PE |
| 6030 | 27 g/hr @ 6% by weight at 12 scfh through external oxygen concentrator (included). 115V/60 Hz, 13.3 amps. | ORP, temperature and pH controller, probes, mounts and oxygen concentrator. | RK2000PE |

The flowrates shown are the rates at which culture water can move through a foam fractionator with a two-minute residence, or dwell time.

| PROTEIN FRACTIONATORS | FLOW AT 2-MIN DWELL (GPM) | AMPS @ 230V/60 HZ/1PH | HEIGHT* | DIAMETER | BASE DIMENSIONS | SHIP WT (LBS) | OPTIONAL | | |
|-----------------------|---------------------------|-----------------------|---------|----------|-----------------|---------------|------------|-----------------|----------|
| | | | | | | | EACH | OZONE GENERATOR | EACH |
| RK10AC | 10 | .95 | 85" | 10" | 15" X 36" | 200 | \$3,910.00 | 6004 | \$755.00 |
| RK25PE | 25 | .95 | 85" | 14" | 24" X 30" | 200 | 3,985.00 | 6004 | 755.00 |
| RK50PE | 40 | 1.3 | 99" | 20" | 24" X 42" | 250 | 6,485.00 | 6009 | 3,815.00 |
| RK75PE | 70 | 4.3 | 102" | 24" | 24" X 42" | 300 | 7,325.00 | 6009 | 3,815.00 |
| RK75PE-HF | 105** | 5.75 | 102" | 24" | 24" X 42" | 300 | 8,305.00 | 6014 | 4,845.00 |
| RK150PE | 155 | 6.9 | 101" | 36" | 36" X 54" | 550 | 9,390.00 | 6014 | 4,845.00 |
| RK150PE-HF | 210** | 8.3 | 101" | 36" | 36" X 54" | 550 | 10,900.00 | 6016 | 6,275.00 |
| RK300PE | 290 | 8.3 | 110" | 48" | 48" X 66" | 650 | 11,640.00 | 6016 | 6,275.00 |
| RK300PE-HF | 375** | 7.8 | 110" | 48" | 48" X 66" | 650 | 12,915.00 | 6016 | 6,275.00 |
| RK600PE | 600 | 8.3 (X2) | 144" | 60" | 60" X 78" | 1,000 | 21,825.00 | 6017 | 6,030.00 |
| RK1000PE | 1,100 | 8.3 (X4) | 144" | 84" | 92" X 114" | 1,500 | 36,360.00 | 6024 | CALL |
| RK2000PE | 1,500 | 7.88 (X4) | 168" | 84" | 92" X 114" | 1,800 | 50,760.00 | 6030 | CALL |

*Minimum clearance. Additional clearance for servicing is highly recommended. **Flow at 90 second dwell.

SAFEGUARD UV SYSTEMS™ VERTICAL OPEN CHANNEL

SAFEGUARD UV SYSTEMS VERTICAL OPEN CHANNEL UV

SafeGUARD UV Systems offers a cost-effective germicidal disinfection solution for high-flow/high-fluence applications, ideal for use in hatcheries and raceways. An exclusive operator-friendly and easy-to-service design reduces labor and costly breakage. The vertical lamp field utilizes turbulent flow which achieves better hydraulic mixing compared to the laminar-flow created by less-efficient horizontal "rack style" open channel UV systems.

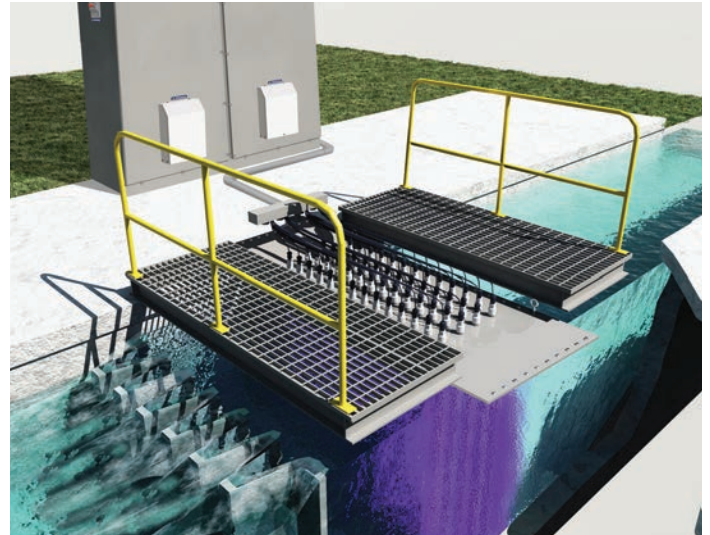
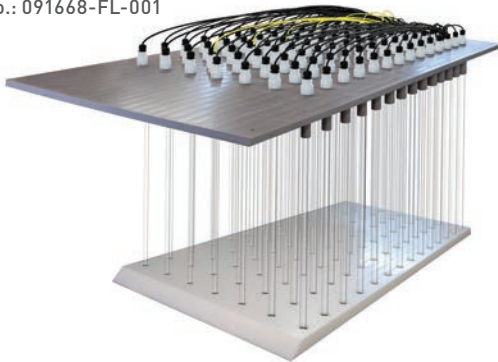
VERTICAL CHANNEL POLYMER PLATE (VCPD)

The design simplicity of the SafeGUARD UV Systems VCPD increases its versatility, making it adaptable for use in a number of applications. Just supply us with the application's existing water quality data such as UVT, desired dose, water flow rate, channel dimensions (mechanical drawing) and power requirements. This open channel system consists of a Control Panel/Power Supply enclosure, quartz ware module plates (upper & lower), quartz sleeves and lamps. A water level control weir maintains the correct water depth inside the channel, within the UV lamp field. The weir is equipped with a drain for easy channel cleaning and available in stainless steel or Schedule-80 Modified Polymer.

Pentair Aquatic Eco-Systems will work with you to customize a VCPD system to best suit your application. Due to the flexible design of the SafeGUARD UV Systems Vertical Open Channel system, configuration possibilities are endless. Quartz ware module plates are engineered to specific application parameters, such as lamp array and plate dimensions. The VCPD reduces microorganisms through ultraviolet light.

Servicing is easy and labor is minimized with the single-end access to your UV lamps and quartz sleeves.

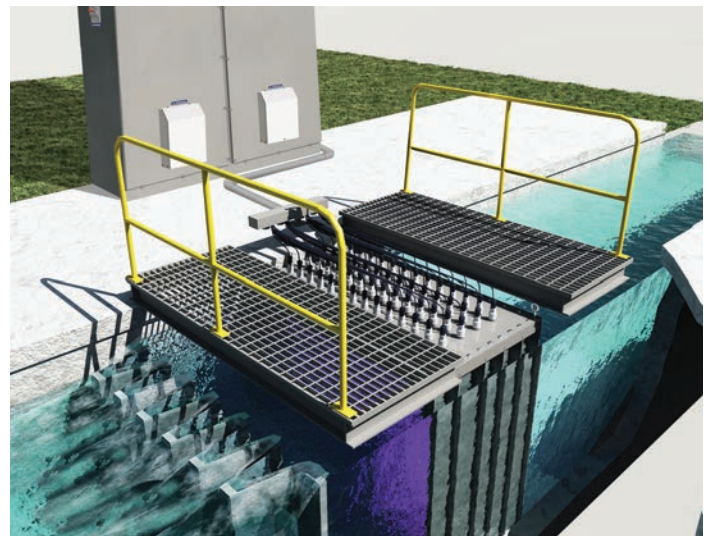
EPA Est. No.: 091668-FL-001



VERTICAL CHANNEL POLYMER FRAME (VCPF)

The SafeGUARD UV Systems VCPF is very similar to the VCPD. Instead of using plates to orient the lamp field, a frame is used. The frame is designed to be lowered into the channel and anchored down. The VCPF reduces microorganisms through ultraviolet light.

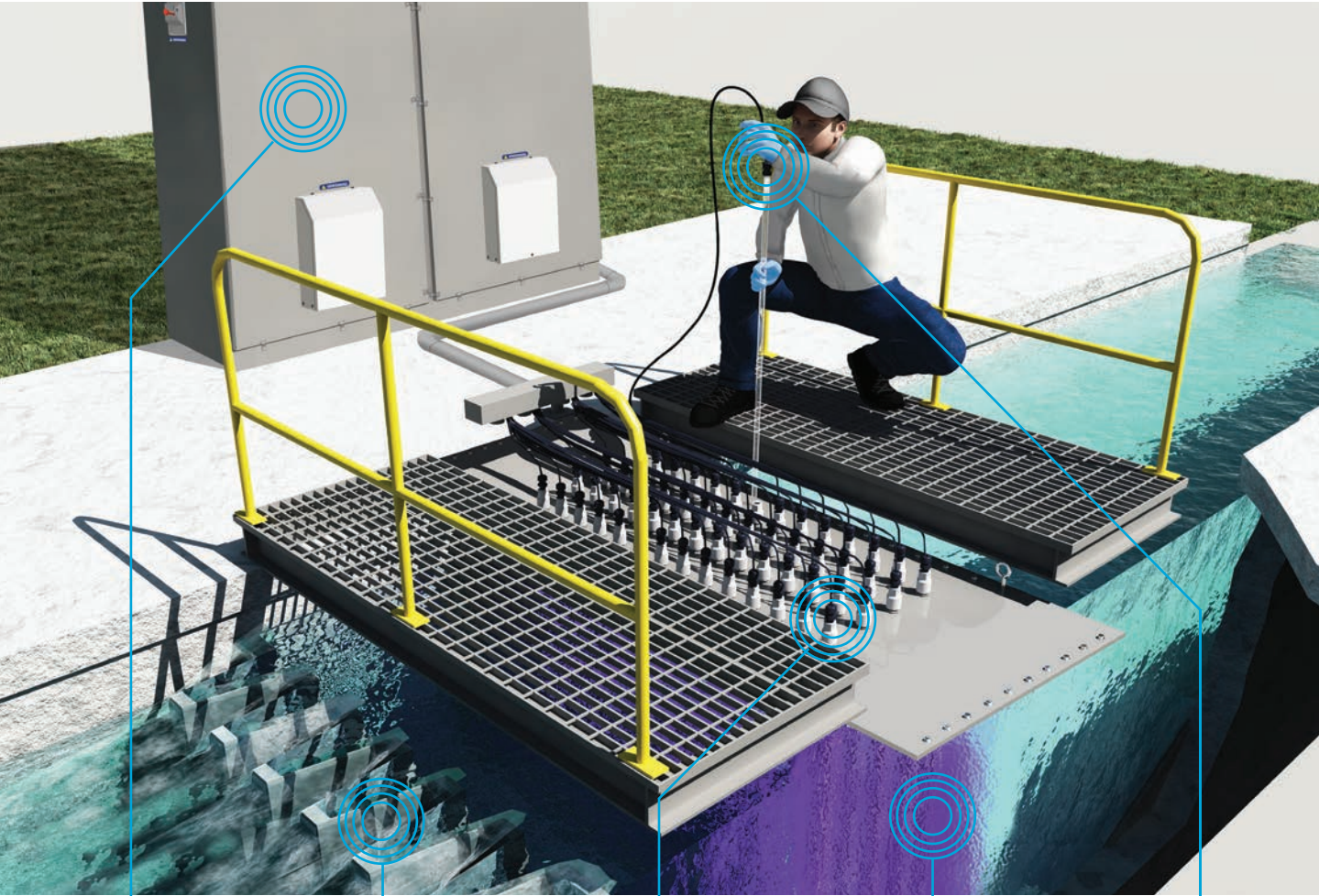
EPA Est. No.: 091668-FL-001



VCPF side frame attached to channel wall (not shown).

SAFEGUARD UV SYSTEMS™ VERTICAL OPEN CHANNEL UV OVERVIEW

Operator-Friendly, Cost Effective, Reliable UV Solution



WALKWAYS ARE CUSTOMER-SUPPLIED



1



2



3



4



5

System Features

- 1. Remote-Mounted Power Supply Enclosure with Control Package (Basic Included. PLC Optional)
- 2. A accurately designed weir is integral to the proper operation of an open channel system.
Pentair AES will provide assistance with the sourcing and supplying of the weir in most cases.
- 3. Quick disconnects and easy to access UV Lamps and Quartz Sleeves enable fast and simple maintenance
- 4. Custom Designed Module Plates or Channel Frame
- 5. Highest-Quality American-Made Low-Pressure High-Output UV Lamps and Quartz Sleeves

SAFEGUARD UV SYSTEMS™ LOW-HEAD UV REACTOR

High Flow/High UV Dose Applications

Our Low-Head UV Reactors provide a cost-savings alternative to shell & tube style UV systems for large applications (flow rates from 1,000 to >10,000 GPM). Low-Head UV Reactors do not require an on-site channel. This specialized system is designed to minimize head-loss while providing high-flow UV dose performance. The latest UV technology—energy-efficient, high-intensity Amalgam lamps—are used for optimal performance and efficacy.

The corrosion-resistant NEMA Type 12 Control Panel/Power Supply enclosure is operator-friendly and designed for in-field service capability. Various control options are available.

Low-Head UV Reactors minimize electrical consumption because they do not require "high-head" (high RPM) pumps. In many situations they can operate by gravity. The treatment chambers are constructed of either Schedule-80 Modified Polymer or fiberglass, depending upon the application. These units are also equipped with an internal baffling system that controls the water-flow through the lamp field to achieve reliable UV dose delivery.

The simple, yet efficient, lamp/quartz sleeve module design allows for fast and easy sleeve cleaning without the need for an expensive and complex automatied cleaning system.

We offer a variety of lamp configurations to address the unique requirements of your specific application. Power Supply Enclosures are UL 508a listed.

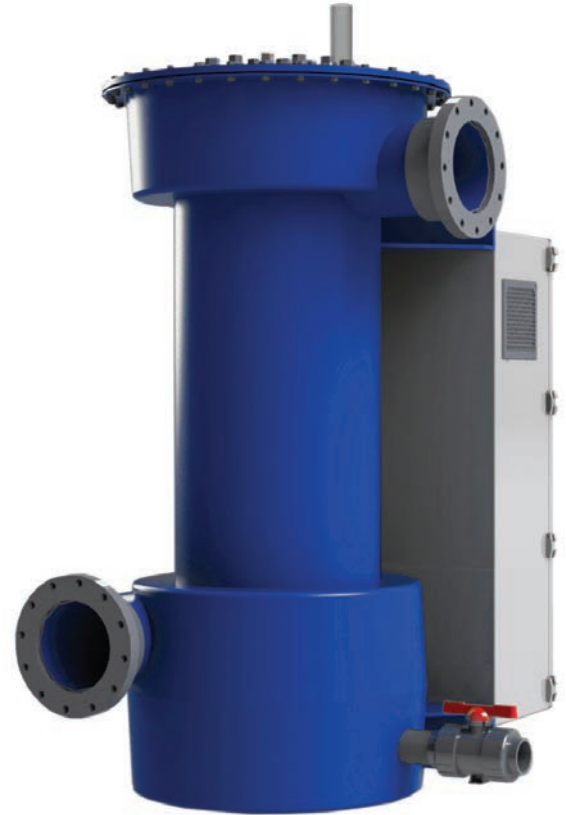
System Features

- Basic Control Package included. (Optional PLC package is available)
- State-of-the-art electronic ballast matched precisely to the lamp's power requirement to ensure optimal UV-C output and maximized lamp life
- American-Made Amalgam lamps offer 12,000 hours of continuous operation**
- Extremely versatile design addresses the requirements of high-flow, low-head applications without requiring an on-site channel
- Can be much more cost-effective than high system pressure shell & tube style UV systems when applied to high-flow applications
- Constructed of durable, heavy-wall, Schedule-80 Modified PVC or fiberglass*
- Vertical system orientation minimizes footprint of unit
- Watertight design protects all electrical hardware from water damage
- Individual lamp and quartz sleeve servicing simplifies maintenance and reduces labor
- Inlet and outlet flanges sized for application
- Reduces microorganisms through ultraviolet light.

