



## AQUATIC ECO-SYSTEMS



DESIGN • SERVICE • EQUIPMENT  
INTERNATIONAL MASTER CATALOG

Shop Online: [PentairAES.com](http://PentairAES.com)

# INTRODUCTION

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## EASY WAYS TO ORDER ▼

### Iceland

Akralind 4  
210 Kopavogur, Iceland  
Office Phone: +354.595.3000  
Fax: +354 595 3001  
Office Hours: 9AM–5PM  
Email: PAESIceland@Pentair.com

### Norway

Thormøhlensgate 55  
5006 Bergen, Norway  
Office Phone: +47 97592374  
Office Hours: 8AM–4PM  
Email: PAESNorway@Pentair.com

### Scotland

Industrial Units (Unit 3)  
Fodderty Way,  
Dingwall Business Park,  
Dingwall, Ross-shire.  
IV15 9XB  
UK  
Office Phone: +44 (0) 1349 867519  
Office Hours: 9AM–5PM  
Email: PAESScotland@Pentair.com

### Pentair Water Belgium bvba

Industriepark Wolfstee, Toekomstlaan 30  
B-2200 Herentals, Belgium  
Office Phone: +32 (0)14 25 99 11  
Fax: +32 (0)14 25 99 75  
Office Hours: 8AM–5PM  
Email: PAESemea@Pentair.com

### Pentair Water Italy srl

Address Via Masaccio, 13  
Lugnano, Pisa - 56010 - Italy  
Office Phone: +39 050716166  
Fax: +39 050716156  
Office Hours: 8.30AM–5.30PM  
Email: PAESemea@Pentair.com

## FIND US ON ▶



## SYMBOL LEGEND



### Designed Here

Our expertise backs these items, so you can expect better performance and reliability than from similar products.



### Tech Favorite

These products are highly recommended by our technicians.



### Fresh Water or Salt Water

Indicates products that are compatible with fresh water or salt water.



### Aquaculture Duty

Ultra reliable and tough enough to withstand constant use.



### Stocked Item in Belgium

Stocked item in Belgium.

To our valued customers: The entire team at Pentair Aquatic Eco-Systems would like to take the opportunity to say thank you for your ongoing support and patronage. This International Catalog is a tangible and symbolic gesture to you that we are eager and equipped to drive growth and improvements in the aquaculture market worldwide. It has been a successful and progressive time for our company with many new initiatives aimed at making your customer experience more enjoyable. In particular, we made several key improvements to our website, including enhanced search by part number and the ability to view our complete product catalog online. We have also made many operational changes to streamline operations in our manufacturing plants, which results in higher-quality products delivered on-time to you, our important customers. In an effort to cater to our customers worldwide, we made the strategic decision to add to our reach with the timely acquisition and integration of VAKI Aquaculture Systems, Ltd. in late 2016. With this acquisition, we not only added dozens of team members in nine offices—including new locations in key aquaculture markets: Norway, Scotland and Iceland—but also the VAKI product offering, which only strengthens Pentair Aquatic Eco-Systems' ability to be a single source solution for our customers' Design, Service and Equipment needs—just ASK US!

Our facility, P.A.E.S.W.A.T.E.R. (Pentair Aquatic Eco-Systems World Aquaculture Technology Engineering & Research) Center in Apopka, FL is one project of note that brings us great pride, especially for what it represents. The center, which consists of 12,400 square feet of laboratories and fish culture systems, is used for demonstration, innovation and educational activities. Now that this flagship facility has been in operation just over one year, we are pleased to report that we've successfully conducted multiple workshops and innovation sessions in the facility. Thanks to the world-class PAES W.A.T.E.R. facilities, our workshop attendees were able to experience first-hand interactions with aquaculture systems and equipment; they could feel what a real day is like in the life of an aquaculture professional. We hope you'll join us for an upcoming workshop to learn more about aquaculture by working alongside our team of scientists, biologists and engineers. In 2016 we were also thrilled to have completed a successful first fish harvest from the PAES W.A.T.E.R. facility. In February, a team of eight Pentair employees worked carefully to ensure complete success during the harvest. In total, over 10,000 pounds of tilapia were transferred from PAES W.A.T.E.R.'s indoor Recirculating Aquaculture System (RAS). We have since produced and sold multiple cohorts to suppliers in the area. The final (and perhaps most exciting) update about PAES W.A.T.E.R. is the launch of an interactive tour on PAESWATER.com. This digital tour allows viewers to walk through the facility, stop and learn about each piece of equipment and so much more. There is also a live video stream where viewers can tune in to live events that happen throughout the year. Allowing our customers the chance to see the facility without actually being there in person is so rewarding and we hope you all enjoy it!

The past year has also seen some exciting news from our Urban Organics Pentair Group as well. In late 2015, we announced a new venture, the establishment and operation of an 87,000-square-foot indoor aquaponics facility in the former Schmidt's brewery building in St. Paul; one of the largest commercial aquaponics facilities in the world. Through diligent teamwork and collaboration with Pentair's team of experts involved in this project – from system design, to construction and execution of the meticulous plans, we're happy to report that there are fish in the tanks, the growing racks are in place and planted and we are anxiously awaiting the grand opening of Urban Organics at the Schmidt's Brewery in summer 2017!

Our continuous aim is to improve our customers' experience when interacting with Pentair Aquatic Eco-Systems. With this in mind, and with the acquisition of VAKI, we have added several new subject matter experts to our team. We have also improved our commercial aquaculture system design capabilities, expanded our service team and added over 200 new items to our already industry-leading product offering.

Our work and dedication to the aquaculture industry has helped to ensure a more stable, sustainable food source for the growing global population. We have and will continue to develop innovative solutions to complex challenges that our customers are facing; enabling their operations to increase yields and profits by improving efficiencies in key input costs such as water, energy and labor.

As always, we hope our customers will 'Think Pentair First!' Whether you need complete system design for a commercial aquaculture project or are just looking for a replacement part, we urge you to think of us first. We will strive to keep you as a valued customer and we do our absolute best to make this catalog as comprehensive as possible, delivering our wide-range of new products in specific categories to create a more user-friendly resource.

There is no doubt in our minds that the coming year will be an exceptional one for growth in the aquaculture industry. With new projects around the globe, technological advancements and a commitment from Pentair Aquatic Eco-Systems to carry out even more improvements this year—all with you, our valued customer, in mind. Thank you for your patronage and support, and we look forward to continuing to serve you in 2017 and beyond.

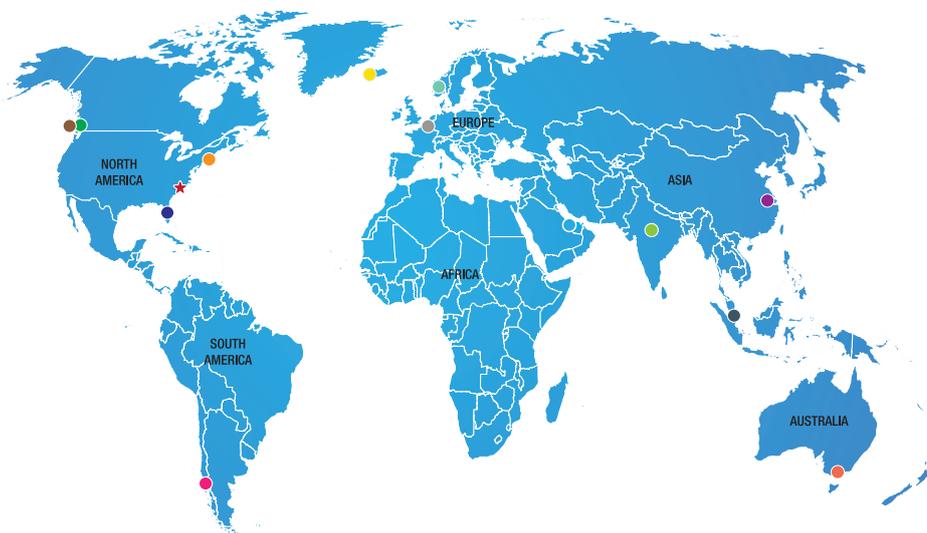
Sincerely,



Hermann Kristjánsson  
Business Development Manager  
Pentair Aquatic Eco-Systems, Inc.

## WORLDWIDE SALES AND SERVICE

Local tech support, customer service, design and consulting with global reach. Pentair is a global company with a local presence. Pentair Aquatic Eco-Systems, Inc., has served over 150 countries worldwide. This includes multiple catalogs and international customer service representatives, which will bring you a better customer experience.



- Corporate offices in Cary, NC
- Operations and sales office in Apopka, FL
- Operations and sales office in Beverly, MA
- Operations and sales office in Vancouver, Canada
- Sales office in Nanaimo, Canada
- Operations and sales office in Puerto Montt, Chile
- Operations and sales office in Suzhou City, China
- Operations and sales office in Kópavogur, Iceland
- Sales office in Dubai, United Arab Emirates
- Sales office in Melbourne, Australia
- Sales office in U.P, India
- Operations and sales office in Herentals, Belgium
- Sales office in Singapore
- Sales office in Norway

# ASK US

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Pentair is dedicated to excellence in all aspects of our business. Whatever you need—equipment selection, consultation, technical support, system design, redesign/retrofitting services, maintenance or service contracts—you can count on us. Pentair provides what's needed to make any system operate more efficiently and effectively to help you extract profit from every facet of your operation. We see the potential in the Commercial Aquaculture market; we've made this our main focus and we strive to be the best in the three key areas of supporting commercial facilities: **Design • Service • Equipment**. Ready to get your aquaculture project started? ...ASK US!



## COMMERCIAL AQUACULTURE

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With depleting food stocks unable to keep up with rising demand, the commercial aquaculture industry is ready to explode. The potential for commercial aquaculture is enormous, but the industry is also highly complex. The need for advanced equipment, high-level support and precise engineering has never been greater, and the many economic and ecological challenges of fish production must be solved. Which is why we're here. Our mission is to offer symbiotic biological and engineering solutions to support any aquaculture need. For you, this means everything from designing a complete facility to engineering solutions for existing production systems. Our commercial aquaculture team can also help you with equipment upgrades, troubleshooting and technical support. With Pentair Aquatic Eco-Systems as your partner, the future has arrived.

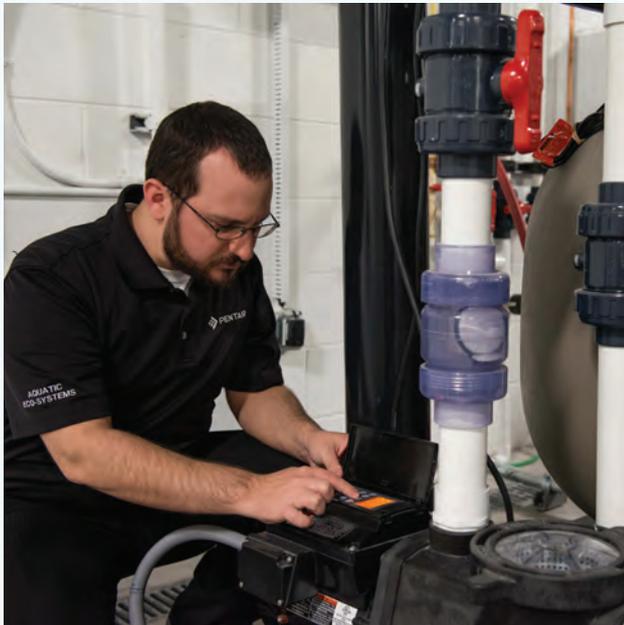
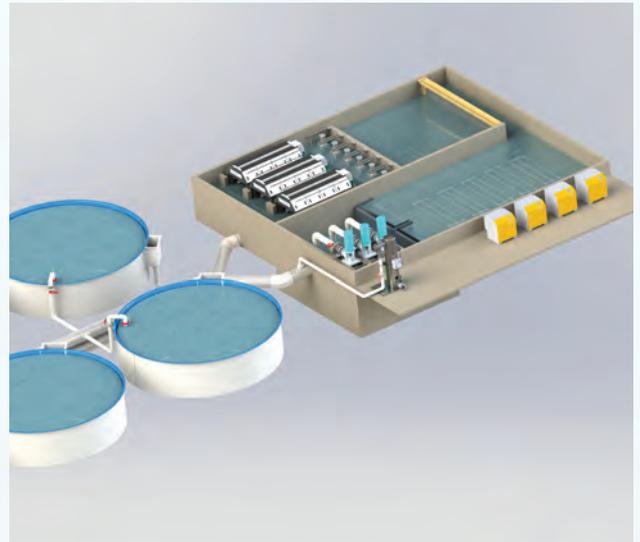


# DESIGN

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Pentair Aquatic Eco-Systems has a team of experts proficient in designing sustainable commercial-scale solutions and systems, offering economic and production benefits... **ASK US!**

- Proven collaborative design model ensures the right solution for specific requirements
- Operational experience with specific species applied in design
- Stage gates ensures alignment and reduces expensive changes
- Dedicated product engineers and system engineers
- Professionally engineered design and construction documents
- Biosecurity
- Scalable operations



# SERVICE

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At Pentair Aquatic Eco-Systems, our commitment to customer support does not end at the time of the sale or after a project is completed. We have a team of knowledgeable field technicians equipped with the fish farming experience and skills to service various types of aquaculture systems. Pentair's team boasts a diverse background in commercial aquaculture and research. Our experience with biological and technological engineering is grounded in decades of research and commercial industry application experience... **ASK US!**

- Project Management
- Installation and start up support
- Training
- Maintenance, troubleshooting and consultancy
- Equipment upgrades

# EQUIPMENT

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Pentair Aquatic Eco-Systems is the largest source of aquatic products and systems worldwide. Pentair is a global manufacturing powerhouse with many products and systems to help optimize your aquaculture operation. We provide the best possible solutions for aquaculture operations, from hatcheries to grow-out systems and everything in between. Our world-class equipment catalog contains over 5000 products, and we have over 7000 products on PentairAES.com. From standard products to customized and configured systems, Pentair Aquatic Eco-Systems has the answers for your farm's needs... **ASK US!**

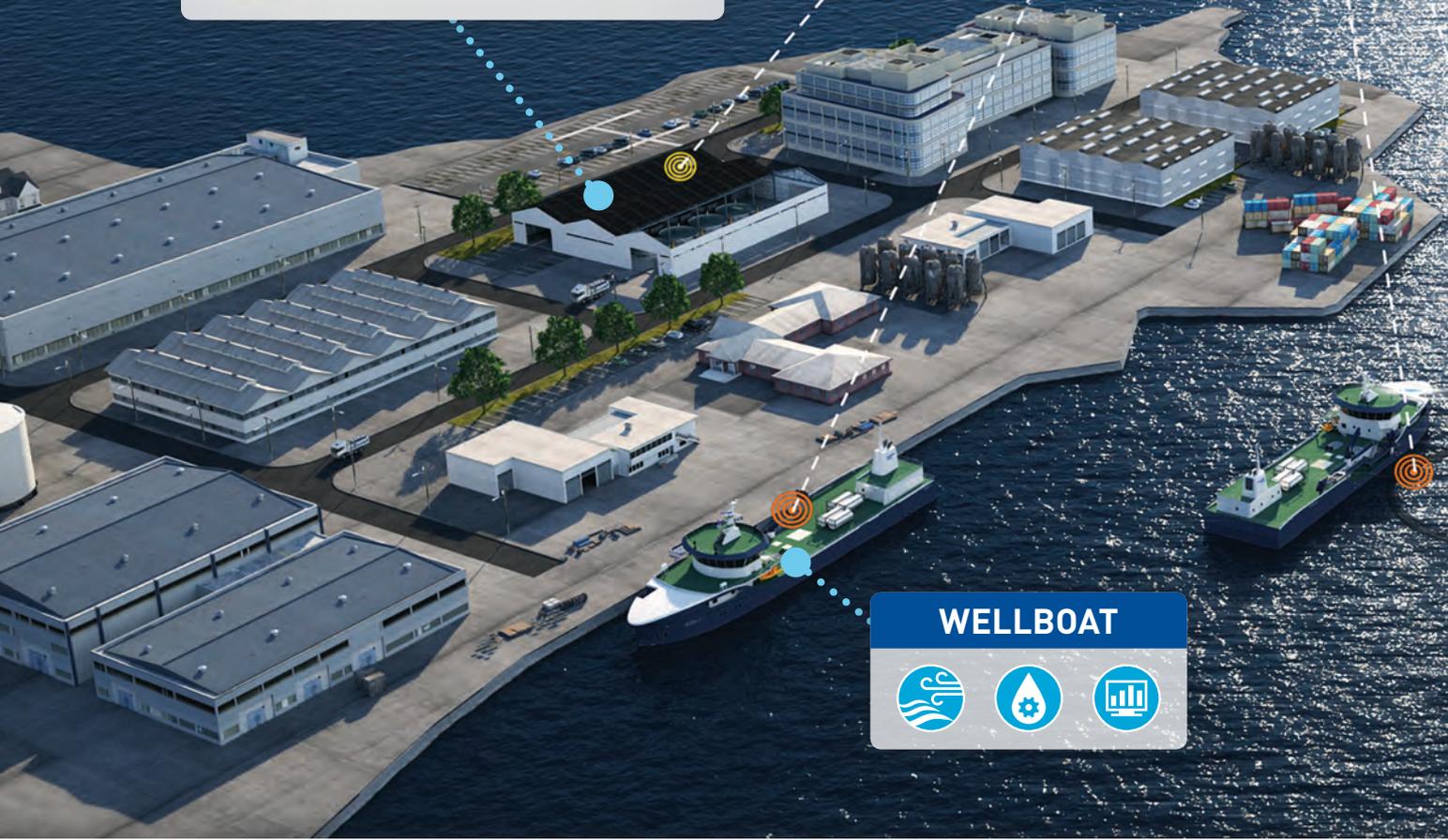


# 4 PAES SOLUTIONS OVERVIEW

**CLOUD-BASED MONITORING**

**LAND-BASED**

A 3D rendering of a land-based aquaculture facility. It features several large, circular white tanks with blue water, arranged in a row. To the right, there is a control room with a desk and computer monitors. The facility is situated on a concrete pier or island.



**WELLBOAT**

A blue box containing the word 'WELLBOAT' and three circular icons: a water wave, a water drop with a gear, and a bar chart.



## **WATER MOVEMENT**

Reliable, continuous water circulation in harsh environments is critical to the success of every aquaculture system.



## **WATER TREATMENT**

Effective removal of solids, contaminants and impurities are critical to water reuse in aquaculture systems.



## **MONITORING AND CONTROL**

Monitoring and Control systems help with maintaining balance in complex aquaculture environments and reduce labor requirements through automation.



## **STOCK CONTROL AND MANAGEMENT**

Mechanized and automated stock management reduces labor and improves operational efficiency.



## SEA PEN



## AERATION AND OXYGENATION

Management of dissolved oxygen concentration through aeration is vital to keeping water conditions optimal in aquaculture operations.



## PENTAIR PUMPS

- Exclusive Constant Flow Technology offers the highest water flow rate of any high performance pump—with the lowest electricity consumption.
- Complete line of fresh and saltwater compatible pumps for a broad range of applications and performance requirements.



## CLOUD-BASED MONITORING

- Pentair AES offers a secure, reliable and easy-to-use internet-based data monitoring cloud service.
- Optimize operations by analyzing the data being monitored using trend analysis and pattern recognition to support system optimization and preventative maintenance strategies.