EPA Est. No.: 091668-FL-001

*Limited 3 Year Warranty

**Limited 12,000 hr warranty on all lamps



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- Comprehensive equipment listings
- Real-time monitoring statistics
- Complete system descriptions

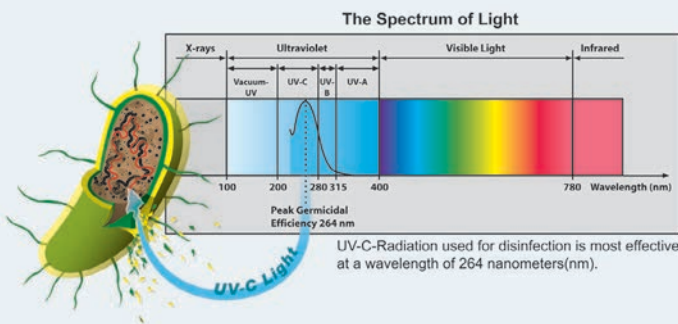


TECH TALK 135

How does UV Sterilize the Organisms in my water?

When you hear "UV", tanning on the beach may come to mind, but the UV light that water treatment systems emit is not the same UV that turns your skin to that golden brown, or red! Light is divided into wavelengths; for example red light and blue light are emitted at different wavelengths. Similarly there are 3 principal bands or wavelengths of UV that are of interest here. The three bands are called UV-A (long wavelength), UV-B, (mid wavelength) and UV-C (short wavelength). Sunlight that reaches the surface of the earth is comprised primarily of UV-A and has some UV-B. These wavelengths are what reach your skin when you go outside on a sunny day. UV-C is emitted by our sun, but is blocked by our atmosphere. UV-C is very natural!

UV-C is emitted at a wavelength range of 200nm (or nanometers) to 280nm.



Light emitted in the UV-C range is very effective at sterilizing very small organisms such as bacteria, fungi, algae, spores, viruses, etc. UV-B and UV-A do as well, just with much lower effectiveness. The peak effective wavelength for micro-organism sterilization is right near the middle of the UV-C wavelength band and found at 262nm. Keep that number in mind! That is where the biology and lamps meet; UV lamps primarily emit UV-C light at 254nm. This wavelength, which happens to be very close to the peak effective sterilization wavelength of 262nm!

It should be also noted that different organisms require different levels of exposure to UV-C in order to be sterilized; some organisms are tougher than others! This level of exposure is called UV "dose". In basic terms dose is the intensity of the emitted UV light multiplied by the exposure time. For example when using the same UV treatment system for an application, doubling the flow rate through the reactor would halve the dose value. A doubled flow rate means that the water was exposed to the light from the UV lamp for half the time it had been before.

Harmful Pathogens associated with Aquaculture

| ALGAE | UV DOSE |
|--|--------------------|
| Chlorella Vulgaris | 22 mJ/cm2 |
| BACTERIA | |
| Aeromonas salmonicida | 3.6 mJ/cm2 (log-3) |
| Pseudomonas fluorescens (fin rot) | 11 mJ/cm2 (log-3) |
| PROTOZOA | |
| Myxobolus cerebralis (TAMs, Whirling Disease) | 40 mJ/cm2 |
| Ichthyophthirius multifiliis (freshwater white spot) | 100 mJ/cm2 |
| Cryptocaryon irritans (marine white spot) | 280 mJ/cm2 |
| VIRUS | |
| KHV (Koi herpesvirus) | 4 mJ/cm2 |
| IHNV (Infectious Hematopoietic Necrosis/RTTO) | 30 mJ/cm2 |
| VHS (Viral Hemorrhagic Septicemia) | 32 mJ/cm2 |
| IPNV (Infectious Pancreatic Necrosis Virus) | 246 mJ/cm2 |

So, How Does a UV System Work?

The lamps used for disinfection are very similar to the lamps used in the fluorescent fixtures in your home. The primary difference is that the lamps in your home convert ALL of the UV-C generated by the lamp into visible light. The UV lamps in your water treatment system have no visible light converting phosphor (that white stuff on the inside of the fluorescent lamps), and special quartz envelopes that allow the UV-C to transmit outside of the bulb. The lamps in your home use a special glass envelope that totally blocks UV at any wavelength be it UV-A, UV-B, or UV-C.

UV treatment systems are comprised of a highly efficient UV lamp that is situated within a high quality UV-C transmitting quartz sleeve, and in turn that lamp and sleeve are placed within a flow chamber or vessel. The quartz sleeve is the boundary between the water and the lamp; we don't want our lamps to get wet!

Water flows through the chamber, and around the lamp/sleeve assembly. The UV-C generated by the lamp emits through the water, hits the organisms we want sterilized, and does its job.

So, What Do We Need to Know to Ensure Successful Installation of a UV Treatment System?

- Target organism – What dose do we need?
- Flow Rate – so we can get you the right dose at your flow rate
- UVT or Ultra Violet Water Transmittance –What is that???

UVT or Ultra Violet Transmittance

Water as a fluid allows light to pass through it, we all know that. We also know that water "attenuates" or absorbs light as you go deeper and deeper into it, i.e. a lake or an ocean. Many people that scuba dive know that water absorbs red light faster than blue light; when you dive down the reds disappear or get absorbed before the blue light does. What this demonstrates is that water absorbs light at different rates, dependent on the wavelengths.

UVT is not a common term. In fact, many do not even know that this parameter is one of the most important aspects with regards to ensuring that a UV treatment system works well. UVT is the amount of light, ONLY at 254nm (or the wavelength that the lamp emits), that can go through 1cm, or about 2/5's of an inch of water. For example, a UVT of say 90% means that 90% of the UV-C light will still be there, and not absorbed, after travelling through 1cm of water. The lower the UVT, the more the UV-C light is absorbed by the water, and generally that means that we have to pick a system with more lamp power. Ineffective UV treatment can be attributed to improper consideration of UVT when sizing a system.

Now UV-C light gets absorbed very quickly by water, even in very pure water. Even our atmosphere absorbs it. If you add things to the water, i.e. anything, the amount of UV-C that gets absorbed goes even higher and effectively the UVT value drops. At microscopic levels minerals, chemicals, tannins, biological debris, etc., can reduce the UVT value of your water. Some typical UVT values are:

- Pools: 85% to 95% UVT
- Aquaculture: 70% to 98%
- Public aquariums & zoo displays: 70% to 98%.

As the water UVT drops, UV systems need more lamp power to reach the same target dose!

Did you know that a system for 90% UVT water can sometimes require as much as 20% to 30% more lamp power than that of a system for water with a 95% UVT, even though they have the same flow rates and dose level requirements? UVT is very important! If you were to use 95% UVT as your criteria when you purchased your system, and your water was actually 90% UVT, your system would not treat your water appropriately; it would be undersized, and perhaps drastically undersized! This is a reason many people have trouble getting UV to work for them. They don't take the actual UVT of their water into account. If you need assistance calculating your UVT please do not hesitate to contact a Pentair Aquatic Eco-Systems representative today!

SAFEGUARD UV SYSTEMS™ CLP SERIES

Commercial L-Vessel Polymer

CLP Series SafeGUARD UV Systems offers an optimized and efficient internal hydraulic and optical design, ensuring that your system always provides the performance required. The optical design matches the UV-C light intensity distribution throughout the treatment chamber to the specific flow patterns of that chamber, ensuring reliable fluence (UV dose) delivery. CLP models feature Schedule-80 Modified Polymer construction**, ideally suited for corrosive and saltwater conditions. CLP vessels are extremely durable and deliver a cost savings of up to 50% when compared to more expensive and corrosion-prone 316 stainless steel. Vessels can be mounted horizontally or vertically.

CLP Series SafeGUARD UV Systems feature single-end UV lamp and Quartz Sleeve assembly. They use a remote NEMA Type 12 thermoplastic Control Panel/Power Supply enclosure and is available with Basic or optional PLC(shown) control packages with either LPHO or Amalgam UV lamps. Power Supply Enclosures are UL 508a listed. NSF 50 Certified.

System Features

- State-of-the-art electronic ballast matched precisely to the lamp's power requirement to ensure optimal UV-C output and maximized lamp life
- Schedule-80 Modified Polymer* construction is stronger and can typically handle higher internal pressures than polypropylene and HDPE vessels
- Single-end UV lamp and quartz sleeve access for easy servicing
- Watertight design protects all electrical hardware from water damage
- Highest-Quality American-Made UV-C lamps offer 12,000 hours of continuous operation** at or above the minimum required UV-C intensity levels required to meet your dose target
- Power supplies are 120v or 230v and are 50/60 Hz compatible
- Reduces microorganisms through ultraviolet light.



CALL FOR MORE INFORMATION AND PRICING.

*Limited 3 Year Warranty

**Limited 12,000 hr warranty on all lamps

EPA Est. No.: 091668-FL-001

| MODEL | LAMPS/ WATTS | INPUT WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (L X D) | POWER ENCLOSURE DIMENSIONS (H X W X D) | (x) INLET/OUTLET PORT(S) (FLANGE) | AMPS MAX LOAD @ 120/230 VAC | MAX PSI/BAR | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM |
|--|-----------------|----------------|-------------------------|------------------------------------|--|---|-----------------------------------|----------------|----------------------------------|-----------------------------------|
| CLP Low-Pressure High-Output UV Systems | | | | | | | | | | |
| CLP4160H06-xFB | 2/80 | 160 | 54 | 56" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.0/1.5 | 150/10.3 | 81/314 | 13/52 |
| CLP4240H06-xFB | 3/80 | 240 | 81 | 56" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 4.0/2.0 | 150/10.3 | 119/461 | 20/77 |
| CLP4320H06-xFB | 4/80 | 320 | 108 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.0/2.5 | 150/10.3 | 155/600 | 26/100 |
| CLP6300H06-xFB | 2/150 | 300 | 114 | 85" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.75/1.8 | 150/10.3 | 174/675 | 29/113 |
| CLP6450H06-xFB | 3/150 | 450 | 171 | 85" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 5.5/2.7 | 150/10.3 | 250/969 | 41/162 |
| CLP6600H06-xFB | 4/150 | 600 | 228 | 85" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 7.5/3.7 | 150/10.3 | 331/1283 | 55/214 |
| CLP Low-Pressure Amalgam UV Systems | | | | | | | | | | |
| CLP4130A6-xFB | 1/130 | 130 | 40 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 2.1/1.0 | 150/10.3 | 66/255 | 11/42 |
| CLP4260A6-xFB | 2/130 | 260 | 80 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 3.9/2.0 | 150/10.3 | 112/434 | 18/72 |
| CLP4390A6-xFB | 3/130 | 390 | 120 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.8/2.9 | 150/10.3 | 161/624 | 27/104 |
| CLP4390A8-xFB | 3/130 | 390 | 120 | 62" X 8" | 16" X 14" X 8.4" | 3", 4", 6" | 5.8/2.9 | 150/10.3 | 228/883 | 38/147 |
| CLP4520A8-xFB | 4/130 | 520 | 160 | 62" X 8" | 20.2" X 16.3" X 8.4" | 3", 4", 6" | 7.5/3.7 | 150/10.3 | 296/1147 | 49/191 |
| CLP4650A8-xFB | 5/130 | 650 | 200 | 62" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 9.4/4.7 | 150/10.3 | 346/1341 | 58/223 |
| CLP4780A10-xFB | 6/130 | 780 | 240 | 64" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 11.2/5.6 | 120/8.3 | 480/1860 | 80/310 |
| CLP4910A10-xFB | 7/130 | 910 | 280 | 64" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 13.3/6.5 | 120/8.3 | 564/2185 | 94/364 |
| CLP4910A12-xFB | 7/130 | 910 | 280 | 69" X 12" | 24.6" X 20.2" X 10.6" | 6", 8" | 13.3/6.5 | 90/6.2 | 648/2511 | 108/418 |
| CLP41040A12-xFB | 8/130 | 1,040 | 320 | 69" X 12" | 30.5" X 24.1" X 12.6" | 6", 8" | 15.0/7.5 | 90/6.2 | 763/2956 | 127/493 |
| CLP6320A6-xFB | 1/320 | 320 | 98 | 85" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 3.2/1.6 | 150/10.3 | 165/639 | 27/106 |
| CLP6640A6-xFB | 2/320 | 640 | 196 | 85" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 6.0/3.0 | 150/10.3 | 276/1070 | 46/178 |
| CLP6960A6-xFB | 3/320 | 960 | 294 | 85" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 9.0/4.5 | 150/10.3 | 392/1519 | 65/253 |
| CLP6960A8-xFB | 3/320 | 960 | 294 | 86" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 9.0/4.5 | 150/10.3 | 587/2275 | 98/379 |
| CLP61280A8-xFB | 4/320 | 1,280 | 392 | 86" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 12.0/6.0 | 150/10.3 | 744/2883 | 124/480 |
| CLP61600A8-xFB | 5/320 | 1,600 | 490 | 86" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 15.0/7.5 | 150/10.3 | 848/3286 | 141/548 |
| CLP61920A10-xFB | 6/320 | 1,920 | 588 | 88" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 18.0/9.0 | 120/8.3 | 1,198/4642 | 200/773 |
| CLP62240A10-xFB | 7/320 | 2,240 | 686 | 88" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 11 AMPS*** | 120/8.3 | 1,405/5442 | 234/907 |
| CLP62240A12-xFB | 7/320 | 2,240 | 686 | 90" X 12" | 30.5" X 24.1" X 12.6" | 6", 8" | 11 AMPS*** | 90/6.2 | 1,611/6243 | 268/1040 |
| CLP62560A12-xFB | 8/320 | 2,560 | 784 | 90" X 12" | 30.5" X 24.1" X 12.6" | 6", 8" | 13 AMPS*** | 90/6.2 | 1,839/7126 | 306/1188 |
| CLP62880A14-xFB | 9/320 | 2,880 | 882 | 92" X 14" | 30.5" X 24.1" X 12.6" | 8", 10", 12" | 14 AMPS*** | 50/3.4 | 2183/8461 | 364/1410 |
| CLP63200A16-xFB | 10/320 | 3,200 | 980 | 94" X 16" | 30.5" X 24.1" X 12.6" | 10", 12", 14" | 16 AMPS*** | 50/3.4 | 2,544/9858 | 424/1643 |

When ordering: Replace 'x' in part number with requested flange size; e.g., '2' for two-inch flange. Basic or Optional PLC Control Package available. ***230 VAC.