## VAKI FISH PUMPS

- Pentair Aquatic Eco-Systems (AES) VAKI Fish Pumps provide a safe, gentle and fast way to transfer stock.
- One operator can move up to 10 tons per hour, reducing labor costs and eliminating the need to lift heavy nets and buckets.



## VAKI COUNTERS

- From hatching to harvesting, Pentair AES VAKI has an extensive range of state-of-the-art counters that have been designed with a Customer First approach.
- Counters deliver accuracy, speed and data verification in a user-friendly package.
- Minimizes unnecessary stress by eliminating the need to remove fish from the water.



## VAKI BIOMASS DAILY

- Using the latest in size estimation technology, Biomass Daily continually measures sea pen inventory providing a daily overview of average weight, size distribution, condition-factor and growth.
- Biomass Daily synthesizes the data that is gathered into accurate reports for improved inventory management and harvest planning.

# 6 AERATION

## Diffusers

### SWEETWATER AIR DIFFUSERS ✓ DESIGNED HERE STOCKED IN BELGIUM

Pentair Aquatic Eco-Systems Sweetwater diffusers are the highest-quality ceramic-type air diffusers on the market today. They're machined from a solid block of glass-bonded silica. Because dust and dirt particles up to 30 microns in size will pass right through these diffusers, there's no need for expensive air filters. And with an air resistance of less than .25 psi, Sweetwater glass-bonded diffusers are compatible with economical low-pressure blowers.

They produce a uniform medium/fine bubble and are very resistant to clogging. And when cleaning does become necessary because of a buildup of calcium precipitate or bacteria, an acid bath restores them to like-new performance.

Note that water pH in excess of 9.0 will shorten the diffuser life. Self-weighting when used with typical tubing lengths.

#### Beware of imitations.

Sweetwater diffusers are the original 1093°C glass-bonded silica diffusers introduced by us in 1984. You may come across other diffusers that copy our sizes, descriptions and even our photos, but it takes more than flattering imitation to compete with the best.

#### SWEETWATER MEDIUM PORE DIFFUSER SPECIFICATIONS

BODY	1093°C GLASS-BONDED SILICA
MAXIMUM PORE SIZE	140 MICRONS (.01397 CM)
BUBBLE SIZE	1-3 MM (.04-.15 INCHES)
NOMINAL PARTICLE RETENTION	50 MICRONS
SERVICE LIFE AT PH BELOW 8.0	UNLIMITED
FLEXURAL STRENGTH	2,500 PSI



MODEL	LENGTH* (CM)	WIDTH* (CM)	SUGGESTED CM	CM	M <sup>3</sup> /HR	AIR SUPPLY CONNECTION
AS1	3.8	4	1.3	1.3	.85	O.D. (4 MM), ABS
AS2	3.8	4	1.9	2	.17	O.D. (4 MM), ABS
AS3	5.1	5	2.54	2.5	.34	O.D. (4 MM), PE
AS4	3.8	4	3.8	4	.42	O.D. (4 MM), PE
AS55	7.6	8	2.54	2.5	.51	O.D. (4 MM), PE
AS8S	7.6	8	3.8	4	.59	O.D. (4 MM), PE
AS8L	7.6	8	3.8	4	.59	O.D. (6 MM), PE
ALR8	7.6	8	3.8	4	.59	NPT (12 MM), PE
AS15S	15.2	15	3.8	4	.85	O.D. (6 MM), PE
AS30S	30.5	30	3.8	4	1.69	O.D. (6 MM), PE

\*Dimensions of length and width are ±3 mm. \*\*Fitting is in center of 7.62 cm x 7.62 cm dimension. The suggested m<sup>3</sup>/hr shown above is typical for aquaculture; higher m<sup>3</sup>/hr amounts will create larger bubbles. Nonstandard fittings are available on request. PE is high-density linear polyethylene. ABS is green plastic.

## SWEETWATER FINE-PORE DIFFUSERS FOR OZONE AND PURE OXYGEN

✓ DESIGNED HERE STOCKED IN BELGIUM

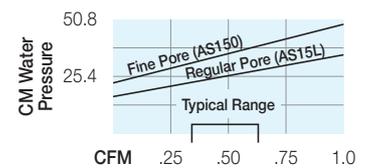
Sweetwater fine-pore diffusers are the same high quality as our regular Sweetwater diffusers. The difference is in the smaller pore size, which produces finer bubbles. Sweetwater fine-pore diffusers do require higher pressure (about 5" H<sub>2</sub>O more) and more frequent cleaning than our regular pore diffusers, so they are not typically recommended for regular aeration. The bubble uniformity is excellent.

The **CP** part numbers are fitted with CPVC for use with mild ozone concentrations. The **SS** part numbers are fitted with stainless steel for use with the strongest ozone and carry a 1-year warranty.

### SWEETWATER FINE-PORE DIFFUSER SPECIFICATIONS

BODY	2,000° HEAT-BONDED SILICA
MAXIMUM PORE SIZE	80 MICRONS
BUBBLE SIZE	0.5-2 MM
NOMINAL PARTICLE RETENTION	25 MICRONS
SERVICE LIFE AT PH BELOW 8.0	UNLIMITED
FLEXURAL STRENGTH	3,500 PSI

MODEL	LENGTH		WIDTH		SUGGESTED CFM	AIR SUPPLY CONNECTION
	IN	CM	IN	CM		
<b>AS10</b>	1.5	4	.50	1.3	.05	3/16" O.D., ABS
<b>AS20-AQ</b>	1.5	4	.75	2.0	.10	3/16" O.D., ABS
<b>AS3F</b>	2	5	1	2.5	.20	3/16" O.D., PE
<b>AS50</b>	3	8	1	2.5	.30	1/4" O.D., PE
<b>AS80</b>	3	8	1	4	.35	1/4" O.D., PE
<b>ALR80SS</b>	3	8	1.5	4	.35	1/2" NPT, SS
<b>ALR80SS4</b>	3	8	1.5	4	.35	1/4" NPT, SS
<b>AS150</b>	6	15	1.5	4	.50	1/4" O.D., PE



MODEL  
**ED328**

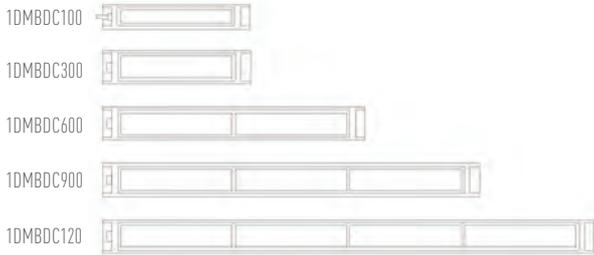
### UNIVERSAL DIFFUSER MOUNT

The universal diffuser mount for disc diffusers is designed to accept a 1.9 cm MNPT diffuser connection. Installation simply requires drilling a 3.1 cm diameter hole, deburring the hole, installing the diffuser mount and screwing in the diffuser. The universal diffuser mount may be used for mounting on the top or bottom of the lateral but is not recommended for sidewall diffuser mounting.

- Provides 1.9 cm FNPT threaded connection
- Engineered for 2-20.3 cm metal or plastic, thick or thin wall pipe
- Can be glued to PVC or ABS pipe
- Easy to install

# 8 AERATION

## Micro Bubble Oxygen Diffusers



### ▼ POINT FOUR MICRO BUBBLE OXYGEN DIFFUSERS (MBD)

AQUACULTURE DUTY STOCKED IN BELGIUM

The original, since 1988.

These aquaculture-duty diffusers are among the most efficient diffusers available, allowing you to increase yield while controlling the cost of expensive gases. Made from premium materials and subject to rigorous testing, MBD diffusers provide the kind of performance and reliability our reputation is built on.

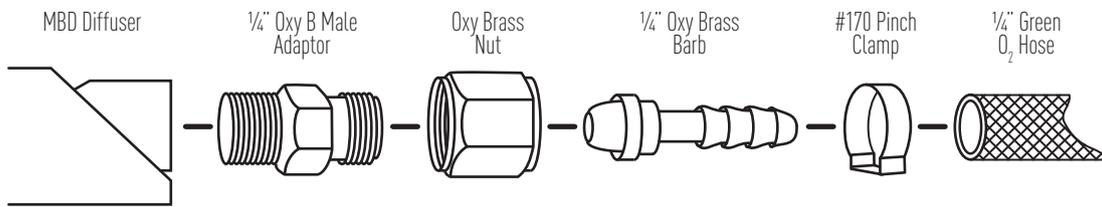
Point Four diffusers use a specially developed, ultra fine pore ceramic plate that produces a cloud of extremely fine bubbles of approximately 100–500 microns; far superior to airstones, porous hose or membrane type designs. The flat plate design ensures uniform bubbles across the entire surface and minimizes bubble coalescence to achieve an absorption rate in excess of 80%, depending on depth and flowrate. Bubbling Pressure is 25 to 35 psi. (1.7 to 2.4 bar).

- Robust construction—ceramic plates set in a rigid aluminum base with solidbrass connection fittings
- Easy to install and use—trouble-free operation
- Flexible, modular design lets you easily add or subtract diffusers as your needs change

SEE OUR [YouTube](#) CHANNEL TO LEARN MORE!

MODEL	BASE	DIFFUSING AREA (CM)		REC. OPERATING RANGE (LPM)	MAX FLOWRATE @ 3.5 KG/CM <sup>2</sup> (3.5 BAR) (LPM)	GAS INLET CONNECTION
		L	W			
<b>1DMBDC100</b>	ALUMINUM	37	4.5	UP TO 1.5	4.5	¼" HOSE BARB
<b>1DMBDC300</b>	ALUMINUM	39	8.3	UP TO 3	9	¼" FEMALE
<b>1DMBDC600</b>	ALUMINUM	70	8.3	UP TO 6	18	¼" FEMALE
<b>1DMBDC900</b>	ALUMINUM	102	8.3	UP TO 9	27	¼" FEMALE
<b>1DMBDC120</b>	ALUMINUM	132	8.3	UP TO 12	36	¼" FEMALE

#### Suggested fitting configuration



MODEL	MBD FITTINGS
<b>1FMOF005</b>	6 MM OXY B MALE ADAPTER
<b>1FMOF008</b>	OXY BRASS NUT
<b>1FMOF006</b>	¼" OXY BRASS BARB
<b>1FMHC004</b>	#170 PINCH CLAMP
<b>1FMHC129</b>	¼" GREEN O <sub>2</sub> HOSE

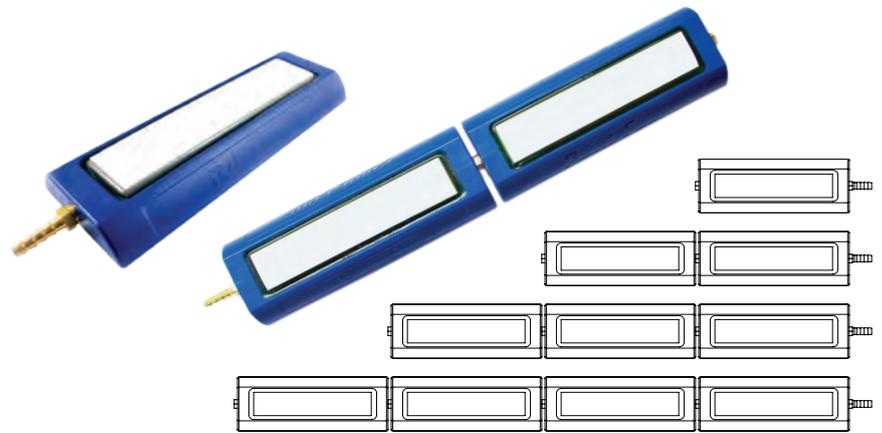
## POINT FOUR PLASTIC MICRO BUBBLE OXYGEN DIFFUSERS ▶

**AQUACULTURE DUTY**    **STOCKED IN BELGIUM**

Point Four Plastic Micro Bubble Diffusers (PMBD) are one of the most efficient diffusers available, allowing you to increase yield while controlling the cost of expensive gases. Made from premium materials and subject to rigorous testing, PMBDs provide the kind of performance and reliability our reputation is built on.

Point Four diffusers use a specially developed, ultra fine pore ceramic plate that produces a cloud of extremely fine bubbles of approximately 100–500 microns; far superior to airstones, porous hose or membrane type designs. The flat plate design ensures uniform bubbles across the entire surface and minimizes bubble coalescence to achieve an absorption rate in excess of 80%, depending on depth and flowrate. Bubbling pressure is 25 to 35 psi (1.7 to 2.4 bar).

- Robust construction—ceramic plates set in an injection molded plastic base with solid brass connection fittings.
- Flexible, modular design lets you easily add or subtract diffusers as your needs change.



MODEL	BASE	DIFFUSING AREA (CM)		REC. OPERATING RANGE (LPM/SCFH)	MAX FLOWRATE @ 50 PSI (3.5 BAR)		GAS INLET CONNECTION
		L	W		LPM	SCFH	
<b>1PMBD075</b>	PLASTIC	21.9	6.9	UP TO 0.75/1.6	2.2	9.5	¼" HOSE BARB

### TECH TALK 4

#### Choosing an Aerator

##### Efficiency Versus Type ... Select the right type of aerator for the application

An aerator's standard aeration efficiency (SAE) is an important consideration when comparing one aerator with another.

The SAE can be calculated by measuring the aerator's oxygen transfer and the amount of energy used per horsepower, per hour, under standard conditions.

An SAE of 2.1, for example, means that 2.1 lbs of oxygen per horsepower, per hour, are transferred to the water under standard conditions. The higher the SAE, the higher the oxygen transfer, the higher the efficiency.

However, SAE numbers are a fair comparison only when comparing aeration equipment of the same exact type. You cannot use the SAE as your only tool in the selection of an aeration system. Before looking at the SAE numbers, choose the right type aerator or oxygenator for the job.

Here are some examples (analyze the differences):

- A surface aerator like the Kasco ¾ hp aerator (with an SAE rating of 2.9) may be a good choice where the volume of water is small and the stocking density is high, such as in a culture tank or small pond. It may be a poor choice, however, if cold water temperatures are required when air temperatures are warm (summer trout culture), because both the motor and the airborne water droplets will add unwanted heat.
- A surface aerator would be a poor choice for a large or deep pond. Without moving water away from the aerator, it will continue to pump the same water over and over again, adding no oxygen where it is needed.
- A surface aerator may be excellent in emergencies because it quickly raises the oxygen level in a small area. If trained, the fish will move to that location. Again, it will not be a good choice for full-time aeration because it will not disperse oxygen throughout the pond.
- A diffused air system (with an SAE rating of 2.7) may be the best choice for multiple tanks and ponds because the energy source (blower) can be centralized and just the right amount of energy (compressed air) can be easily directed where it is needed. What appears to be lower SAE efficiency (2.7) is more than offset by comparative application efficiency.

- Water-moving aeration devices like the AIRE-02 Series II aerator and paddle wheel type aerators are excellent choices for medium and large ponds where movement of oxygenated water away from the aerator is most important.
- If destratification alone will solve a bottom oxygen problem, only a few air diffusers may be needed to accomplish this. For instance, a 10-acre lake, 15' deep, may need only ¾ hp. Only 1 cfm of air may be needed to aerate a ½-acre pool when raising tropical fish, compared to 6 cfm per pool using airlifts.
- A destratification system, such as our Great Lakes aeration system, should not be used as an emergency aerator because it very quickly mixes the water. Its rate of oxygen transfer is excellent; however, it cannot raise the oxygen level of such a large volume quickly enough to avoid a fishkill. It can actually aggravate the problem.
- Even noise is a consideration above and below the water surface. Pentair AES diffused air systems are preferred over agitators in bait stores, improving conditions for both the fish and the employees. As more of our research is conducted under water, we are increasingly aware of underwater noise produced by devices such as paddle wheels, agitators, airlifts and drilled pipe spargers (our Sweetwater air diffusers have a barely audible hiss). Some fish breeders have reported that diffused air is the only aeration method they can use that will not disrupt breeding.

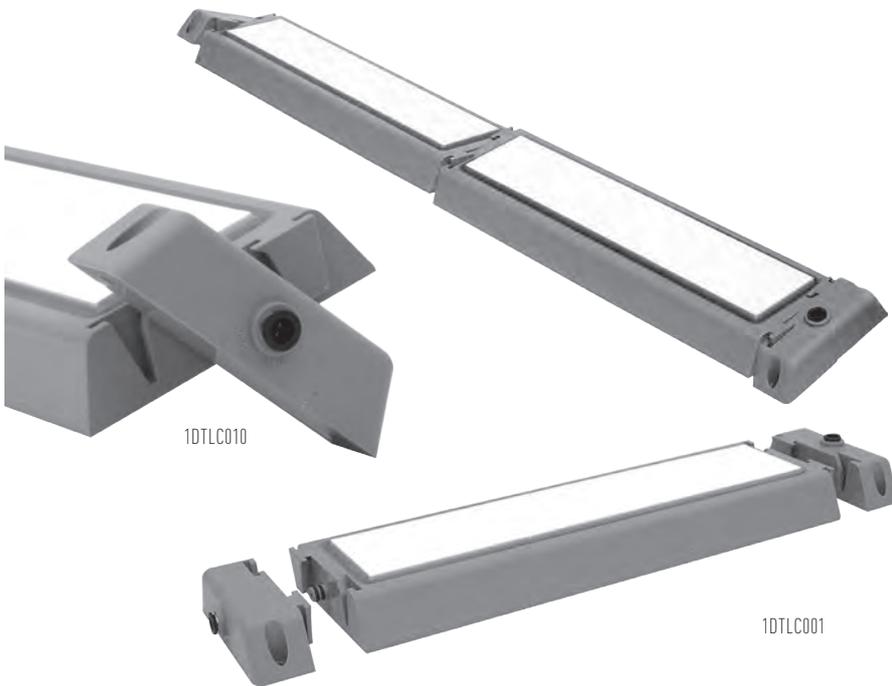
The situations and considerations are virtually endless, so take some time to research the best aeration method for your particular application. Through a phone call, you can discuss your application with an aquaculture technician and get an expert opinion (877-347-4788).

**Standard aeration efficiency tests conducted at Auburn University showed that the Pentair AES Sweetwater diffuser and 1-hp blower combination yielded a 2.71 SAE. Prior to rating our diffusers, Auburn gave air diffusers in general an SAE rating of only 1.6. That 70% increase illustrates how much efficiency can change when the right combination is used.**

Kasco is a registered trademark of Kasco Marine, Inc.  
AIRE-02 is a registered trademark of Aeration Industries International, LLC.

# 10 AERATION

## Lockable Oxygen Diffusers



### POINT FOUR TRAC-LOCK MICRO BUBBLE OXYGEN DIFFUSER

AQUACULTURE DUTY STOCKED IN BELGIUM

Point Four Trac-Lock Diffusers are an economical alternative to the Point Four Micro Bubble Diffusers (MDBs). Like the MDBs, they are good for use with pure oxygen and/or carbon dioxide.

#### A Simple Design

The ceramic flat plate design ensures bubbles across the entire surface. The slim design will not hinder fish netting and will accommodate most fish transportation systems. The "twist and lock" design allows for easy diffusing area adjustment, or for simple removal of sections for cleaning/ servicing. We recommend using a support when locking three or more bases together.

#### High Absorption Efficiency

Depends on submerged depth, flowrate and dissolved oxygen concentration. Typically 40% to 50% at 1 m depth; can be as high as 80% or even 100% at depths of 6 m or more.

#### Features and Benefits

- Plastic frame will not rust or degrade over time.
- Easy to install and use—trouble-free operation.
- Efficient design minimizes rising air bubble coalescence.