Online Orders: PentairAES.com | Phone Orders and Tech Advice: 877.347.4788



**NOT RECOMMENDED FOR USE
WITH SALT WATER APPLICATIONS**

CALL FOR MORE INFORMATION AND PRICING.

*Limited 3 Year Warranty

**Limited 12,000 hr warranty on all lamps

SAFEGUARD UV SYSTEMS™ CLS SERIES

Commercial L-Vessel Stainless Steel

For applications requiring Stainless Steel, Pentair's CLS Series SafeGUARD UV Systems 316L Stainless Steel Vessels* provide reliable operation. Electropolish is available as an option on these units. Vessels are equipped with sensor ports and optional temperature and UV intensity sensors. Like all of our systems, the CLS series offers an optimized and efficient internal hydraulic and optical design, thus ensuring that your system always provides the performance required. Can be horizontally or vertically mounted.

CLS Series SafeGUARD UV Systems feature a single-ended quartz assembly, remote NEMA Type 12 thermoplastic power supply enclosure, and are available with Basic or optional PLC (shown) Control packages. Power Supply Enclosures are UL 508a listed. NSF 50 Certified.

System Features

- Enhanced, state-of-the-art electronic ballast-sized precisely to the lamp's power requirement ensures optimal UV-C output and maximum lamp life
- 316L stainless steel vessel has removable faceplate for internal inspection and cleaning
- Single-end UV lamp and quartz sleeve access for easy servicing
- Watertight design protects all electrical hardware from water damage
- Highest-Quality American-Made Low-Pressure High-Output UV lamps offer 12,000 hours** of continuous operation (80% efficient after 12,000 hours)
- Choice of inlet/outlet port styles
- Power supply is 50/60 Hz capable
- 6' power cord and 20' lamp cables
- Reduces microorganisms through ultraviolet light.

EPA Est. No.: 091668-FL-001

| MODEL | LAMPS/ WATTS | INPUT WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (L X D) | POWER ENCLOSURE DIMENSIONS (H X W X D) | (x) INLET/OUTLET PORT(S) (FLANGE) | AMPS MAX LOAD @ 120/230 VAC | MAX PSI/BAR | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM |
|--|-----------------|----------------|-------------------------|------------------------------------|--|---|-----------------------------------|----------------|----------------------------------|-----------------------------------|
| CLS Low-Pressure High-Output UV Systems | | | | | | | | | | |
| CLS4160H06-xFB | 2/80 | 160 | 54 | 56" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.0/1.5 | 150/10.3 | 81/314 | 13/52 |
| CLS4240H06-xFB | 3/80 | 240 | 81 | 56" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 4.0/2.0 | 150/10.3 | 119/461 | 20/77 |
| CLS4320H06-xFB | 4/80 | 320 | 108 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.0/2.5 | 150/10.3 | 155/600 | 26/100 |
| CLS6300H06-xFB | 2/150 | 300 | 114 | 85" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.75/1.8 | 150/10.3 | 174/675 | 29/113 |
| CLS6450H06-xFB | 3/150 | 450 | 171 | 85" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 5.5/2.7 | 150/10.3 | 250/969 | 41/162 |
| CLS6600H06-xFB | 4/150 | 600 | 228 | 85" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 7.5/3.7 | 150/10.3 | 331/1283 | 55/214 |
| CLS Low-Pressure Amalgam UV Systems | | | | | | | | | | |
| CLS4130A6-xFB | 1/130 | 130 | 40 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 2.1/1.0 | 150/10.3 | 66/255 | 11/42 |
| CLS4260A6-xFB | 2/130 | 260 | 80 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 3.9/2.0 | 150/10.3 | 112/434 | 18/72 |
| CLS4390A6-xFB | 3/130 | 390 | 120 | 56" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.8/2.9 | 150/10.3 | 161/624 | 27/104 |
| CLS4390A8-xFB | 3/130 | 390 | 120 | 62" X 8" | 16" X 14" X 8.4" | 3", 4", 6" | 5.8/2.9 | 150/10.3 | 228/883 | 38/147 |
| CLS4520A8-xFB | 4/130 | 520 | 160 | 62" X 8" | 20.2" X 16.3" X 8.4" | 3", 4", 6" | 7.5/3.7 | 150/10.3 | 296/1147 | 49/191 |
| CLS4650A8-xFB | 5/130 | 650 | 200 | 62" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 9.4/4.7 | 150/10.3 | 346/1341 | 58/223 |
| CLS4780A10-xFB | 6/130 | 780 | 240 | 64" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 11.2/5.6 | 150/10.3 | 480/1860 | 80/310 |
| CLS4910A10-xFB | 7/130 | 910 | 280 | 64" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 13.3/6.5 | 150/10.3 | 564/2185 | 94/364 |
| CLS4910A12-xFB | 7/130 | 910 | 280 | 69" X 12" | 24.6" X 20.2" X 10.6" | 6", 8", 10" | 13.3/6.5 | 150/10.3 | 648/2511 | 108/418 |
| CLS41040A12-xFB | 8/130 | 1,040 | 320 | 69" X 12" | 30.5" X 24.1" X 12.6" | 6", 8", 10" | 15.0/7.5 | 150/10.3 | 763/2956 | 127/493 |
| CLS6320A6-xFB | 1/320 | 320 | 98 | 85" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 3.2/1.6 | 150/10.3 | 165/639 | 27/106 |
| CLS6640A6-xFB | 2/320 | 640 | 196 | 85" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 6.0/3.0 | 150/10.3 | 276/1070 | 46/178 |
| CLS6960A6-xFB | 3/320 | 960 | 294 | 85" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 9.0/4.5 | 150/10.3 | 392/1519 | 65/253 |
| CLS6960A8-xFB | 3/320 | 960 | 294 | 86" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 9.0/4.5 | 150/10.3 | 587/2275 | 98/379 |
| CLS61280A8-xFB | 4/320 | 1,280 | 392 | 86" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 12.0/6.0 | 150/10.3 | 744/2883 | 124/480 |
| CLS61600A8-xFB | 5/320 | 1,600 | 490 | 86" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 15.0/7.5 | 150/10.3 | 848/3286 | 141/548 |
| CLS61920A10-xFB | 6/320 | 1,920 | 588 | 88" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 18.0/9.0 | 150/10.3 | 1,198/4642 | 200/773 |
| CLS62240A10-xFB | 7/320 | 2,240 | 686 | 88" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 11 AMPS*** | 150/10.3 | 1,405/5442 | 234/907 |
| CLS62240A12-xFB | 7/320 | 2,240 | 686 | 90" X 12" | 30.5" X 24.1" X 12.6" | 6", 8", 10" | 11 AMPS*** | 150/10.3 | 1,611/6243 | 268/1040 |
| CLS62560A12-xFB | 8/320 | 2,560 | 784 | 90" X 12" | 30.5" X 24.1" X 12.6" | 6", 8", 10" | 13 AMPS*** | 150/10.3 | 1,839/7126 | 306/1188 |
| CLS62880A14-xFB | 9/320 | 2,880 | 882 | 92" X 14" | 30.5" X 24.1" X 12.6" | 8", 10", 12" | 14 AMPS*** | 130/8.9 | 2183/8461 | 364/1410 |
| CLS63200A16-xFB | 10/320 | 3,200 | 980 | 94" X 16" | 30.5" X 24.1" X 12.6" | 10", 12", 14" | 16 AMPS*** | 100/6.8 | 2,544/9858 | 424/1643 |
| CLS63520A18-xFB | 11/320 | 3,520 | 1,078 | 96" X 18" | 40.4" X 32.5" X 12.6" | 12", 14", 16" | 17 AMPS*** | 80/5.5 | 2,904/11,253 | 484/1876 |
| CLS63840A20-xFB | 12/320 | 3,840 | 1,176 | 98" X 20" | 40.4" X 32.5" X 12.6" | 14", 16", 18" | 19 AMPS*** | 65/4.4 | 3,434/13308 | 572/2218 |
| CLS64160A24-xFB | 13/320 | 4,160 | 1,274 | 102" X 24" | 40.4" X 32.5" X 12.6" | 16", 18", 20" | 20 AMPS*** | 50/3.4 | 3,821/14807 | 636/2468 |

When ordering: Replace 'x' in part number with requested flange size; e.g., '2' for two-inch flange. Basic or Optional PLC Control Package available. ***230 VAC.

Online Orders: PentairAES.com | Phone Orders and Tech Advice: 877.347.4788

SAFEGUARD UV SYSTEMS™ CUP SERIES

Commercial U-Shaped Polymer

The CUP Series UVs carry on the 23-year tradition of quality, and a compact "U" vessel port orientation that reduces footprint. The Schedule-80 Modified Polymer construction is ideally suited for corrosive saltwater conditions. Can be horizontally or vertically mounted (Call for limitations).

The CUP Series SafeGUARD UV Systems, like all of our Commercial units, feature single-end UV lamp and Quartz Sleeve assemblies. They use a remote NEMA Type 12 thermoplastic Control Panel /Power Supply enclosure and is available with Basic or optional PLC (shown) control packages with either LPHO or Amalgam UV lamps. Power Supply Enclosures are UL 508a listed. NSF 50 Certified.

System Features

- State-of-the-art electronic ballast matched precisely to the lamp's power requirement to ensure optimal UV-C output and maximized lamp life
- Highest-Quality American-Made UV-C lamps offer 12,000 hours of continuous operation** at or above the minimum required UV-C intensity levels required to meet your dose target
- Schedule-80 Modified Polymer* construction is stronger and can typically handle higher internal pressures than polypropylene and HDPE vessels
- Watertight design protects all electrical hardware from water damage
- Power supplies are 120v or 230v and are 50/60 Hz compatible
- Compact 'U' Inlet and Outlet configuration allows fitment where space is at a premium 6' power cord and 20' lamp cables
- Reduces microorganisms through ultraviolet light.

EPA Est. No.: 091668-FL-001



CALL FOR MORE INFORMATION AND PRICING.

*Limited 3 Year Warranty

**Limited 12,000 hr warranty on all lamps

| MODEL | LAMPS/ WATTS | INPUT WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (L X D) | POWER ENCLOSURE DIMENSIONS (H X W X D) | (x) INLET/OUTLET PORT(S) (FLANGE) | AMPS MAX LOAD @ 120/230 VAC | MAX PSI/BAR | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM |
|---|-----------------|----------------|-------------------------|------------------------------------|--|---|-----------------------------------|----------------|----------------------------------|-----------------------------------|
| CUP Series Low-Pressure High-Output UV Systems | | | | | | | | | | |
| CUP4160H06-xFB | 2 / 80 | 160 | 54 | 52" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.0/1.5 | 50 / 3.4 | 81 / 314 | 13 / 52 |
| CUP4240H06-xFB | 3 / 80 | 240 | 81 | 52" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 4.0/2.0 | 50 / 3.4 | 119 / 461 | 20 / 77 |
| CUP4320H06-xFB | 4 / 80 | 320 | 108 | 52" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.0/2.5 | 50 / 3.4 | 155 / 600 | 26 / 100 |
| CUP6300H06-xFB | 2/150 | 300 | 114 | 70" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.75/1.8 | 50 / 3.4 | 174 / 675 | 29 / 113 |
| CUP6450H06-xFB | 3/150 | 450 | 171 | 70" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 5.5/2.7 | 50 / 3.4 | 250 / 969 | 41 / 162 |
| CUP6600H06-xFB | 4/150 | 600 | 228 | 70" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 7.5/3.7 | 50 / 3.4 | 331 / 1283 | 55 / 214 |
| CUP Series Low-Pressure Amalgam UV Systems | | | | | | | | | | |
| CUP4130A6-xFB | 1/130 | 130 | 40 | 52" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 2.1/1.0 | 50/3.4 | 66/255 | 11/42 |
| CUP4260A6-xFB | 2/130 | 260 | 80 | 52" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 3.9/2.0 | 50/3.4 | 112/434 | 18/72 |
| CUP4390A6-xFB | 3/130 | 390 | 120 | 52" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.8/2.9 | 50/3.4 | 161/624 | 27/104 |
| CUP4390A8-xFB | 3/130 | 390 | 120 | 54" X 8" | 16" X 14" X 8.4" | 3", 4" 6" | 5.8/2.9 | 50/3.4 | 228/883 | 38/147 |
| CUP4520A8-xFB | 4/130 | 520 | 160 | 54" X 8" | 20.2" X 16.3" X 8.4" | 3", 4" 6" | 7.5/3.7 | 50/3.4 | 296/1147 | 49/191 |
| CUP4650A8-xFB | 5/130 | 650 | 200 | 54" X 8" | 24.6" X 20.2" X 10.6" | 3", 4" 6" | 9.4/4.7 | 50/3.4 | 346/1341 | 58/223 |
| CUP4780A10-xFB | 6/130 | 780 | 240 | 60" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 11.2/5.6 | 50/3.4 | 480/1860 | 80/310 |
| CUP4910A10-xFB | 7/130 | 910 | 280 | 60" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 13.3/6.5 | 50/3.4 | 564/2185 | 94/364 |
| CUP4910A12-xFB | 7/130 | 910 | 280 | 62" X 12" | 24.6" X 20.2" X 10.6" | 6", 8" | 13.3/6.5 | 50/3.4 | 648/2511 | 108/418 |
| CUP41040A12-xFB | 8/130 | 1,040 | 320 | 62" X 12" | 30.5" X 24.1" X 12.6" | 6", 8" | 15.0/7.5 | 50/3.4 | 763/2956 | 127/493 |
| CUP6320A6-xFB | 1/320 | 320 | 98 | 75" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 3.2/1.6 | 50/3.4 | 165/639 | 27/106 |
| CUP6640A6-xFB | 2/320 | 640 | 196 | 75" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 6.0/3.0 | 50/3.4 | 276/1070 | 46/178 |
| CUP6960A6-xFB | 3/320 | 960 | 294 | 75" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 9.0/4.5 | 50/3.4 | 392/1519 | 65/253 |
| CUP6960A8-xFB | 3/320 | 960 | 294 | 77" X 8" | 24.6" X 20.2" X 10.6" | 3", 4" 6" | 9.0/4.5 | 50/3.4 | 587/2275 | 98/379 |
| CUP61280A8-xFB | 4/320 | 1,280 | 392 | 77" X 8" | 24.6" X 20.2" X 10.6" | 3", 4" 6" | 12.0/6.0 | 50/3.4 | 744/2883 | 124/480 |
| CUP61600A8-xFB | 5/320 | 1,600 | 490 | 77" X 8" | 24.6" X 20.2" X 10.6" | 3", 4" 6" | 15.0/7.5 | 50/3.4 | 848/3286 | 141/548 |
| CUP61920A10-xFB | 6/320 | 1,920 | 588 | 79" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 18.0/9.0 | 50/3.4 | 1,198/4642 | 200/773 |
| CUP62240A10-xFB | 7/320 | 2,240 | 686 | 79" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | *** | 50/3.4 | 1,405/5442 | 234/907 |

When ordering: Replace 'x' in part number with requested flange size; e.g., '2' for two-inch flange. Basic or Optional PLC Control Package available. ***230 VAC/11 AMPS.