MODEL	BASE	TYPE	DIFFUSING AREA (CM)		MAX FLOW	
			L	W	LPM	CFH
<b>1DTLC001</b>	PLASTIC	BASE	31	53	3	6.5
<b>1DTLC010</b>	PLASTIC	END SET	—	—	—	—

### POINT FOUR WEDGE-LOCK MICRO BUBBLE OXYGEN DIFFUSER

AQUACULTURE DUTY STOCKED IN BELGIUM

WEDGE-LOCK is a modular system of diffusers and end sets that fit together to form a bank of up to eight units. Oxygenation capacity can be increased (or decreased) as your needs demand by simply changing the number of diffusers used for greater flexibility and minimal downtime.

Designed for total ease of use, WEDGE-LOCK modules "twist and lock" together to form an airtight seal without the use of tools. Hose with push-in fittings connects the diffuser banks to the gas supply, significantly reducing set-up time and effort. The diffuser's streamlined wedge shape improves stability in tanks with high water flow and offers less resistance in self-cleaning tank systems.

Single base (unassembled) diffusers measure 13.7 cm x 16.7 cm x 3.1 cm. Recommended flow 1.6 cfh (.75 Lpm). Recommended operating pressure is 22–35 psi, maximum pressure is 50 psi\*. Inlet is 6 mm barb fitting (only included with end set). One-year warranty.

#### Features and Benefits

- Flexible, modular design lets you easily add or subtract diffusers to match your changing needs.
- Simple "twist and lock" installation—diffuser modules and hose connect in minutes without the use of tools.
- Rugged thermoplastic build is corrosion-free and UV-resistant.
- Streamlined wedge shape improves stability in tanks with high water velocity.

\*Above 50 psi (3.4 bars) the diffuser can break.

MODEL	BASE	TYPE	DIFFUSING AREA (CM)		MAX FLOW	
			L	W	LPM	CFH
<b>1DWLC001</b>	PLASTIC	BASE	11.5	11.5	1.6	3.4
<b>1DWLC010</b>	PLASTIC	END SET*	—	—	—	—

\*Includes 6 mm barb fitting and one adapter.



## SEA PEN AERATION & OXYGENATION

Harmful algal blooms, low dissolved oxygen events and parasite infestations can wreak havoc on net-pen operations. In fact, year after year, millions of dollars are lost to these events. Working closely with industry leaders over the last 3 years, Pentair has developed a pair of solutions that provide commercial aquaculture farmers a way to mitigate the impact of these events and the support to manage the ever changing conditions faced by sea pen operations.

The primary goal of the Pentair SPA (Sea Pen Aeration) and SPO (Sea Pen Oxygenation) system is to balance the flow of air or oxygen at each site so that distribution is even throughout the sea pen. A unique pod-based approach provides delivery systems that can be customized to the specific requirements of each site. Each pod can be placed strategically throughout the pen at specific depths to compensate for conditions. Once balance has been achieved, site specific flow adjustments can be made. The even distribution assists mitigation efforts through the promotion of increased water movement and oxygen dissolution. The even flow distribution of air or oxygen to each of these injection sites is accomplished using back pressure compensated flowmeters.

The maintenance and control of oxygen saturation supports healthy fish stocks and increase in yield potential. Manage dosing regimens by tracking critical water quality parameters using the Point Four line of monitoring and control equipment. That includes a cloud-based offering for remote monitoring and data trend analysis.



A Sea Pen Aeration system in full operation at a salmon farm site.  
Note: Four plumes of aeration inside each pen.

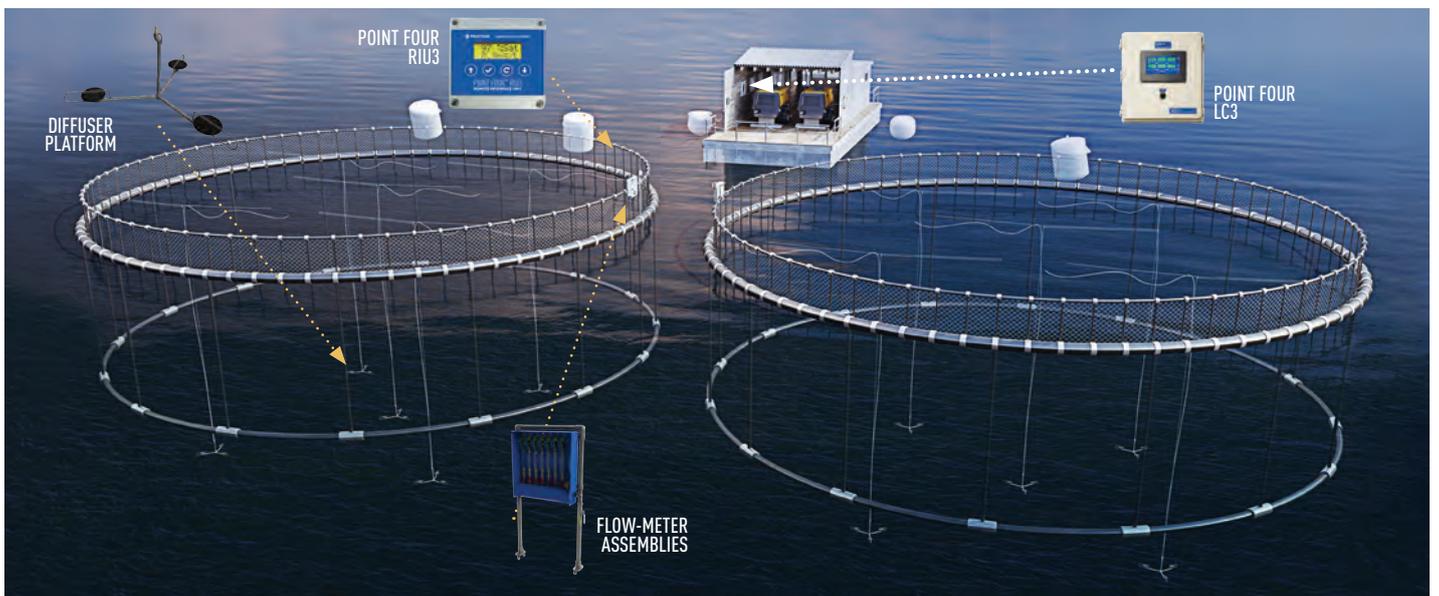


A balanced manifold with precise flow meters and individual valves allows for accurate, reliable adjustments of each platform.



Platforms are lightweight for easy installation, positioning and maintenance.

## Typical Round Pen Aeration System Configuration



## SEA PEN AERATION SYSTEM (SPA) DESIGNED HERE

### Sea Pen Aeration System Overview

Pentair Aquatic Eco-Systems Sea Pen Aeration System is a fully balanced air flow system that evenly distributes compressed air across all net pens at an aquaculture production site to promote greater water upwelling and movement. This mitigates plankton blooms by moving low density algae/plankton water from below to help dilute the algae/plankton density in the water inhabited by the fish within the pens to a reduced level. There are many different species of algae/plankton that pose different threat levels to the well-being of the fish. As such, different air flows can be dialed into the flowmeters to control the delivery of air within each pen's diffuser platforms. This air control allows the site operator to mitigate different harmful plankton species, for each pen, based on the plankton's unique motility. Consult with a Pentair AES representative for site specific design and performance.

### Features & Benefits

- Mitigates mortalities caused by algae/plankton
- Dilutes the algae/plankton density to reduced levels in the water inhabited by the fish
- Creates water movement and upwelling across the entire net pen site
- Customers have reported > 50% improvement in removal of harmful plankton from the usage of the SPA units
- Unique pod-based aeration system simplifies installation, maintenance and service compared to antiquated hose & grid based aeration systems.
- Platforms are constructed of corrosion resistant 316L stainless steel
- Outfitted with either 22.8 cm or 30.4 cm rubber membrane disc diffusers
- Lightweight platforms are easy to install, position and maintenance
- Designed not snag or tear nets
- Flowmeter manifold design allows for air output to be dialed in for maximum performance

CALL FOR SYSTEM CONFIGURATION, INFORMATION, AND PRICING.  
MORE INFORMATION ALSO AVAILABLE AT [PENTAIRAES.COM/SEA-PEN](http://PENTAIRAES.COM/SEA-PEN)



Aeration Platform



Flowmeter Manifold

### TYPICAL SQUARE PEN SYSTEM

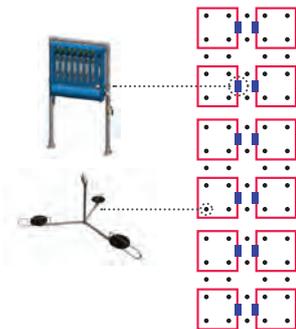


Illustration shows twelve pens, with four diffusers per pen, and one manifold per pen.  
(NOTE: Additional diffusers are deployed under walkways.)

#### AERATION PLATFORM

Material of Construction	Powder Coated Steel
Diameter	78" (2 m)
Diffuser Size	3x: 22.8 cm or 30.4 cm Rubber Membrane Disc Diffuser
Design Airflow—9"	0–10 scfm
Design Airflow—12"	0–18 scfm
Height (hanging)	48" (1.2 m)
Weight	41 lbs (18.6 kg)

#### FLOWMETERS

Accuracy	±3% F.S.
Press	100 PSIG/6.9 Bar MAX
SCFM	3–12

◀ **SEA PEN OXYGENATION SYSTEM (SPO) ✓ DESIGNED HERE**

### Sea Pen Oxygenation System Overview

The Pentair Sea Pen Oxygenation System is a flexible and robust dissolved oxygen management platform. A unique pod-based approach allows the flow of compressed oxygen to be controlled and balanced throughout each sea pen site. Each pod can be strategically placed throughout the pen at specific depths to compensate for conditions and optimize dissolution. The system can accommodate any number of sea pens at any one site with no limit on flowmeter panels or diffuser assemblies.