Online Orders: PentairAES.com | Phone Orders and Tech Advice: 877.347.4788



**NOT RECOMMENDED FOR USE
WITH SALT WATER APPLICATIONS**

CALL FOR MORE INFORMATION AND PRICING.

*Limited 3 Year Warranty

**Limited 12,000 hr warranty on all lamps

SAFEGUARD UV SYSTEMS™ CUS SERIES

Commercial U-Shaped Stainless Steel

SafeGUARD UV Systems CUS Series provides reliable protection against harmful waterborne pathogens by reducing such pathogens through the use of ultraviolet light. The "U" style UV vessel allows for space-saving horizontal mounting. CUS Series use either LPHO or Amalgam UV lamps and are available in various models suitable for a wide variety of application sizes. Wetted material is 316L and is available Electropolished as an option.

CUS Series SafeGUARD UV Systems feature a single-ended quartz assembly, remote NEMA Type 12 thermoplastic power supply enclosure, and are available with Basic or optional PLC (shown) Control packages. Power Supply Enclosures are UL 508a listed. NSF 50 Certified.

System Features

- State-of-the-art electronic ballast matched precisely to the lamp's power requirement to ensure optimal UV-C output and maximized lamp life
- Highest-Quality American-Made UV-C lamps offer 12,000 hours of continuous operation** at or above the minimum required UV-C intensity levels required to meet your dose target
- 316L Stainless Steel* vessels with removable ends for internal inspection and cleaning
- Single-end UV lamp and quartz sleeve access for easy servicing
- Watertight design protects all electrical hardware from water damage
- Compact 'U' Inlet and Outlet configuration allows fitment where space is at a premium
- Power supplies are 120v or 230v and are 50/60 Hz compatible
- 6' power cord and 20' lamp cables

EPA Est. No.: 091668-FL-001

| MODEL | LAMPS/ WATTS | INPUT WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (L X D) | POWER ENCLOSURE DIMENSIONS (H X W X D) | (x) INLET/OUTLET PORT(S) (FLANGE) | AMPS MAX LOAD @ 120/230 VAC | MAX PSI/BAR | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM |
|---|-----------------|----------------|-------------------------|------------------------------------|--|---|-----------------------------------|----------------|----------------------------------|-----------------------------------|
| CUS Series Low-Pressure High-Output UV Systems | | | | | | | | | | |
| CUS4160H06-xFB | 2/80 | 160 | 54 | 52" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.0/1.5 | 150/10.3 | 81/314 | 13/52 |
| CUS4240H06-xFB | 3/80 | 240 | 81 | 52" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 4.0/2.0 | 150/10.3 | 119/461 | 20/77 |
| CUS4320H06-xFB | 4/80 | 320 | 108 | 52" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.0/2.5 | 150/10.3 | 155/600 | 26/100 |
| CUS6300H06-xFB | 2/150 | 300 | 114 | 70" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.75/1.8 | 150/10.3 | 174/675 | 29/113 |
| CUS6450H06-xFB | 3/150 | 450 | 171 | 70" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 5.5/2.7 | 150/10.3 | 250/969 | 41/162 |
| CUS6600H06-xFB | 4/150 | 600 | 228 | 70" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 7.5/3.7 | 150/10.3 | 331/1283 | 55/214 |
| CUS Series Low-Pressure Amalgam UV Systems | | | | | | | | | | |
| CUS4130A6-xFB | 1/130 | 130 | 40 | 55" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 2.1/1.0 | 150/10.3 | 66/255 | 11/42 |
| CUS4260A6-xFB | 2/130 | 260 | 80 | 55" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 3.9/2.0 | 150/10.3 | 112/434 | 18/72 |
| CUS4390A6-xFB | 3/130 | 390 | 120 | 55" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.8/2.9 | 150/10.3 | 161/624 | 27/104 |
| CUS4390A8-xFB | 3/130 | 390 | 120 | 57" X 8" | 16" X 14" X 8.4" | 3", 4", 6" | 5.8/2.9 | 150/10.3 | 228/883 | 38/147 |
| CUS4520A8-xFB | 4/130 | 520 | 160 | 57" X 8" | 20.2" X 16.3" X 8.4" | 3", 4", 6" | 7.5/3.7 | 150/10.3 | 296/1147 | 49/191 |
| CUS4650A8-xFB | 5/130 | 650 | 200 | 57" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 9.4/4.7 | 150/10.3 | 346/1341 | 58/223 |
| CUS4780A10-xFB | 6/130 | 780 | 240 | 60" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 11.2/5.6 | 150/10.3 | 480/1860 | 80/310 |
| CUS4910A10-xFB | 7/130 | 910 | 280 | 60" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 13.3/6.5 | 150/10.3 | 564/2185 | 94/364 |
| CUS4910A12-xFB | 7/130 | 910 | 280 | 62" X 12" | 24.6" X 20.2" X 10.6" | 6", 8", 10" | 13.3/6.5 | 150/10.3 | 648/2511 | 108/418 |
| CUS41040A12-xFB | 8/130 | 1,040 | 320 | 62" X 12" | 30.5" X 24.1" X 12.6" | 6", 8", 10" | 15.0/7.5 | 150/10.3 | 763/2956 | 127/493 |
| CUS6320A6-xFB | 1/320 | 320 | 98 | 75" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 3.2/1.6 | 150/10.3 | 165/639 | 27/106 |
| CUS6640A6-xFB | 2/320 | 640 | 196 | 75" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 6.0/3.0 | 150/10.3 | 276/1070 | 46/178 |
| CUS6960A6-xFB | 3/320 | 960 | 294 | 75" X 6" | 24.6" X 20.2" X 10.6" | 2", 3", 4" | 9.0/4.5 | 150/10.3 | 392/1519 | 65/253 |
| CUS6960A8-xFB | 3/320 | 960 | 294 | 77" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 9.0/4.5 | 150/10.3 | 587/2275 | 98/379 |
| CUS61280A8-xFB | 4/320 | 1,280 | 392 | 77" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 12.0/6.0 | 150/10.3 | 744/2883 | 124/480 |
| CUS61600A8-xFB | 5/320 | 1,600 | 490 | 77" X 8" | 24.6" X 20.2" X 10.6" | 3", 4", 6" | 15.0/7.5 | 150/10.3 | 848/3286 | 141/548 |
| CUS61920A10-xFB | 6/320 | 1,920 | 588 | 79" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 18.0/9.0 | 150/10.3 | 1,198/4642 | 200/773 |
| CUS62240A10-xFB | 7/320 | 2,240 | 686 | 79" X 10" | 30.5" X 24.1" X 12.6" | 4", 6", 8" | 11 AMPS*** | 150/10.3 | 1,405/5442 | 234/907 |
| CUS62240A12-xFB | 7/320 | 2,240 | 686 | 81" X 12" | 30.5" X 24.1" X 12.6" | 6", 8", 10" | 11 AMPS*** | 150/10.3 | 1,611/6243 | 268/1040 |
| CUS62560A12-xFB | 8/320 | 2,560 | 784 | 81" X 12" | 30.5" X 24.1" X 12.6" | 6", 8", 10" | 13 AMPS*** | 150/10.3 | 1,839/7126 | 306/1188 |
| CUS62880A14-xFB | 9/320 | 2,880 | 882 | 83" X 14" | 30.5" X 24.1" X 12.6" | 8", 10", 12" | 14 AMPS*** | 130/8.9 | 2,183/8461 | 364/1410 |
| CUS63200A16-xFB | 10/320 | 3,200 | 980 | 85" X 16" | 30.5" X 24.1" X 12.6" | 10", 12", 14" | 16 AMPS*** | 100/6.8 | 2,544/9858 | 424/1643 |
| CUS63520A18-xFB | 11/320 | 3,520 | 1078 | 87" X 18" | 40.4" X 32.5" X 12.6" | 12", 14", 16" | 17 AMPS*** | 80/5.5 | 2,904/11,253 | 484/1876 |
| CUS63840A20-xFB | 12/320 | 3,840 | 1176 | 89" X 20" | 40.4" X 32.5" X 12.6" | 14", 16", 18" | 19 AMPS*** | 65/4.4 | 3,434/13308 | 572/2218 |
| CUS64160A24-xFB | 13/320 | 4,160 | 1274 | 91" X 24" | 40.4" X 32.5" X 12.6" | 16", 18", 20" | 20 AMPS*** | 50/3.4 | 3,821/14807 | 636/2468 |

When ordering: Replace 'x' in part number with requested flange size; e.g., '2' for two-inch flange. Basic or Optional PLC Control Package available. ***230 VAC.

Online Orders: PentairAES.com | Phone Orders and Tech Advice: 877.347.4788

SAFEGUARD UV SYSTEMS™ CVP SERIES

Commercial Vertical Polymer

When operating space is restricted, our CVP (Vertical) Series SafeGUARD UV Systems provide the small footprint you need. CVP models feature single-end, top-loading quartz ware to minimize space required and maximize serviceability! Each model is extremely durable and features a corrosion-resistant remote power supply enclosure and UV vessel. All models are designed to deliver optimum UV performance by utilizing their UV lamp's UV-C output to its maximum potential. CVP LPHO and Amalgam SafeGUARD UV Systems are watertight and designed for indoor/outdoor use. Each model is equipped with a flanged base for easy installation. Power Supply Enclosures are UL 508a listed.

System Features

- Control Package included (optional PLC Package shown).
- State-of-the-art electronic ballast matched precisely to the lamp's power requirement to ensure optimal UV-C output and maximized lamp life
- Small footprint: vertical operation reduces required horizontal space
- Schedule-80 Modified Polymer construction is stronger and can typically handle higher internal pressures than polypropylene and HDPE vessels*
- Single-End UV lamp and quartz sleeve access for easy servicing
- Watertight design protects all electrical hardware from damage
- Highest-Quality American-Made UV-C lamps offer 12,000 hours of continuous operation** at or above the minimum required UV-C intensity levels required to meet your dose target
- Choice of inlet/outlet port styles
- Included Over-Temp System Shutdown Sensor shuts down the lamp field to avoid damage when water temperature inside the vessel exceeds 120° F
- 6-foot power cord and 20-foot lamp cables
- Reduces microorganisms through ultraviolet light.

EPA Est. No.: 091668-FL-001

*Limited 3 Year Warranty

**Limited 12,000 hr warranty on all lamps



| MODEL | LAMPS/ WATTS | INPUT WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (H X D) | POWER ENCLOSURE DIMENSIONS (H X W X D) | (x) INLET/OUTLET PORT(S) (FLANGE) | AMPS MAX LOAD @ 120/230 VAC | MAX PSI/BAR | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM |
|--|-----------------|----------------|-------------------------|------------------------------------|---|---|-----------------------------------|----------------|----------------------------------|-----------------------------------|
| CVP Low-Pressure High-Output UV Systems | | | | | | | | | | |
| CVP4160H06-xFB | 2/80 | 160 | 54 | 57" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 3.0/1.5 | 50/3.4 | 81/314 | 13/52 |
| CVP4240H06-xFB | 3/80 | 240 | 81 | 57" X 6" | 14" X 12" X 8.4" | 2", 3", 4" | 4.0/2.0 | 50/3.4 | 119/461 | 20/77 |
| CVP4320H06-xFB | 4/80 | 320 | 108 | 57" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.0/2.5 | 50/3.4 | 155/600 | 26/100 |
| CVP Low-Pressure Amalgam UV Systems | | | | | | | | | | |
| CVP4130A6-xFB | 1/130 | 130 | 40 | 57" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 2.1/1.0 | 50/3.4 | 66/255 | 11/42 |
| CVP4260A6-xFB | 2/130 | 260 | 80 | 57" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 3.9/2.0 | 50/3.4 | 112/434 | 18/72 |
| CVP4390A6-xFB | 3/130 | 390 | 120 | 57" X 6" | 16" X 14" X 8.4" | 2", 3", 4" | 5.8/2.9 | 50/3.4 | 161/624 | 27/104 |
| CVP4390A8-xFB | 3/130 | 390 | 120 | 63" X 8" | 16" X 14" X 8.4" | 3", 4" 6" | 5.8/2.9 | 50/3.4 | 228/883 | 38/147 |
| CVP4520A8-xFB | 4/130 | 520 | 160 | 63" X 8" | 20.2" X 16.3" X 8.4" | 3", 4" 6" | 7.5/3.7 | 50/3.4 | 296/1147 | 49/191 |
| CVP4650A8-xFB | 5/130 | 650 | 200 | 63" X 8" | 24.6" X 20.2" X 10.6" | 3", 4" 6" | 9.4/4.7 | 50/3.4 | 346/1341 | 58/223 |
| CVP4780A10-xFB | 6/130 | 780 | 240 | 68" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 11.2/5.6 | 50/3.4 | 480/1860 | 80/310 |
| CVP4910A10-xFB | 7/130 | 910 | 280 | 68" X 10" | 24.6" X 20.2" X 10.6" | 4", 6", 8" | 13.3/6.5 | 50/3.4 | 564/2185 | 94/364 |
| CVP4910A12-xFB | 7/130 | 910 | 280 | 75" X 12" | 24.6" X 20.2" X 10.6" | 6", 8" | 13.3/6.5 | 50/3.4 | 648/2511 | 108/418 |
| CVP41040A12-xFB | 8/130 | 1,040 | 320 | 75" X 12" | 30.5" X 24.1" X 12.6" | 6", 8" | 15.0/7.5 | 50/3.4 | 763/2956 | 127/493 |

When ordering: Replace 'x' in part number with requested flange size; e.g., '2' for two-inch flange. Basic or Optional PLC Control Package available.



**NOT RECOMMENDED FOR USE
WITH SALT WATER APPLICATIONS**

SAFEGUARD UV SYSTEMS™ HOSS SERIES

High-Output Stainless Steel

Quality craftsmanship meets superior design to deliver years of dependable and trouble-free operation. HOSS Series SafeGUARD UV Systems combine the latest, most efficient Low-Pressure (LP) UV lamp technology with robust stainless steel UV vessel construction to create a versatile, high-quality UV system suited for freshwater Aquaculture and light-Industrial applications.

HOSS UV Systems feature a thermoplastic NEMA 4x enclosure mounted to the UV vessel brackets, allowing 4-way orientation for either horizontal or vertical system mounting.

HOSS controls consist of analog re-settable hour meter, lamp-status LEDs, input power LED, and an external on/off switch. Single-end UV-C lamps and quartz sleeve access allows for quick-easy servicing. Cable hardware protects lamp connections from water damage and is durable and inexpensive to replace if required.