The main reason for the oxygenation system on a sea pen site is to increase the dissolved oxygen (D.O.) content the fish will encounter. The side benefits of increased D.O., are shortened harvesting cycles, improved feed conversion rates, or continuous feeding during low D.O. events. The peace of mind, knowing a remote sea pen site can deal with an emergency oxygen situation, is also beneficial. Each platform will still receive the same flow of oxygen, regardless of the movements of the other platforms.

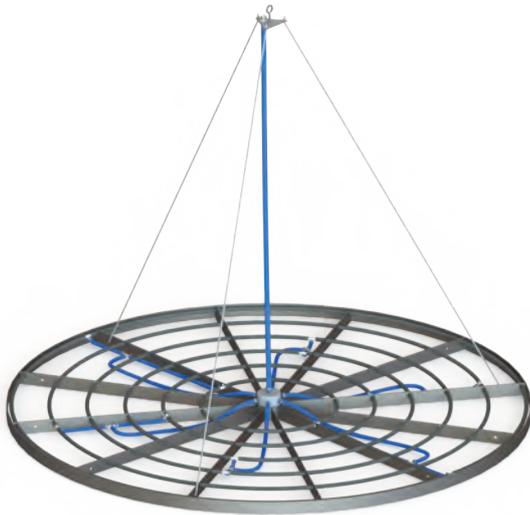
### Application Examples

- Parasite treatment
- Reduce harvesting cycles
- Continuous feeding during low D.O. events
- Oxygenation before harvest/stimulate fish to feed (Improve feed conversion ratio)

### Features & Benefits

- Micro-bubble oxygen clouds for efficiencies up to 80% oxygen dissolution
- Complete oxygen generator/manifold packages
- Lightweight galvanized frames are easily deployed and removed
- GenSet and oxygen generator monitoring system offers full oxygen control via stationary probes
- Protrusion free design does not snag or tear nets
- Stand-alone flowmeter panels/manifolds, on-off capability without removal from pens

CALL FOR SYSTEM CONFIGURATION, INFORMATION, AND PRICING.  
MORE INFORMATION ALSO AVAILABLE AT [PENTAIRAES.COM/SEA-PEN](http://PENTAIRAES.COM/SEA-PEN)



Oxygenation Platform



Flowmeter Manifold

### TYPICAL SQUARE PEN SYSTEM

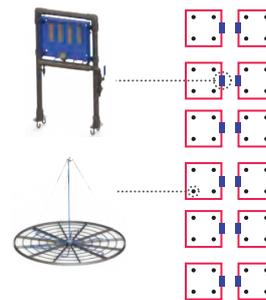


Illustration shows twelve pens, with four diffusers per pen, one manifold per pen and three oxygen supply module with six oxygen generators

#### OXYGEN PLATFORM

Material of Construction	Galvanized Steel
Diameter	6.4 ft/1.95 m
Diffuser Size	74 ft/22.6 m of porous diffuser hose
Characteristics	74 lpm
Height (hanging)	5 ft/1.5 m
Weight	33 lbs/15 kg



Oxygenation Platform being deployed



Flowmeter Manifold

# 14 MECHANICAL FILTRATION

## Waste Solids Removal System

### ECO-TRAP WASTE SOLIDS REMOVAL SYSTEM

STOCKED IN BELGIUM

Pentair Aquatic Eco-Systems' Eco-Trap is an exclusive highly-optimized dual drain waste collection system that allows for the effective and efficient removal of settleable waste solids (uneaten feed and feces) in Recirculating Aquaculture Systems (RAS). 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. 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. The Eco-Trap system contains no moving parts and nothing to wear out; and it has been proven in many commercial RAS installations worldwide.

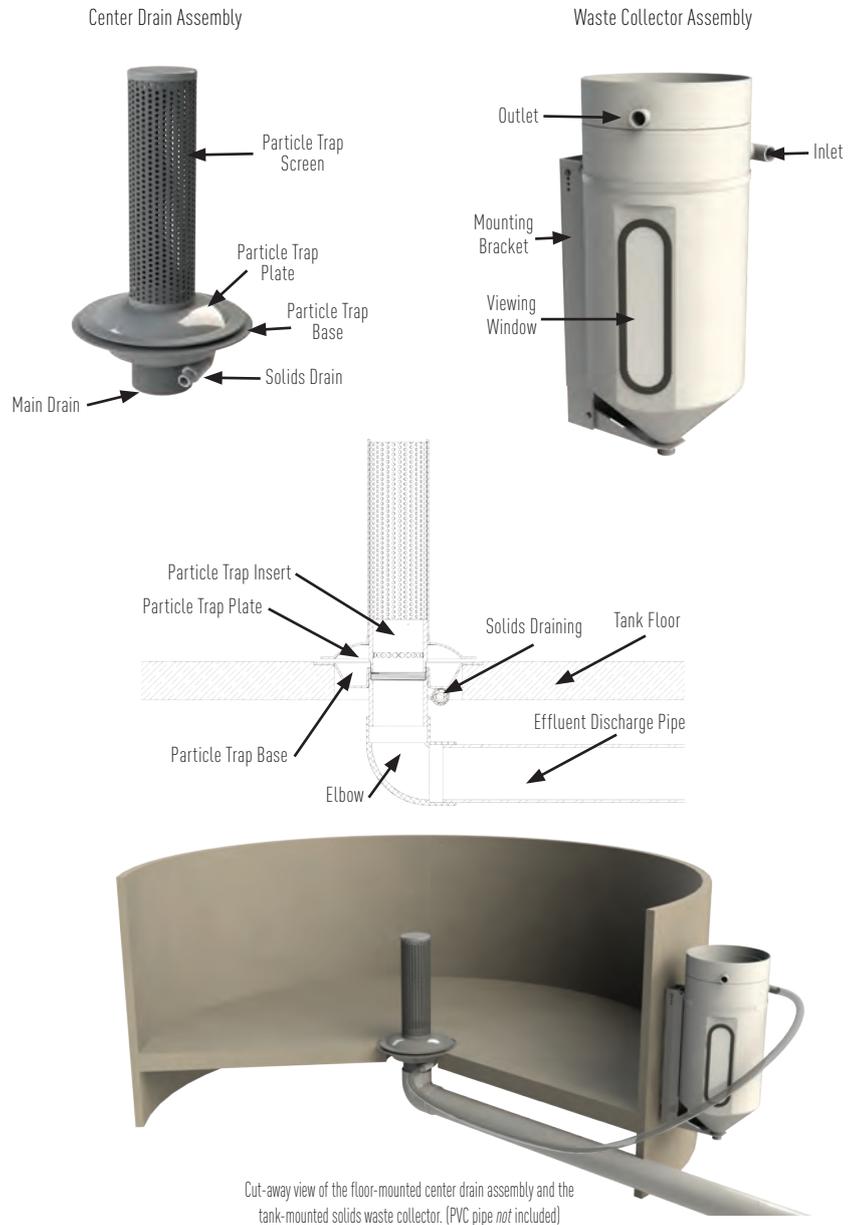
#### Benefits

- Provides a self-cleaning action by automatically removing solids by pulling them to the middle of the tank
- Observation window in the waste collector makes it easy to identify feed waste
- Nothing to wear out as there are no moving parts
- Reduces the size and complexity of other associated waste solids removal technologies
- Adaptors are available for applications that utilize metric plumbing

**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 110 mm main drain port and a 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 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 6" socket connections for Sch.80 PVC pipe, optional Schedule 80 PVC adaptors are available for connecting the Drain Assembly in applications that utilize metric plumbing.



#### MODEL

#### CENTER DRAIN ASSEMBLIES (ONE REQUIRED PER CULTURE TANK)

<b>AOET110PVC</b>	ECO-TRAP 110 - DRAIN ASSEMBLY, 110 MM MAIN DRAIN PORT.
<b>930002</b>	ECO-TRAP 160 - DRAIN ASSEMBLY, 6" MAIN DRAIN PORT.

#### WASTE COLLECTOR ASSEMBLIES (ONE REQUIRED PER CULTURE TANK)

<b>930073</b>	ECO-TRAP 110 - WASTE COLLECTOR & MOUNTING BRACKET
<b>930074</b>	ECO-TRAP 160 - WASTE COLLECTOR & MOUNTING BRACKET

#### METRIC ADAPTERS

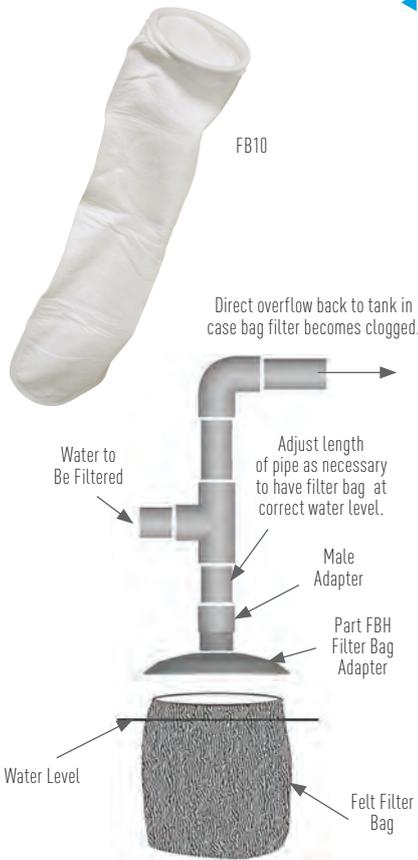
<b>930008</b>	ECO-TRAP 160 - SCHEDULE 80, 6" NPT TO 160MM
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## ◀ FILTER BAGS WITH POLY RING MOUTH

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 81 cm long with a 17.7 cm diameter mouth and polypropylene ring that fits the optional high-performance acetal resin adaptor (**FBH**) perfectly.