HOSS UV systems are compact and designed to fit into tight spaces. All HOSS UV vessels feature stainless steel threaded ports and flanges. Power Supply Enclosures are UL 508a listed.

System Features

- Housing Material*: Stainless Steel 316L with optional 316L with Electropolished Finish
- UV Lamp: Low-Pressure High-Output, T-6 style
- Control Enclosure: Type 12 or optional NEMA 4X
- Reduces microorganisms through ultraviolet light.

Monitoring System:

- Main Power Indicator Light
- Elapsed Run-Time Hour Meter
- UV Lamp Status Indicator

EPA Est. No.: 091668-FL-001

*Limited 3 Year Warranty
**Limited 12,000 hr warranty on all lamps

| MODEL | LAMPS/ WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (H X D) | POWER ENCLOSURE DIMENSIONS (H X W X D) | AVAILABLE INLET/OUTLET PORT(S) (FLANGE) | AMPS MAX LOAD @ 115/230 VAC | MAX PSI/BAR | 30 MJ/CM** GPM/LPM | 180 MJ/CM*** GPM/LPM | 316L EACH | 316L-EP EACH |
|--------------------|-----------------|-------------------------|------------------------------------|---|---|-----------------------------------|----------------|-----------------------|-------------------------|-------------------|-------------------|
| COM480HOSS | 1/80 | 27 | 42" X 11" | 12.5" X 10.5" X 7.7" | 2" MNPT | 1.25/0.75 | 50/3.4 | 47/182 | 8/30 | \$4,489.20 | \$4,794.44 |
| COM4160HOSS | 2/80 | 54 | 42" X 11" | 12.5" X 10.5" X 7.7" | 2" MNPT | 2.5/1.25 | 50/3.4 | 75/290 | 12/48 | 4,965.32 | 5,206.88 |
| COM4240HOSS | 3/80 | 81 | 42" X 11" | 12.5" X 10.5" X 7.7" | 2" MNPT | 3.5/1.75 | 50/3.4 | 112/434 | 18/72 | 5,496.89 | 5,667.35 |
| COM4320HOSS | 4/80 | 108 | 42" X 11" | 12.5" X 10.5" X 7.7" | 2" MNPT | 5.0/2.5 | 50/3.4 | 146/566 | 27/94 | 5,972.04 | 6,078.94 |

*Recommended dose for algae and bacteria.
**Typical maximum dose required in aquaculture applications.

Call to determine the dose required for your application

TECHNICIAN PROFILE



Mikel Ferri

Mikel received both his Bachelor's in electrical engineering and Master's in Business Administration from Olivet Nazarene University. His past experience includes water reclamation for power plants and mining applications. He has experience in instrumentation, controls and product development.

WARNING
Pentair Aquatic Eco-Systems does not recommend using 316L stainless steel in corrosive environments that include, but are not limited to, saltwater aquaculture (includes aquaria) and other corrosive applications. 316L stainless steel is subject to pitting and crevice corrosion in warm chloride (salts) environments, and to stress corrosion cracking with water temperatures above 60°C, approximately.

SAFEGUARD UV SYSTEMS™ HIGH-OUTPUT SINGLE-LAMP COM SMART SERIES

Research facility staff and other aquatic husbandry personnel will find our SafeGUARD UV Systems COM Smart Series sterilizers easy to install, operate and maintain. Single-end access allows for time saving serviceability of the lamp and quartz sleeve. Highest-Quality American-Made UV-C lamps offer 12,000 hours of continuous operation at or above the minimum required UV-C intensity levels required to meet your dose target. Units are High-Output, 115V or 230V and are 50/60 Hz compatible, and have a one-year warranty on ballasts, limited lifetime warranty on the housing and 90-day warranty on lamps.

System Features

- Reduces microorganisms through ultraviolet light.
- Housing Material: Heavy-Wall UV Resistant High-Density Polymer
- Housing Pressure (Max.): 20 psi / 1.378 bar
- Housing Inlet/Outlet Port Size: 2" Union
- UV Lamp(s): Low-Pressure High-Output, T6-Style

Standard Monitoring System

- Control Enclosure: NEMA 4X
- Control Enclosure Size: 14" H x 12" W x 8.4" D
- Main Power Indicator Light
- Elapsed Run-Time Hour Meter
- UV Lamp Status Indicator
- PLC package optional

EPA Est. No.: 091668-FL-001



VESSEL OVER-TEMP PROTECTION NOT AVAILABLE FOR THIS SERIES.

| MODEL | LAMPS/ WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (L X D) | AMPS MAX LOAD @ 120/230 VAC | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM | EACH |
|----------------------|-----------------|-------------------------|------------------------------------|-----------------------------------|----------------------------------|-----------------------------------|-------------------|
| COM250HO-2UB | 1/50 | 15 | 28" X 6" | 1.15/0.57 | 25/97 | 4/16 | \$2,949.00 |
| COM480HO-2UB | 1/80 | 27 | 43" X 6" | 1.15/0.57 | 45/170 | 7/26 | 2,995.00 |
| COM5120HO-2UB | 1/120 | 37 | 56" X 6" | 1.15/0.57 | 64/242 | 10/38 | 3,048.00 |
| COM6150HO-2UB | 1/150 | 150 | 70" X 6" | 1.85/0.85 | 100/387 | 17/65 | 3,099.00 |



SMART UV® HIGH-OUTPUT (HO) MULTI-LAMP UV STERILIZERS

Research facility staff and other aquatic husbandry personnel will find our Smart HO Multi-Lamp UV Systems are easy to install, operate and maintain. Single-end access allows for time saving serviceability of the lamp and quartz sleeve. Highest-Quality American-Made UV-C lamps offer 12,000 hours of continuous operation at or above the minimum required UV-C intensity levels required to meet your dose target. One-year warranty on ballasts.

System Specifications:

- Reduces microorganisms through ultraviolet light.
- Housing Material*: Heavy-Wall UV Resistant High-Density Polymer
- Housing Size: Refer to Chart Below (UV Vessel Dimensions)
- UV Lamp(s): Low-Pressure High-Output, T6-style
- Each lamp will require its own outlet
- 115V/60 Hz and 230V 50/60 Hz versions available.

EPA Est. No.: 091668-FL-001

*Limited 3 Year Warranty

**Limited 12,000 hour warranty on all lamps

| MODEL | LAMPS/ WATTS | INPUT WATTS | UV-C OUTPUT WATTS | UV VESSEL DIMENSIONS (L X D) | INLET/OUTLET PORT(S) | AMPS MAX LOAD @ 120/230 VAC | MAX PSI/BAR | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM | EACH |
|----------------|-----------------|----------------|-------------------------|------------------------------------|-------------------------|-----------------------------------|----------------|----------------------------------|-----------------------------------|-------------------|
| 0250100 | 2/50 | 100 | 30 | 35" X 6" | 3" UNION | 1.15/0.57 | 150/10.3 | 43/166 | 7/28 | \$3,281.97 |
| 0250160 | 2/80 | 160 | 54 | 50" X 6" | 3" UNION | 1.15/0.57 | 150/10.3 | 81/314 | 14/52 | 3,436.03 |
| 0250240 | 2/120 | 240 | 74 | 62" X 6" | 3" UNION | 2.0/1.0 | 150/10.3 | 110/426 | 18/71 | 3,502.46 |
| 0250300 | 2/150 | 300 | 114 | 76" X 6" | 3" UNION | 2.6/1.3 | 150/10.3 | 174/675 | 29/113 | 3,883.12 |
| 0250450 | 3/150 | 450 | 171 | 85" X 6" | 3" UNION | 5.5/2.7 | 150/10.3 | 250/946 | 41/155 | 4,073.00 |
| 0250600 | 4/150 | 600 | 228 | 85" X 6" | 3" UNION | 7.5/3.7 | 150/10.3 | 331/1,253 | 55/208 | 4,265.00 |



SMART UV® HIGH-OUTPUT STERILIZERS

UV vessels are built of a UV-resistant, high density polymer with a removable end cap to provide easy access. Internal viewing ports allow visual indication of lamp status. Units have 2" slip unions and 5 3/4" diameter housings. 10' cable to ballast and 6' cord to plug. 115V/60 Hz and 230V 50/60 Hz options available.

Models include an in-line, sealed watertight power supply for wet applications. One-year warranty on ballasts, limited lifetime warranty on the housing and 90-day warranty on lamps.

System Features

- Reduces microorganisms through ultraviolet light.
- Housing Material: Heavy-Wall UV Resistant High-Density Polymer
- Housing Pressure (Max.): 20 psi / 1.378 bar
- Housing Inlet/Outlet Port Size: 2" Union
- UV Lamp(s): Low-Pressure High-Output, T6-style

EPA Est. No.: 091668-FL-001

| MODEL | INPUT WATTS | U-C OUTPUT WATTS | UV VESSEL DIMENSIONS | AMPS MAX LOAD @ 115/230 VAC | 30 MJ/CM ² GPM/LPM | 180 MJ/CM ² GPM/LPM | EACH |
|--------------|-------------|------------------|----------------------|-----------------------------|-------------------------------|--------------------------------|-----------------|
| E50S | 50 | 15 | 30" X 6" | 1.15/0.57 | 25/97 | 4/16 | \$724.00 |
| E80S | 80 | 27 | 45" X 6" | 1.15/0.57 | 45/170 | 7/26 | 735.00 |
| E120S | 120 | 37 | 57" X 6" | 1.15/0.57 | 64/242 | 10/38 | 852.00 |
| E150S | 150 | 57 | 71" X 6" | 1.85/0.85 | 100/387 | 17/65 | 1,015.18 |

Fluence (UV dose) calculated using UVT factors of 90–95%T and UV lamps at end of useful lamp life.

SMART UV® HIGH-OUTPUT STERILIZER REPLACEMENT PARTS

| WATTS | LAMP | EACH | 4 + | QUARTZ SLEEVE | EACH | SEAL KITS | EACH | BALLAST (120-230V) | EACH | 4-PIN LAMP CONNECTOR | EACH |
|------------|------------|----------------|----------------|---------------|----------------|-----------|----------------|--------------------|-----------------|----------------------|---------------|
| 50 | FL-2538-IP | \$69.89 | \$62.90 | FL-QZ175-IP | \$40.08 | 20375-2 | \$27.21 | 20105-MV | \$125.95 | 709-1S | \$7.00 |
| 80 | FL-2997-IP | 79.85 | 71.60 | FL-QZ176-IP | 44.59 | 20375-2 | 27.21 | 20105-MV | 125.95 | 709-1S | 7.00 |
| 120 | FL-2998-IP | 100.17 | 90.15 | FL-QZ165 | 54.37 | 20375-2 | 27.21 | 20105-MV | 125.95 | 709-1S | 7.00 |
| 150 | FL-2999 | 128.27 | 115.44 | FL-QZ167 | 89.24 | 20375-2 | 27.21 | 202150-1* | 125.95 | 709-1S | 7.00 |

*model is 120V

SIZED FOR YOUR APPLICATION

Did you know:

The flow rate at which the water passes through a UV system, and the UV-C Intensity establishes the "UV Dose". All waterborne microorganisms require their own specific UV Dose for successful disinfection. For more information on the SMART UV Sterilizer and other UV-C water treatment products, please visit us online at PentairAES.com.

Thanks for helping me with my UV light problem. My pond has never been so beautiful, and I have shared my news with friends and relatives. You have one grateful and very satisfied customer.

Vanna Wu

Lihue, HI

TECH TALK 5

"Why Watts"

You know how you can tell what people know by the questions they ask? Well, we know that most people don't know about watts. They ask, "How many amps does this motor use?" instead of, "How many watts does this motor use?" Watts are what you pay for, not amps; amps are used to size wire, breakers, etc.

The direct current formula we all learned (volts x amps = watts) is correct for incandescent light bulbs and electric heaters, but it is not correct for motors. When dealing with power loads that

involve inductance magnetic devices such as motor windings, solenoids, transformers, lamp ballasts, etc., the formula for single-phase loads is volts x amps x power factor = watts.

In many cases, especially with linear air compressors and mag drive pumps, the actual watts used are significantly less than what is calculated by multiplying volts x amps. The only way to determine the watt consumption is to test it using a wattmeter.

SMART UV® LITE STERILIZERS

The SMART UV Lite features the same durable "UV-resistant" construction as the SMART UV, but utilizes a smaller inner diameter body (2"). The Smart UV Lite reduces microorganisms through ultraviolet light. They are watertight and can be used indoors or outdoors in any position. Units include standard LP UV lamps, remote power supply and instructions.

All UV lights have 1 1/2" slip union inlets/outlets. Units are 115V/60 Hz, and 230v 50/60Hz is optional. They have a one-year warranty on ballasts, limited lifetime warranty on the housing and 90-day warranty on lamps.

EPA Est. No.: 091668-FL-001

| MODEL | GPM @ 30 mJ/cm ² * | WATTS/ # LAMPS | MAX SIZE AQUARIUM (GAL) | OVERALL LENGTH | SHIP WT (LBS) | EACH |
|---------------|----------------------------------|-------------------|----------------------------|-------------------|------------------|-----------------|
| EU18-2 | 4 | 18/1 | 75 | 22" | 8 | \$290.00 |
| EU25-2 | 6 | 25/1 | 110 | 30" | 14 | 300.00 |
| EU40-2 | 10 | 40/1 | 200 | 45" | 22 | 346.00 |
| EU80-2 | 20 | 80/2 | 350 | 45" | 56** | 630.00 |

*Calculated using UVT factors of 90-95% transmittance and UV lamps at end of useful lamp life.

**Ships Oversize.



SMART UV STERILIZERS

These high-quality ultraviolet sterilizers feature a watertight sealed design and can be used safely both indoors and outdoors. The Smart UV reduces microorganisms through ultraviolet light. The units have a 3" inside diameter and 1 1/2" slip union. They are an excellent choice for everything from small koi ponds to large recirculating systems. Units can be operated in any position and feature Low Pressure lamps with a 12,000 hour effective life. These SMART UV units feature remote-style ballasts with 16' power cords. Units are 115V/60 Hz and 230v 50/60Hz is optional.

One-year warranty on ballasts, limited lifetime warranty on the housing and 90-day warranty on lamps.

EPA Est. No.: 091668-FL-001



| MODEL | GPM @ 30 mJ/cm ² * | WATTS/ # LAMPS | INLET/OUTLET | OVERALL SIZE | ACTUAL WT (LBS) | EACH |
|---------------|----------------------------------|-------------------|-------------------|-----------------|--------------------|-----------------|
| EU25-U | 8 | 25/1 | 1 1/2" SLIP UNION | 29" | 14 | \$365.00 |
| EU40 | 17 | 40/1 | 1 1/2" SLIP UNION | 44" | 22 | 397.00 |
| EU65P | 32 | 65/1 | 1 1/2" SLIP UNION | 71" | 28** | 510.00 |

*Calculated using UVT factors of 90-95% transmittance and UV lamps at end of useful lamp life.

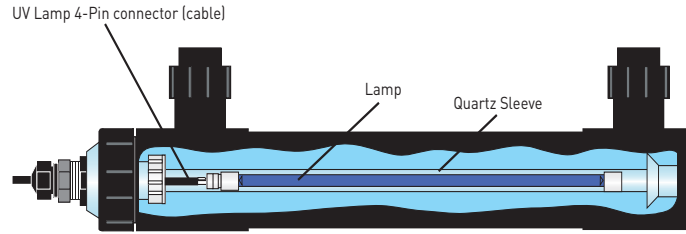
**Ships Oversize.

UV Light Transmittance

UV transmittance (UVT) is not turbidity! The water's clarity is not an effective indicator, because both solid and dissolved material can absorb UV light. For example: metals (iron) in water are not visible to the human eye but absorb UV light and have a negative impact on UVT.

UVT is the transmission of UV-C light (at 254 nm) through water. Regarding Aquaculture applications, flow-through fish-culture systems requiring influent disinfection typically test at 90-95% UVT. In contrast, RAS recirculating aquaculture systems typically test lower at 70-85%T. Application conditions vary and, therefore, must be evaluated individually.

UVT must be considered when sizing any UV system. Using a meter is the only method of determining an application's true %T.



SMART UV® LITE STERILIZER REPLACEMENT PARTS

| WATTS | SEAL KITS | EACH | BALLAST (120V) | EACH | 4-PIN LAMP CONNECTOR | EACH |
|-------|-----------|----------------|----------------|----------------|----------------------|----------------|
| 18 | 20624-AQ | \$27.08 | 20100 | \$95.95 | 20078 | \$15.75 |
| 25 | 20624-AQ | 27.08 | 20100 | 95.95 | 20078 | 15.75 |
| 40 | 20624-AQ | 27.08 | 20100 | 95.95 | 709-1S | 7.00 |
| 80 | 20625-AQ | 27.08 | 20100 x 2* | 95.95 | 709-1S x 2* | 7.00 |

| WATTS | LAMP | EACH | 4 + | QUARTZ SLEEVE | EACH | 4 + |
|-------|-----------------|----------------|----------------|------------------|----------------|----------------|
| 18 | FL-2536-IP | \$60.83 | \$54.75 | FL-QZ173-IP | \$35.51 | \$33.73 |
| 25 | FL-2542-IP | 63.75 | 57.38 | FL-QZ175-IP | 38.95 | 37.00 |
| 40 | FL-1957-IP | 64.65 | 58.19 | FL-QZ176-IP | 44.58 | 42.35 |
| 80 | FL-1957-IP x 2* | 63.75 | 57.38 | FL-QZ176-IP x 2* | 44.58 | 42.35 |

*Requires 2 EA

SMART UV STERILIZER REPLACEMENT PARTS

| WATTS | SEAL KITS | EACH | BALLAST (120V) | EACH | 4-PIN LAMP CONNECTOR | EACH |
|-------|-----------|----------------|----------------|----------------|----------------------|----------------|
| 25 | 20375 | \$27.08 | 20100 | \$95.95 | 20078 | \$15.75 |
| 40 | 20375 | 27.08 | 20100 | 95.95 | 709-1S | 7.00 |
| 65 | 20375 | 27.08 | 20100 | 95.95 | 709-1S | 7.00 |
| 80 | 20374-AQ | 30.25 | 20100 x 2* | 95.95 | 709-1S x 2* | 7.00 |
| 130 | 20374-AQ | 30.25 | 20100 x 2* | 95.95 | 709-1S x 2* | 7.00 |

| WATTS | LAMP | EACH | 4 + | QUARTZ SLEEVE | EACH | 4 + |
|-------|-----------------|----------------|----------------|------------------|----------------|----------------|
| 25 | FL-2542-IP | \$63.75 | \$57.38 | FL-QZ175-IP | \$38.95 | \$37.00 |
| 40 | FL-1957-IP | 64.65 | 58.19 | FL-QZ176-IP | 44.58 | 42.35 |
| 65 | FL-2529 | 103.71 | 57.38 | FL-QZ167 | 86.77 | 82.43 |
| 80 | FL-1957-IP x 2* | 64.65 | 58.19 | FL-QZ176-IP x 2* | 44.58 | 42.35 |
| 130 | FL-2529 x 2* | 103.71 | 93.34 | FL-QZ167 x 2* | 86.77 | 82.43 |

*Requires 2 EA

UVT FIELD METER

With innovative Split-Sense technology

The RealTech UV254 P200 field meter with exclusive Split-Sense technology is the world's most advanced and affordable portable UV254 testing meter, guaranteed. The portable Real UVT meter can quickly and accurately test UV254 in the field within minutes. The Real UVT meter utilizes Real Tech Inc.'s patented Split-Sense technology to give it many advantages such as its fast 1 minute warm-up time and extreme accuracy.

Split-Sense technology works by using a single beam of UV light to take continuous readings before and after the insertion of the quartz cuvette allowing for compensation of the effects of UV lamp drift and fluctuations.

The Real UVT meter's new calibration memory feature allows testing to be performed without the need to zero the meter with 100% DI water even if the meter has been powered off.

Measuring Organics

UV254 provides an indication of the amount of natural organic matter (NOM) in water and wastewater. More specifically, UV254 is the best detector of aromatic organics or reactive NOM.

Aromatic organics are problematic, having several negative effects. For example, when combined with chlorine, aromatic organics readily form disinfection by-products (DBPs).

The Real UVT field meter is the ideal solution for testing UV254 anywhere, anytime. The Real UVT can also be used as a practical alternative or supplement to measuring other more expensive and complicated organic test parameters such as TOC, DOC, BOD and COD.

System Features

- Memory calibration—no field zeroing needed
- Performs both UV Transmittance and UV Absorbance measurements
- Portable and easy to use
- Battery powered option
- 1 minute warm-up time
- Extreme accuracy

| MODEL | | EACH |
|-------------------|------------------------------------|-------------------|
| P200UV254 | REAL TECH P200 UV254 METER | \$1,695.00 |
| 1UVT060020 | REPLACEMENT LAMP, P SERIES | 99.00 |
| 1UVT045010 | REPLACEMENT CUVETTE, QUARTZ, 10 MM | 115.00 |

TECHNICIAN PROFILE



Hernan Casasbuena

Hernan received his Bachelor of Science in biology from the University of Nevada and his Fisheries Scientist Certification from the American Fisheries Society. Hernan's design and management experience includes hatcheries, floating cage cultures and fish culture farms, with concentration on rainbow trout and tilapia.



2-YEAR WARRANTY

REAL UVT TECHNICAL SPECIFICATIONS

| | |
|---------------------------------|--|
| UV WAVELENGTH | 253.7 nm |
| SOURCE | Low pressure germicidal UV lamp |
| RANGE | 5 - 100 % Transmittance, 0 - 1.3 Absorbance |
| ACCURACY | 0.5% UV Transmittance |
| RESOLUTION | 0.1% Transmittance, 0.001 Absorbance |
| UNITS OF MEASUREMENT | UV Percent Transmittance (%), UV Absorbance per cm (cm-1) |
| BUILT-IN FAULT DETECTION SYSTEM | Notification of a system failure |
| DISPLAY | 32 character back-lit LCD digital display provides easy on screen instructions and system messages |
| CALIBRATION MEMORY | Calibration memory technology. Calibration with DI water required only periodically. |
| RESPONSE TIME | Warm-up Time - 1 minute, Calibration - 2 seconds, Computation - 2 seconds |
| OPERATING TEMPERATURES | 0 - 45 °C (32 - 133 °F) |
| CASE | Rugged, Compact, Watertight, and Dustproof with convenient carrying handle |
| SAMPLE CELL | 10 mm x 10 mm quartz cuvette |
| PATH LENGTH | 1 cm |
| POWER SUPPLY | <ul style="list-style-type: none"> • Wall Adapter - 110 VAC (UL approved) or 220 VAC, Car Adapter - 12 VDC • Battery power pack option |
| DIMENSIONS | 8.7" L x 7.5" W x 3.9" H (254 cu in) |
| WEIGHT | 4 lbs |

INTERNATIONAL OZONE SYSTEM

Includes:

OZ8 Ozone Generator

Variable output, 0-8 grams per hour of ozone. Manual output control with reference meter. Air cooled.

12 SCFH Oxygen Concentrator

Up to 12 SCFH oxygen flow at 10 PSIG.

Backflow Prevention Device

Power to open, spring to close actuator with drain and manual outlet valve. Interlocked to stop system if back flow event should occur.

Inline Oxygen Monitor

Measures gas flow, gas pressure and oxygen concentration Interlocked to stop ozone production on alarm.

Ambient Ozone Monitor

0-2 parts per million, two alarm levels.

Interlocked to stop ozone production on high ambient ozone alarm.

ORP Monitor and Sensor with 3 Meter Cable

Integrated to stop ozone production on high ORP alarm.

10' of 1/4" PTFE Tubing to Process

System Features

- Wall mounted, single point electrical.
- 120 VAC, 60 Hz, 1 phase, 20 amp service.
- Dimensions: 36" x 38", 139 pounds.
- One year warranty on parts only.



Please allow 4-5 weeks lead time.

| MODEL | | VOLTAGE | PHASE | AMPS | EACH |
|----------------|-------------------------|------------------------------------|-------|------|--------------------|
| IOSYS1 | OZONE SKID SYSTEM 8G/HR | 120V/60HZ | 1PHS | 20A | \$12,135.00 |
| OWS-0M2 | AMBIENT OZONE MONITOR | 2 SENSORS W/POWER SUPPLY & HORN | | | 2,828.60 |



| MODEL | | EACH |
|--------------|--------------------------------------|-------------------|
| PSAG1 | O ₂ CONCENTRATION MONITOR | \$1,350.00 |

TECHNICIAN PROFILE



Kurt Lang

Kurt Lang has been in the commercial aquaculture industry for over 15 years. He has a mechanical engineering degree from Höhere Technische Lehranstalt in Vienna, Austria. Over the past 10 years, Kurt has focused on all aspects of field related work. Providing installation support, commissioning & start-up services, preventive maintenance and troubleshooting support, ranging from small pumps to large scale Recirculating Aquaculture Systems.

TOROSOLEIL SENTINEL PSAG

Using its patented technology, the Sentinel PSAG continuously monitors oxygen concentration, gas flow, and pressure, and will isolate equipment and alarm to minimize costly repairs and downtime.

The Sentinel PSAG now features a serial data output to allow remote monitoring and control via SCADA, RCK Controls, Inc. or PLC communication. The outputs include gas flow, pressure, concentration, run status, fault status, and if failsafe bypass mode is enabled. All that is required to remotely start/stop the unit is a dry digital output. This feature greatly enhances the capabilities of the Sentinel PSAG!

How does it work?

If the Sentinel PSAG senses a high flow-low pressure, low flow, or low O₂ condition, it will begin an alarm sequence and countdown to isolation. Once the countdown is completed, the Sentinel will remove power from the PSA and isolate, as well as disable the output relay to shut down the supplied process. It will remain in this condition until an operator investigates the cause of the alarm and resets the system.

In aquaculture the oxygen is introduced in the process and is responsible for keeping the stock alive and enhancing crop growth rates. In a failed oxygen supply system, the dissolved oxygen levels will drop while the nitrogen level increases. This will cause the fish to suffer from nitrogen toxicity resulting in gill embolism and total crop loss.

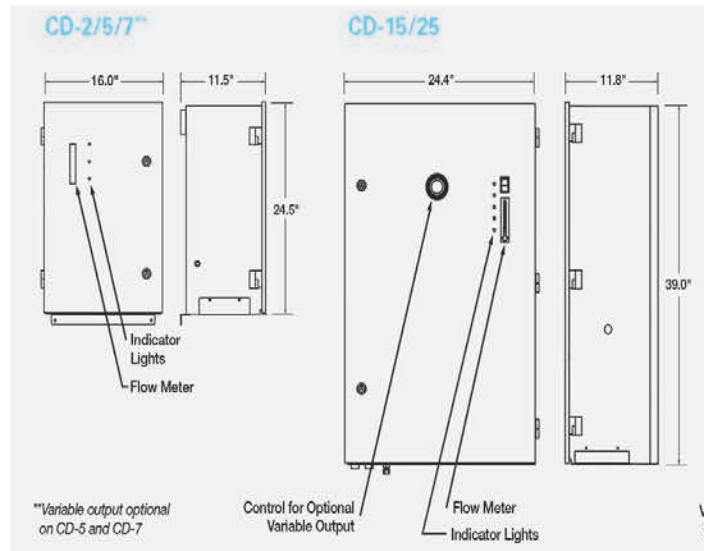
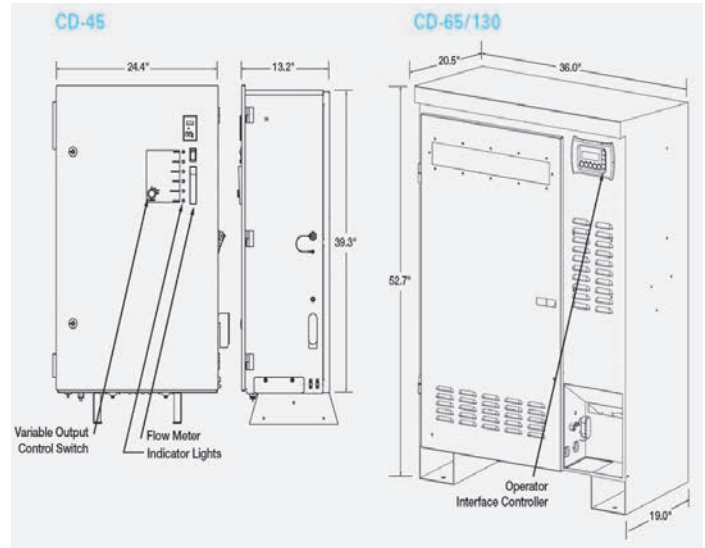
In an ozone system the lower oxygen concentration will lead to a rise in dew point that will cause fouling due to the creation of nitric acid. This also puts major stress on electronic components that lead to costly repairs, and under dosing ozone to the system.

INTELLIZONE® SERIES GENESIS OZONE GENERATORS

Fully integrated wall mount ozone systems designed for simple installation in small spaces

Pentair Aquatic Eco-Systems Genesis Ozone Generators are fully integrated wall mount ozone systems. They are designed for installation into new or pre-existing aquatic operations without equipment modification. Systems generate 2 to 45 grams of ozone per hour with on-board oxygen concentrators, and all operate under vacuum for safety and include integrated DEL Ozone Safety Management System. UL- and NSF-listed.