### NYLON MONOFILAMENT BAGS, 81 CM x 17.7 CM

MODEL	MICRON	
<b>FB20N</b>	20	—
<b>FB40N</b>	40	—
<b>FB75</b>	75	—
<b>FB100N</b>	100	STOCKED IN BELGIUM
<b>FB200</b>	200	—
<b>FB300</b>	300	STOCKED IN BELGIUM
<b>FB800</b>	800	—

### FELT BAGS, POLYPROPYLENE, 81 CM x 17.7 CM

MODEL	MICRON	
<b>FB1</b>	1	—
<b>FB5</b>	5	—
<b>FB10</b>	10	—
<b>FB25</b>	25	—
<b>FB50</b>	50	STOCKED IN BELGIUM
<b>FB100</b>	100	—

### ADAPTOR

MODEL		
<b>FBH</b>	FILTER BAG ADAPTER	STOCKED IN BELGIUM

## NEWS & OFFERS

- Receive exclusive promotions and online shopping incentives
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- Find out about our workshops and educational courses
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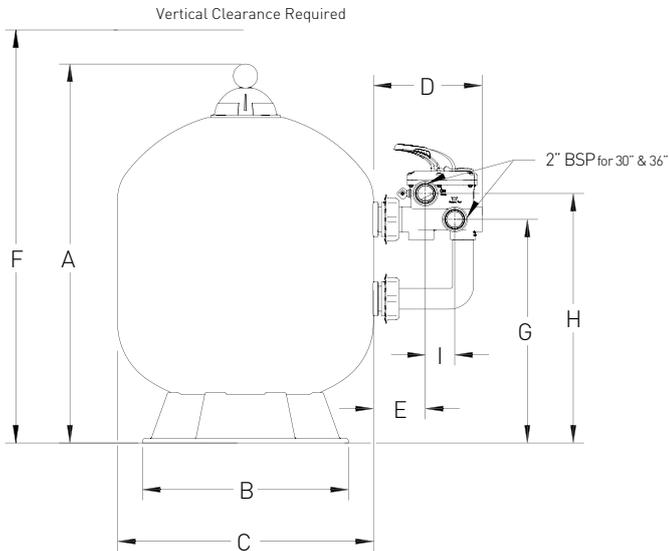
# 16 MECHANICAL FILTRATION

## Sand Filtration

### ARIAS 7000 STOCKED IN BELGIUM

#### Features

- One-piece, fiberglass reinforced tank with UV resistant coating
- Easy-to-read top mounted pressure gauge with manual air relief
- A 360° diffuser to keep the sand bed flat for optimum filtration, has a "swing-away" design for instant access to sand
- Easy-to-use water drain for simplified service and winterizing
- All filter fittings are threaded for easy servicing
- Includes 6-way multiport valve
- Available from European Distribution Center



	F-30S8-ARIAS (CM)	F-36S8-ARIAS (CM)
A	109.5	120.0
B	61.0	61.0
C	76.2	91.4
D	30.2	30.2
E	16.0	16.0
F	114.6	125.1
G	59.0	65.7
H	67.1	73.8
I	7.0	7.0

MODEL	FILTER (MM)	RECOMMENDED FLOW RATE (M <sup>3</sup> /H)	FILTER AREA (M <sup>2</sup> )	FLANGE CONNECTION	SAND 0.4-0.8 MM (KG)	GRAVEL 3-5 MM (KG)	CLEARANCE DISTANCE (MM)	MAXIMUM WORKING PRESSURE (BAR)	VALVE
<b>F-30S8-ARIAS</b>	762	22	0.45	2"	200	80	1095	3.5	6-WAY
<b>KIT-F-36S8-ARIAS</b>	914	32	0.64	2"	320	120	1200	3.5	6-WAY

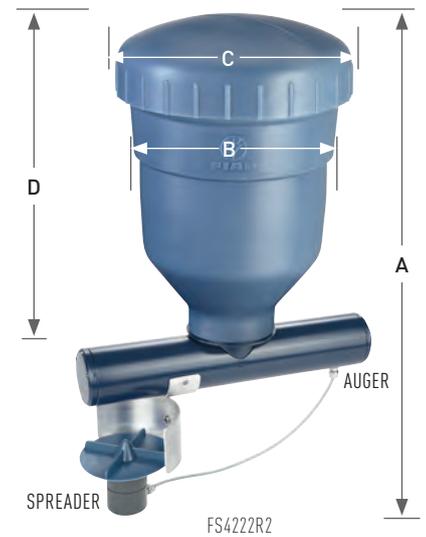
MODEL	DIMENSIONS L X W X H (CM)	GROSS WT (KG)	PCS BY PALLET	PALLET DIMENSIONS L X W X H (CM)
<b>F-30S8-ARIAS</b>	78 X 78 X 120	13.4	2	156 X 80 X 93
<b>KIT-F-36S8-ARIAS</b>	95 X 95 X 106	18.4	2	95 X 95 X 223

## AUGER FEEDERS

FIAP Auger Feeders are designed to achieve reduced feeding expenditures and improved feed ratios, and can be used both indoors and outdoors. They are used throughout the world in commercial aquaculture facilities, providing perfectly controlled feeding in fish ponds and production plants. They are designed for feed pellets ranging from 1–10 mm. It's blockage-free auger screw is driven by a 12VDC motor and controlled by the FIAP Proficontrol controller (sold separately). One-year warranty.

MODEL		CAPACITY (LBS/KG)	DIMENSIONS (CM)			
			A	B	C	D
<b>FS4222R2</b>	FEEDER W/AUGER & SPREADER	22/10	66.0	25.4	30.5	53.3
<b>FS4244R2</b>	FEEDER W/AUGER & SPREADER	44/20	68.6	30.5	38.1	53.3
<b>FS4288R2</b>	FEEDER W/AUGER & SPREADER	88/40	88.9	38.1	48.3	76.2
<b>FS4232R2</b>	FEEDER W/AUGER & SPREADER	132/60	106.7	48.3	23"	91.4
<b>FS4022R2</b>	FEEDER W/AUGER ONLY	22/10	66.0	25.4	30.5	53.3
<b>FS4044R2</b>	FEEDER W/AUGER ONLY	44/20	68.6	30.5	38.1	53.3
<b>FS4088R2</b>	FEEDER W/AUGER ONLY	88/40	88.9	38.1	48.3	76.2
<b>FS4132R2</b>	FEEDER W/AUGER ONLY	132/60	106.7	48.3	58.4	91.4
<b>FS4059UPR2</b>	REPLACEMENT AUGER					

Note: Bottom of feeder should be at least 20" (50cm) above the surface of the water



## DEMAND FEEDERS

The unique twist-lock lid is wind and varmint-proof on these high-quality, UV-resistant, polyethylene hoppers. All four sizes have the same pendulum demand feeding mechanism for #4 crumble to .6 cm pellets. One-year warranty.

MODEL		CAPACITY (LBS/KG)	DIMENSIONS (CM)		
			A	B	C
<b>FH221</b>	DEMAND FEEDER	22/10	58.4	30.5	35.6
<b>FH441</b>	DEMAND FEEDER	44/20	58.4	38.1	45.7
<b>FH881</b>	DEMAND FEEDER	88/40	58.4	48.3	66.0
<b>FH133</b>	DEMAND FEEDER	132/60	58.4	58.4	83.8

Note: Bottom of feeder should be at least 20" (50cm) above the surface of the water

## FEEDER CONTROLLER

The innovative FIAP Proficontrol Control sets new standards in automatic fish feeding. Thanks to its unique and smart programmability, it meets all expectations towards best possible feed dosing. The FIAP Proficontrol allows for operating up to 4 different FIAP feeders with one control. All settings as well as feeding periods (0–99 seconds), breaks (0–99 minutes) and motor speeds can be defined individually for the single outputs. Any settings made will be saved. Testing and manual feeding per output is feasible at any time. One-year warranty.

MODEL	
<b>1590</b>	115/230V, 50/60HZ CONTROL
<b>1594</b>	5M CABLE
<b>1594-1</b>	10M CABLE
<b>1594-2</b>	20M CABLE
<b>1591</b>	SOCKET
<b>1592</b>	COUPLER CONNECTOR
<b>1593</b>	CONNECTOR PLUG



CABLES SOLD SEPARATELY



## SAFEGUARD UV SYSTEMS CMPS SERIES

### Commercial Medium Pressure Stainless Steel

Pentair Medium Pressure UV systems emit a UV-C irradiation between 200 and 600 nm; these wavelengths alter chemical links present among nucleotides so that the information contained and conveyed by the DNA of every organism present in the water changes.

These alterations lead to the sterilization of unwanted organisms.

Thanks to the multispectrum wavelength of medium pressure lamps the UV unit has the ability to break chemical bonds, and has a good reduction of unwanted chemicals in the water.

The disinfection system has a physical working principle and not a chemical one. Nothing is added to, nor taken away from water; this way there is no formation of undesired by-products.