CALL FOR MORE INFORMATION AND PRICING.



| Specifications | CD-2 | CD-5 | CD-7 | CD-15 | CD-25 | CD-45 | CD-65 | CD-130 |
|-------------------------------|--------------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------------|--------------------------------|
| Ozone Output g/hr | 2 g/hr | 5 g/hr | 7 g/hr | 15 g/hr | 25 g/hr | 45 g/hr | 65 g/hr | 130 g/hr |
| Ozone Concentration | 2.0% by weight | 2.0% by weight | 2.5-3.0% by weight | 2.5-3.0% by weight | 3.5-4.0% by weight | 3.5-4.0% by weight | 5.0-6.0% by weight | 5.0-6.0% by weight |
| Voltage Requirement | 115 V - 60 Hz or 230 V - 50 Hz | | | | | | 240 V - 50/60 Hz | |
| Required Current at 115 V | 5.5 A | 5.5 A | 6.0 A | 8.0 A | 10.0 A | 17.0 A | N/A | N/A |
| Required Current at 230 V | 3.0 A | 3.0 A | 3.5 A | 3.5 A | 5.0 A | 8.0 A | 13.0 A | 26.0 A |
| Ambient Operating Temperature | 40 -100° F (5 - 38° C) | 40 -100° F (5 - 38° C) | 40 -100° F (5 - 38° C) | 40 - 100° F (5 - 38° C) | 40 - 100° F (5 - 38° C) | 40 - 100° F (5 - 38° C) | 40 - 100° F (5 - 38° C) | 40 - 100° F (5 - 38° C) |
| Oxygen Feed Flow | 2.5 scfh | 6 scfh | 7 scfh | 13 scfh | 17 scfh | 30 scfh | 30 scfh | 60 scfh |
| Cooling Water | N/A [Air Cooled] | N/A [Air Cooled] | N/A [Air Cooled] | 0.10 gpm [.4 lpm] | 0.10 gpm [.4 lpm] | 0.20 gpm [.8 lpm] | 1.0 gpm [4.0 lpm] | 1.5 gpm [6.0 lpm] |
| Inlet Temperature** | N/A | N/A | N/A | 50 - 90° F (10 - 32° C) | 50 - 90° F (10 - 32° C) | 50 - 90° F (10 - 32° C) | 50 - 90° F (10 - 32° C) | 50 - 90° F (10 - 32° C) |
| Inlet Pressure | N/A | N/A | N/A | 15 - 40 psi [103 - 275 kPa] | 15 - 40 psi [103 - 275 kPa] | 15 - 40 psi [103 - 275 kPa] | 15 - 40 psi [103 - 275 kPa] | 15 - 40 psi [103 - 275 kPa] |
| System Control | N/A | N/A | N/A | N/A | N/A | N/A | PLC | PLC |
| Enclosure Material/Finish | Steel, 16 gauge / Grey [powder coat] | | | | | | Steel, 14 gauge / White [powder coat] | |

**70° F (21° C) max recommended

DEL ozone™
ECLIPSE SERIES



◀ OZONE GENERATORS

The DEL OZONE Next Generation Eclipse Ozone Systems are compact and provide dependable, low- maintenance operation. Cabinets are made of extruded aluminum with molded plastic end caps and are wall-mountable. Electrodes are rated for 15,000 hours of operation at over 80% capacity. Power supplies are rated to operate for the life of the generator under normal conditions. Generators may be operated in a vacuum or with positive pressure. When using O₂ as feed gas, you can expect approximately twice the concentration than with air as feed gas. Air compressor not included. All models require .25 cfm feed gas (air or oxygen). 1/4" hose inlet and outlet. UL- and cUL-listed. 115V/60 Hz. One-year warranty.

- Improved water quality and clarity
- Kills up to 99.99% of harmful microorganisms
- Minimized operating and maintenance cost
- No unpleasant chemical odors
- High ozone output, low energy cost
- No Air Dryer required

| MODEL | AVG O ₃ CONC. (PPM) | O ₃ OUTPUT (GRAMS/HR) | AMPS @ 115V | DIMENSIONS (W X H X D) | SHIP WT (LBS) | EACH |
|--------|--|----------------------------------|-------------|------------------------|---------------|-----------------|
| ECL10 | 450 | .25 | .06 | 7.8" X 8" X 2.5" | 9 | \$389.00 |
| ECL20 | 700 | .5 | .12 | 7.8" X 14" X 2.5" | 9 | 599.00 |
| ECL40 | 1,350 | 1 | .24 | 7.8" X 24 X 2.5" | 14 | 899.00 |
| 90150E | ACCESSORY PACKAGE W/O MAZZEI® INJECTOR | | | | | 27.00 |
| 90210E | ACCESSORY PACKAGE W/MAZZEI® INJECTOR | | | | | 138.00 |

DEL Zone® and Eclipse™ is a trademark and/or registered trademark of Del Industries, Inc. Mazzei® is a registered trademark of Mazzei® Injector Corp.

PTFE TUBING

Ozone resistance is the reason most people select PTFE tubing. It is a flexible thermoplastic, highly resistant to oxidizing agents. A nearly complete resistance to alcohols, acids, bases and chlorinated solvents makes it excellent for the delivery of ozone. It remains flexible at extreme temperatures and is nontoxic. We recommend using brass or stainless steel fittings with this tubing. Add an "R" to the end of the part number for full roll lengths. Made in USA.



8069

| MODEL | I.D. | EACH | ROLL |
|-------|------|---------------|-----------------|
| 8069 | 1/4" | \$3.74 | \$137.27 |
| 8135 | 1/2" | 19.40 | 804.58 |

| MODEL | | I.D. | O.D. | EACH |
|-------|----------|-------|------|----------------|
| TN8 | 8' COIL | 3/16" | 3/8" | \$16.15 |
| TN25 | 25' ROLL | 3/16" | 3/8" | 42.63 |
| TN50 | 50' ROLL | 3/16" | 3/8" | 67.80 |



◀ OZONE TUBING

This ozone-resistant plastic tubing will not crack or harden and is much more flexible than PVDF tubing and PTFE.

VENTURI INJECTORS

Widely used for the injection of air, oxygen, and ozone. Also compatible with liquids. Tests have shown that when installed properly, injectors can transfer ozone into water with efficiencies as high as 99%. These are constructed of PVDF and are ozone compatible. Mazzei® venturis have no moving parts and provide trouble-free operation. All except **V514** include a 1/4" barbed ozone-safe check valve. Maximum operating pressure at 100°F (38°C) is 400 psi. Made in USA.

| MODEL | INLET/OUTLET | FLOW (GPM) @ 15 PSI IN/ 5 PSI OUT | AIR SUCTION (CFH) @ 15 PSI IN/ 5 PSI OUT | EACH | 4+ |
|---------------|--------------|---|--|----------------|----------------|
| V384 | 1/2" MNPT | 1 | 1 | \$67.00 | \$60.00 |
| V584 | 3/4" BARB | 4 | 5 | 54.00 | 48.60 |
| V584-2 | 3/4" MNPT | 4 | 5 | 60.00 | 54.00 |
| V978 | 1" MNPT | 7 | 9 | 129.00 | 115.00 |
| V1584 | 1 1/2" MNPT | 31 | 72 | 177.00 | 159.00 |
| V514 | 2" MNPT | 57 | 394 | 370.00 | 348.00 |

Mazzei® is a registered trademark of Mazzei® Injector Corp.
Turbo-Venturi® is a registered trademark of United Pet Group, Inc.



V1584

VENTURIS OFFER AN EFFICIENT AND RELIABLE WAY TO INJECT VIRTUALLY ANY GAS OR LIQUID INTO WATER



OZD2

AIR DRYERS

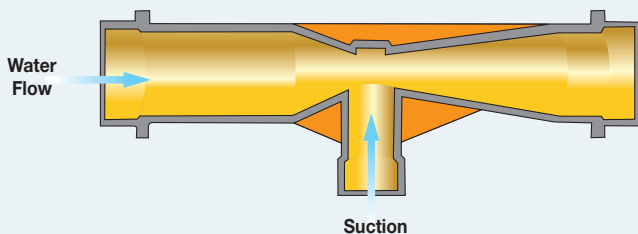
These dryers offer a low-cost alternative for ozone experiments and applications with very low flowrates. The desiccant (included) changes color from blue to pink when regeneration is due. Both ends have 1/2" NPT with 1/4" barb adapters. Made in USA.

| MODEL | OVERALL LENGTH | VOLUME (IN³) | SHIP WT (LBS) | EACH |
|-------------|----------------|--------------|---------------|------------------|
| OZD2 | 2" X 12" | 17" | 38 | 5 \$62.25 |
| OZD3 | 3" X 24" | 32" | 170 | 14 125.00 |

TECH TALK 72

Ozone Sizing: Know Your Goal

In sizing an ozone system the most important design factor is getting the correct ozone dose for your specific application. Ozone is used mainly to achieve two different goals: sterilization/oxidation and microflocculation. Maximizing mass transfer (getting the ozone from the gas phase into the water) is of primary importance for both. The most efficient method of dissolving ozone (or any gas) is achieved by using a venturi eductor, a device that passively pulls in ozone under a vacuum using the physical (motive) force of the water flowing in a pipe. The water enters the venturi where the velocity rapidly increases due to a cone-shaped restriction in the venturi throat. This increase in velocity causes a low pressure area to form at the point of maximum restriction (see diagram below), generating suction that pulls the ozone into the water stream. The venturi then rapidly expands in diameter, slowing the water down instantaneously, causing the water and gas to crash into each other at very high velocity and driving the gas into solution. The higher the pressure in the venturi and downstream piping, the more gas can be driven into



solution. Air diffusers and pressurized injectors are also sometimes used but have lower transfer efficiencies. The real advantage in using a venturi from a safety standpoint is that with positive pressure ozone delivery systems (where the ozone is pumped into the system under pressure) a leak in the delivery hoses or piping can let ozone leak into the environment. With a properly sized venturi, if a leak occurs under vacuum, surrounding (ambient) air will be drawn into the delivery tubing, so there's no chance of affecting nearby people with ozone.

Ozone has long been known to be a very efficient oxidant. In typical aquarium/aquaculture applications ozone can greatly reduce total organic carbon (TOC) levels by direct oxidation of the organics or indirect oxidation by other powerful oxidants that naturally occurs when ozone reacts with water (free radical oxidation). Applied ozone doses for oxidation and disinfection are similar and fall within .1 to 1.0 mg/L. Another rule of thumb for ozone sizing for oxidation is based on food loading. An ozone dose of 15-20 grams of ozone per kg of food fed is recommended by Doctors Timmons and Ebling for aquaculture systems.

The other use of ozone not nearly as well known in aquatic systems is as a microfloculent. When dosed at rates roughly 1/10 of the oxidation dose (.01-.1 mg/L), ozone can act as a flocculent, causing very small particulates that normally pass through mechanical filters to clump into larger particles that mechanical filters can capture. The ozone does this by causing electrical charges on the surface of the particles so that they become attracted to each other like microscopic magnets. This type of ozone dose is typically used in foam fractionators (protein skimmers), so the flocculated particulates are carried out of the system water in the foam column.



◀ OZONE-SAFE CHECK VALVES

These clear, duckbill check valves work great for preventing water from back siphoning into ozone generators. Cracking pressure is 2½" H₂O. Inlet/outlet accepts ⅛" and ¾" I.D. tubing.

| MODEL | | EACH | 10+ |
|--------------|-----------|---------------|---------------|
| CKV55 | ¾" TUBING | \$9.99 | \$5.72 |
| CKV60 | ¼" TUBING | 11.99 | 7.70 |

DESICCANT

When stored, desiccant media should be placed in an airtight container. It changes color from blue to pink when regeneration is due. To recharge, simply place desiccant on a baking sheet and heat at 350°F (176° C) for approximately 20 minutes. Replace after 25 rechargings.

| MODEL | LBS | EACH | 10+ |
|------------|-----|----------------|----------------|
| DR2 | 1¼ | \$15.00 | \$13.50 |
| DR3 | 5½ | 52.99 | 34.47 |



TECH TALK 71

Ozone Notes

We have offered ozone generators to the aquaculture industry for well over 20 years. Slow to catch on, ozonization is gaining in popularity for the following reasons:

- It is highly effective in removing organics, pesticides, color and nitrates.
- It reverts back to oxygen quickly. Unlike chlorine, there are no detrimental residuals (except in salt water).
- It is produced on site, with no electricity near the water.
- It is economical and nonpolluting, when used correctly.
- It can be used as a sterilizer before, during and after water is used for aquaculture.
- Ozonization improves biological filtration and particulate filtration.
- It can remove the biological oxygen demand in the water.
- It oxidizes long chain molecules, which biofiltration cannot do.

Basic Ozone Information

- Ozone is very unstable. It will revert back to oxygen within 24 hours, even if there are no organics in the water for it to oxidize.
- Temperature, pressure and shear cause it to revert back to oxygen. When ozone (O₃) molecules collide, they recombine as oxygen (O₂), so it is virtually impossible to get ozone to the tank above 10% (by weight). When under pressure or traveling a long distance in the tubing, it can revert considerably.
- Use dry air or oxygen to produce ozone. Humidity can reduce ozone production by 70%, form scale in the corona discharge (CD) reactor and produce nitric acid.
- To ensure sterile (germ free) water, there is nothing better than ozone. For sterilization, pre-filter to 5 microns and maintain ozone levels above 600 mV for a minimum of 8 minutes.
- OSHA says that it is harmful to breathe ozone above .1 ppm in the air (most people can smell ozone above .05 ppm). Vent gas outdoors or into an ozone destruction device, such as a UV light or activated charcoal. Downflow bubble contactors such as cones and saturators are recommended so the gas cannot escape. High levels of ozone may cause a single species biofilter to develop, due to the ozone oxidizing the nitrite. This is not bad unless something goes wrong with the ozone system, causing nitrite to spike!

How It Works

Ozone is generated by passing air or oxygen through a reaction vessel, where either an electric arc, CD or an ultraviolet (UV) lamp "excites" the oxygen. In this reaction, oxygen molecules separate into atoms of oxygen, which then temporarily recombine with each other to form ozone. When ozone oxidizes organics only one atom of oxygen is used, leaving one molecule of oxygen.

Types of Ozone Generators

Ultraviolet lights with a specific ozone-generating wavelength are generally used to produce low levels of ozone. The slower the gas moves through the UV-reaction vessel, the higher the percent of ozone.

The corona discharge (CD) type uses an electric arc similar to sparks or lightning to produce higher percentages of ozone by weight. A small CD reaction vessel can produce a relatively large volume of ozone. The greater the percentage of ozone, the faster the oxidizing reactions take place.

Where to Use It

Ozone can be used in a protein skimmer (foam fractionation device), where it helps the process, while the vessel allows capture of the off gas for venting or ozone destruction. Ozone works very well in oxygen saturators for the same reasons. We do not recommend its use in lakes or ponds, unless the water is pre-filtered and treated in a reaction vessel. Just bubbling it into the water is not effective.

How Much to Use

In a small home aquarium, .1 mg/L may be used (300–400 mV). A sterilizing system for drinking water may need 1 mg/L+ with a 10-minute contact time. In recirculating aquaculture, with high BOD and COD loads, the ozone requirement can be more than 20 mg/L. The dosage is impossible to determine because aquaculture conditions are always changing. Therefore, we recommend either the use of a side stream, where the water is treated as much as possible with ozone before it is mixed back into the main water body, or the use of a redox controller, which will automatically adjust to the changing conditions.

How to Handle It

Ozone is a very strong oxidizer and must be handled with special materials. The best is stainless steel for tubing, valves and other components (certain Sweetwater® air diffusers are made for use with ozone). The second best material is pure PTFE, then PVDF, CPVC and HDLPE, in that order. Be careful using vinyl air tubing, as the ozone will leach out the potentially toxic plasticizer (it will look like oil on the inside of the tubing).

Safety

A whiff of low concentration ozone will not kill you. If you smell ozone in the air in your building, turn off the ozone generator and vent the air space. Note that OSHA requires an ambient ozone monitor on any generator that produces over 5 g/hr.

Ozone System Design Service

Due to the complex nature of custom ozone system design, please call the Pentair Aquatic Eco-Systems team at 877-347-4788 for engineering services.

G SERIES OZONE GENERATORS

NEW!

The reliable, versatile, and cost-effective Pacific Ozone™ G Series ozone generators are designed to satisfy a wide range of applications. The ultra-compact, fiberglass reinforced case is perfect for harsh and demanding environments such as aquaculture and agriculture installations, cooling tower and wastewater treatment skids, and other commercial and industrial ozone applications.

The G Series incorporates Pacific Ozone's exclusive Floating Plate Technology™ – an air-cooled titanium and ceramic reactor cell with high frequency, variable control power supply. This compact line of ozone generators offers a broad range of ozone output performance from 12 to 60 grams per hour. The power consumption of the highly efficient G Series is among the lowest in the industry. Yet, the high-concentration ozone output and broad range of features of this series provides greater flexibility of use. The G Series ozone generators can be controlled manually or remotely using a 0-10VDC or 4-20mA signal.

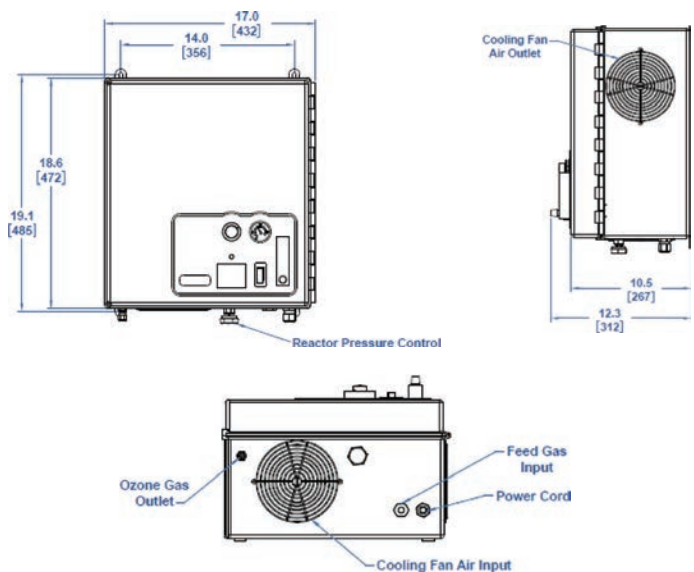
Features

- Air-Cooled Ceramic and Titanium Reactor Cell
- Feed Gas Pressure Regulator
- Door Safety Switch
- Over-Temperature Protection
- Feed Gas Flow Switch
- Stainless Steel Ozone Fittings

Controls

- 4-20 mA or 0-10 VDC Input
- Variable Output Control
- Power Feed Back Reference Meter
- Reactor Pressure Control
- Reactor Pressure Gauge
- Feed Gas Flow Control
- Remote On/Off Control
- LED Visual Ozone Indicator

CONTACT OUR TECH SUPPORT STAFF FOR ASSISTANCE AND PRICING INFORMATION



| MODEL | VOLTS | HZ (1 PH) | WATTS (15A) | POWER CORD | MAX. OZONE PRODUCTION | | MAX. OZONE CONCENTRATION | MAX. REACTOR PRESSURE | | FEED GAS FLOW RANGE | | AIR COOLING | | FEED GAS INLET FITTING FNPT* | OZONE OUTLET FITTING* | DIMENSIONS | | | SHIP WT (LBS) |
|--------|-------|-----------|-------------|------------|-----------------------|----------|--------------------------|-----------------------|-----|---------------------|---------|-------------|------|------------------------------|-----------------------|------------|-----|-----|---------------|
| | | | | | LBS/DAY | GRAMS/HR | | PSI | BAR | SCFH | LPM | SCFH | LPM | | | L | W | H | |
| 970004 | 115 | 60 | 230 | US | 0.6 | 12 | 5% | 12 | 0.8 | 7-10 | 3.3-4.7 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 42 |
| 970005 | 230 | 60 | 230 | EURO | 0.6 | 12 | 5% | 12 | 0.8 | 7-10 | 3.3-4.7 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 42 |
| 970006 | 230 | 60 | 230 | US | 0.6 | 12 | 5% | 12 | 0.8 | 7-10 | 3.3-4.7 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 42 |
| 970007 | 115 | 60 | 270 | US | 1.0 | 18 | 6% | 12 | 0.8 | 7-10 | 3.3-4.7 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 42 |
| 970008 | 230 | 60 | 270 | EURO | 1.0 | 18 | 6% | 12 | 0.8 | 7-10 | 3.3-4.7 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 42 |
| 970009 | 230 | 60 | 270 | US | 1.0 | 18 | 6% | 12 | 0.8 | 7-10 | 3.3-4.7 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 42 |
| 970010 | 115 | 60 | 435 | US | 1.6 | 30 | 8% | 12 | 0.8 | 7-20 | 3.3-9.4 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 44 |
| 970018 | 230 | 60 | 435 | EURO | 1.6 | 30 | 8% | 12 | 0.8 | 7-20 | 3.3-9.4 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 44 |
| 970012 | 230 | 60 | 435 | US | 1.6 | 30 | 8% | 12 | 0.8 | 7-20 | 3.3-9.4 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 44 |
| 970013 | 115 | 60 | 525 | US | 2.4 | 45 | 8% | 12 | 0.8 | 7-30 | 3.3-14 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 51 |
| 970014 | 230 | 60 | 525 | EURO | 2.4 | 45 | 8% | 12 | 0.8 | 7-30 | 3.3-14 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 51 |
| 970015 | 230 | 60 | 525 | US | 2.4 | 45 | 8% | 12 | 0.8 | 7-30 | 3.3-14 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 51 |
| 970016 | 230 | 50/60 | 625 | EURO | 32.0 | 60 | 8% | 12 | 0.8 | 7-40 | 3.3-19 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 54 |
| 970017 | 230 | 50/60 | 625 | US | 32.0 | 60 | 8% | 12 | 0.8 | 7-40 | 3.3-19 | 240 | 6796 | 1/4" | 1/4" | 19" | 17" | 11" | 54 |

*Compression fitting.

M SERIES OZONE GENERATOR SYSTEMS

NEW!

The advanced chassis-based design of the M Series ozone generators is the foundation for a potent ozone production system. It combines the power of Pacific Ozone's patented Floating Plate Technology™ ozone reactor cells with PID control in a 19-inch rack-mountable chassis. Three of the fully redundant, self-contained chassis' are housed in a stainless steel enclosure. The populated enclosure modules may be combined to form the most powerful air-cooled ozone generators available. Standard configurations of the M Series can produce from 7 pounds per day to more than 50 pounds per day ozone.

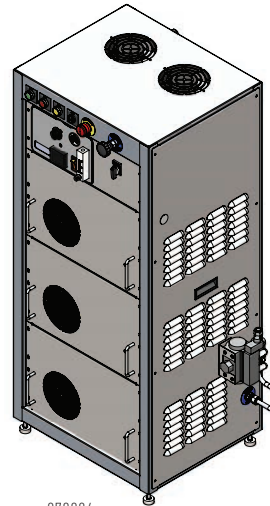
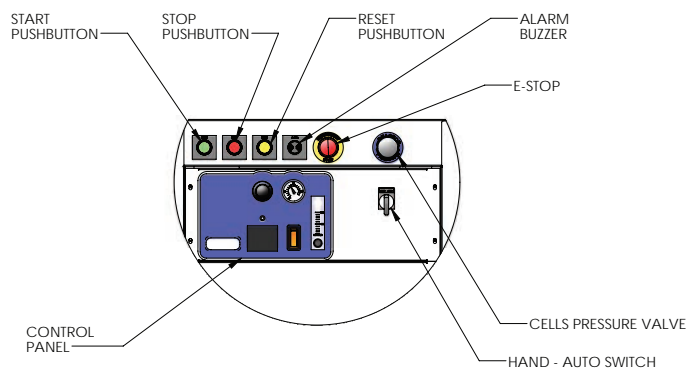
Modular redundancy is the key to the M Series' revolutionary chassis-based design, providing unsurpassed reliability. The M Series is engineered to meet demanding ozone process requirements with 4-20mA or 0-10VDC proportional ozone control interface. The standard PID controller is ready to receive feedback signal from your process and provide precise control of the ozone system. The PLUS options for M Series add one or two channels of dissolved ozone detection for input to the standard PID controller.

Features

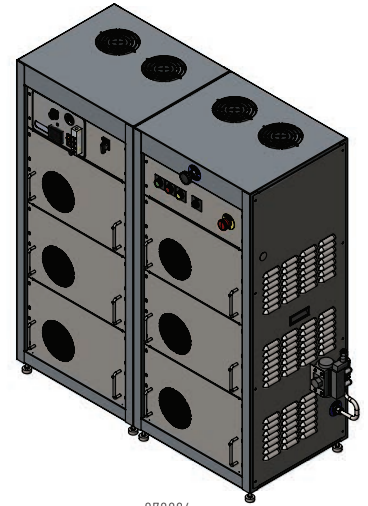
- A Redundant Modular Ozone Chassis Design
- Stainless Steel Floor-Mount Enclosure
- Air-Cooled Ceramic and Titanium Reactor Cell
- Over-Temperature & Over Voltage Protection
- Outlet Isolation Valve & Inlet Isolation Valve Package
- Feed Gas Flow Switch
- CSA/UL Available

Controls

- 4-20 mA or 0-10 VDC Input
- Auto sequencing – SSR Control w/Gas prep and auto purge
- Variable Output Control
- Programmable PID Controller
- Reactor Pressure Control
- Reactor Pressure Gauge
- Feed Gas Flow Control
- Remote On/Off Control



970024



970026



970028

CONTACT OUR TECH SUPPORT STAFF FOR ASSISTANCE AND PRICING INFORMATION

| MODEL | VOLTS | HZ (1 PH) | WATTS (40A) | MAX. OZONE PRODUCTION LBS/DAY | MAX. OZONE PRODUCTION GRAMS/HR | MAX. OZONE CONCENTRATION | MAX. REACTOR PRESSURE PSI | MAX. REACTOR PRESSURE BAR | FEED GAS FLOW RANGE SCFH | FEED GAS FLOW RANGE LPM | AIR COOLING SCFH | AIR COOLING LPM | COMPRESSED AIR INLET FITTING (MNPT) | OZONE OUTLET FITTING* | DIMENSIONS L | DIMENSIONS W | DIMENSIONS H | SHIP WT (LBS) |
|--------|-------|-----------|-------------|-------------------------------|--------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|-------------------------|------------------|-----------------|-------------------------------------|-----------------------|--------------|--------------|--------------|---------------|
| 970024 | 230 | 50/60 | 1550 | 7.1 | 135 | 8% | 12 | 0.8 | 10-90 | 4.7-42 | 720 | 20388 | 1/2" | 1/2" | 18 3/4" | 23 1/4" | 51 1/2" | 340 |
| 970025 | 230 | 50/60 | 1700 | 9.5 | 180 | 8% | 12 | 0.8 | 20-120 | 9.4-57 | 720 | 20388 | 1/2" | 1/2" | 18 3/4" | 23 1/4" | 51 1/2" | 345 |
| 970026 | 230 | 50/60 | 2900 | 14.3 | 270 | 8% | 12 | 0.8 | 20-180 | 9.4-84 | 1440 | 40776 | 1/2" | 1/2" | 18 3/4" | 45 1/2" | 51 1/2" | 630 |
| 970027 | 230 | 50/60 | 3200 | 19.0 | 360 | 8% | 12 | 0.8 | 50-240 | 24-114 | 1440 | 40776 | 1/2" | 1/2" | 18 3/4" | 45 1/2" | 51 1/2" | 640 |
| 970028 | 230 | 50/60 | 4400 | 21.4 | 405 | 8% | 12 | 0.8 | 50-270 | 24-127 | 2160 | 61164 | 1/2" | 1/2" | 18 3/4" | 67 3/4" | 51 1/2" | 925 |
| 970029 | 230 | 50/60 | 4850 | 28.6 | 540 | 8% | 12 | 0.8 | 50-360 | 24-170 | 2160 | 61164 | 1/2" | 1/2" | 18 3/4" | 67 3/4" | 51 1/2" | 935 |

*Compression fitting.



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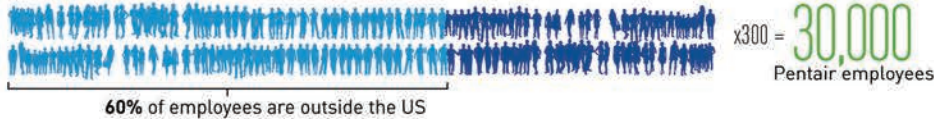
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*Restrictions apply. Please visit pentairaes.com/signup for more information

PENTAIR AT A GLANCE

EMPLOYEES



Product availability on all **7** continents

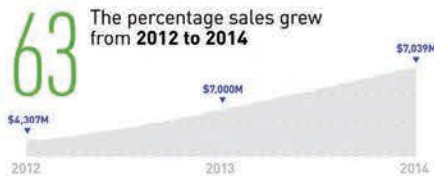
SALES ACROSS THE GLOBE

2014 SALES BY REGION



50% US & Canada **19%** Western Europe **31%** Fast growth and other developed countries

ROBUST GROWTH



PRODUCTION



The number of seconds it takes to fill an Olympic size swimming pool with water by one of Pentair's custom-made flood protection pumps

250 MILLION

The number of liters of freshwater per day Pentair provides the residents of Sydney, Australia

350,000

The number of people in Colon, Honduras who receive clean water each day through Pentair's Project Safewater initiative



100+ Pentair manufacturing facilities



200,000+ Following Pentair AES on Social Media

INSPIRED SOLUTIONS. IMPROVING LIVES.

75%

of our solutions relate to food, water and energy



PENTAIR AES 5 PILLARS

SOLE PARTNER



SINGLE-SOURCE PARTNER

A single-source provider of equipment, expertise and accountability for virtually all water-related applications

VALUE



A TEAM WITH DEEP, REAL-WORLD EXPERTISE

Former curators/operators bringing valuable expertise and experience

INNOVATION



PRODUCT AND SOLUTION INNOVATION

An innovator that consistently brings value to the industry and its business via new ideas, equipment and solutions for every challenge

PERFORMANCE



COMMITMENT ACROSS THE ENTIRE SYSTEM LIFE CYCLE

From system commissioning and start-up through maintenance and troubleshooting

WIN RIGHT



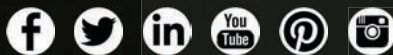
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