### Main System Components

- Stainless steel reactor
- Control panel is fully-compliant with UL508A and CE standards
- Special Germicidal Lamps

### Primary Applications

Water Disinfection for:

- Aquaculture
- Well boats
- Horticulture



### CMPS SERIES

GENERAL INFORMATION	
Water Temperature	32-122°F/0-50°C
Mounting	Horizontal or vertical with lamp in horizontal position
UV REACTOR	
Material	316L Stainless Steel
Connection Type	ASME ANSI B16.5-150/UNI EN 1092-1 PN 10
Max Pressure (PSI/bar)	145 PSI/10 bar (Test 220PSI/15 bar)
Rating (IP/NEMA)	IP65/NEMA 4X
Chamber Options	Sea water internal coating
UV LAMP	
Lifespan	8,000-10,000 hrs
UV SENSOR	
UVC	960368 (0-NORM Certified on request)
Sensor Cable	Shielded cable 4 meters
Material	Stainless steel 316L
CONTROL PANEL	
Material	Epoxy Coated Mild Steel
Rating (IP/NEMA)	IP 54/NEMA 12
Ambient Temp Range	41-113°F/5-45°C
Interface	Touch-Screen
Mains Power	230 Vac 1PH+N+E/400 Vac 3PH+N+E
Hertz	50/60 Hz
Lamp Cable (ft/m)	20ft/6m



MODEL	LAMPS	TOTAL CONSUMPTION (KW)	STANDARD IN/OUT (INCH/MM)	40 MJ/CM <sup>2</sup>			180 MJ/CM <sup>2</sup>		
				GPM	LPM	M <sup>3</sup> /H	GPM	LPM	M <sup>3</sup> /H
COMPUTATIONAL FLUID DYNAMICS FLOW TABLE - UVT = 90% @ 1CM									
CMPS006	1	0.66	2½"	79	300	18	18	67	4
CMPS010	1	1.1	4"/DN100	128	483	29	26	100	6
CMPS020	1	2.2	6"/DN150	326	1,233	74	70	267	16
CMPS025	1	2.7	8"/DN200	550	2,083	125	123	467	28
CMPS035	1	3.9	8"/DN200	704	2,667	160	159	600	36
CMPS050	2	5.5	8"/DN200	1,145	4,333	260	255	967	58
CMPS070	2	7.7	10"/DN250	1,673	6,333	380	370	1,400	84
CMPS105	3	11.6	12"/DN300	2,611	9,883	593	581	2,200	132
CMPS140	4	15.5	16"/DN400	3,496	13,233	794	775	2,933	176
CMPS150	2	17	16"/DN400	3,742	14,167	850	832	3,150	189
CMPS175	5	19	20"/DN500	4,372	16,550	993	973	3,683	221
CMPS180 (2 X 105 IN SERIES)	6	23	12"/DN300	5,222	19,767	1,186	1,162	4,400	264
CMPS225	3	26	20"/DN500	5,627	21,300	1,278	1,250	4,733	284
CMPS300	4	35	20"/DN500	7,485	28,333	1,700	1,664	6,300	378
CMPS375	5	44	24"/DN600	9,378	35,500	2,130	2,083	7,883	473

## Stainless Steel Reactor

The UV reactor is made of internally and externally polished 316L stainless steel; stainless steel does not degrade and is particularly suitable for the treatment of primary waters. Polished internals eliminate pores that could lead to spore collection.

The special UV reactor configuration guarantees correct contact time, water speed decreases when in the "radiation area" and returns to the original speed at the outlet flange.

In order to make the maintenance and inspection operations easier the chamber is accessible on the lamp side.



## Control Panel

The electrical control panel supplied is ready for the installation (includes all the necessary cables).

- Painted steel control panel box (RAL 7035), main switch, cooling fans and touch screen panel
- Protection class: IP 54/NEMA 12
- Status messages (multi-language)
- PLC control
- Total hour meter
- Resettable hour meter
- Control of each lamp
- Electrical panel temperature control
- ON/OFF timer
- Alarm 220 V NO/NC outlet
- Remote on/off
- Alarm free contact outputs
- 4-20 mA output
- Protocols: Modbus, TCP/IP, CANopen
- Communication ports: USB, Ethernet and Serial RS485/RS232
- UV intensity: W/m<sup>2</sup> or %

- Pre-alarm UV Intensity
- UV dose reading (optional)
- Shutdown for high temperature in the UV chamber and in the electrical panel
- Control of temperature & UV irradiation (preset alarm threshold)
- Datalog of UV irradiance and panel & UV chamber temperature
- Adjustment for connection with external flow: online flow visualisation, shutoff in case of no flow, possible shut off for low flow, possible shut off for high flow (optional)
- Datalog of the flow rate (optional)
- Datalog of UV irradiance and panel and UV chamber temperature
- Event records
- Lamp power regulation
- App (iPhone—Android) Smartphone and Tablet (optional)
- Temperature Range: 5–45 °C/41–113°F



## Manual Cleaning System (Standard)

The UV reactor is made of internally and externally polished 316L stainless steel; stainless steel does not degrade and is particularly suitable for the treatment of primary waters. Polished internals eliminate pores that could lead to spore collection.

The special UV reactor configuration guarantees correct contact time, water speed decreases when in the "radiation area" and returns to the original speed at the outlet flange.

In order to make the maintenance and inspection operations easier the chamber is accessible on the lamp side.

## Automatic Cleaning System RA (Optional)

Automatic cleaning system is available on all models.

The special teflon wiper is programmable using a monitor that controls a motor shaft located on the UV reactor. Pentair UV Touch Panel that moves a motor shaft placed on the UV reactor. Days and time can easily be set on site.

## Lamp Power Regulation (Standard)

Pentair CMPS units need a 4/20 mA input from an external source in order to automatically change lamp power following these parameters:

- Flow rate (external flow meter needed)
- UV dose (external flow meter needed)



### SPARUS PUMP WITH CONSTANT FLOW TECHNOLOGY

- The world's first aquaculture duty pump to deliver a CONSTANT user-defined flow rate
- Pump motor speed self-adjusts to maintain the constant flow rate setting, even as system conditions change
- Digital communication port RS-485 allows monitoring/control by PLC systems. Contact us for solutions utilizing a PLC.



Under typical operating conditions, Sparus Pump with Constant Flow Technology offers the highest water flow rate of any high performance pump—with the lowest electricity consumption. Thanks to its integrated on-board variable frequency drive, this pump automatically calculates and self-adjusts to provide the exact operational speed needed to deliver the exact flow rate you establish. As system conditions change, it self-adjusts to achieve a constant user-specified flow rate. The result of this breakthrough technology is that you achieve the absolute minimum energy usage required to deliver any given flow rate! This high level of efficiency can save you thousands of dollars per year in pump operating costs.

No more closing valves to decrease flow rate or making manual adjustments. Simply select the flow rate you require and the Sparus Pump with Constant Flow Technology delivers. As system conditions change, the flow rate remains constant. Need a higher or lower flow rate? Simply adjust the desired flow rate by using the simple keypad. No matter what flow rate you select, you'll rest assured that your desired flow rate remains constant.

The law of physics known as the Affinity Law states that there is a cubic relationship between the speed of an electric motor and its power consumption. By decreasing the speed of a motor by only 10%, you'll reap up to 33% in electrical energy savings while still achieving the exact flow rate that your application requires. With conventional pumps, the motor is often operating at a speed that is needlessly high for the application. Users of conventional single-speed pumps often find that their only option to decrease their flow rate is to partially close a valve to "throttle" the flow rate. The Sparus Pump with Constant Flow Technology takes that paradigm and turns it on its head! The intelligence built into this pump means that you establish the desired flow rate and leave the decision-making to the pump.

**SPARUS PUMP WITH CONSTANT FLOW TECHNOLOGY**

**STOCKED IN BELGIUM**

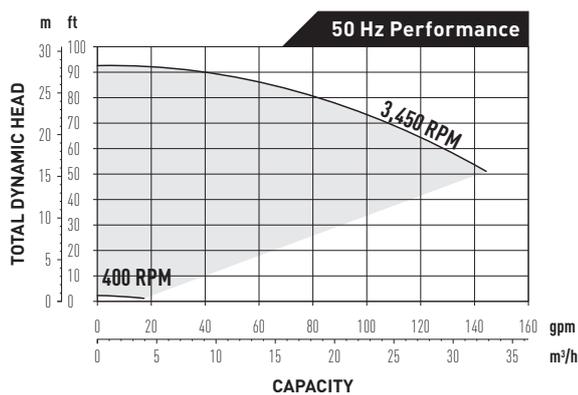
Sparus Pump with Constant Flow Technology(CFT) will always operate at the slowest speed required to achieve the user-established flow rate; the savings it provides is yours to keep! This pump delivers proven reliability thanks to its saltwater-rated stainless steel internal fasteners and highly robust mechanical seal. Sparus Pump with Constant Flow Technology is a self-priming pump, and it's also suitable for flooded-suction applications. Not certified for use in swimming pool applications.

**Pump Features:**

- Fully-programmable for any flow rate from 20–140 gpm
- On-board keypad for simple programming of desired flow rate
- 3 hp rating, 230V, single-phase, 50hz
- Ultra efficient permanent magnet TEFC motor
- 2" internally threaded BSP inlet/outlet ports and anti-blocking strainer basket ensure maximum flow and efficiency
- Easy installation and trouble-free servicing
- IP55-rated enclosure for wet locations and harsh conditions
- Unions included for both 500mm and 63mm connections



Sparus Pump with Constant Flow Technology Performance Chart



MODEL	HP	POWER(KW) INPUT/OUTPUT	VOLTS	HZ	PHASE	MOTOR	FULL LOAD AMPS	IN/OUT PORTS	DIMENSIONS (CM)		
									L	W	H
348045-AQ	3	3.2/2.2	230	50/60	1	TEFC	16	2" BSP	59.4	28	32

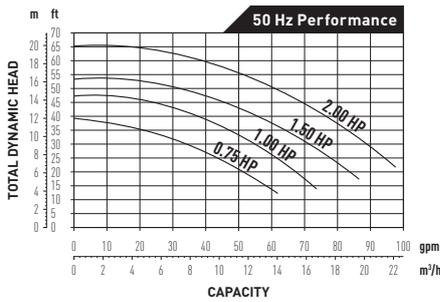


Sparus Pump with Constant Flow Technology in a five pump application at Pentair Aquatic Eco-Systems' PAES W.A.T.E.R. facility in Apopka, FL.

**SPARUS WITH CFT COST SAVINGS CALCULATOR**

The Sparus Pump with Constant Flow Technology Cost Calculator Tool calculates the savings an operator will realize when switching from a standard pump to the Sparus with Constant Flow Technology. It's simple and easy to use. Just enter in the operational, hydraulic, and head loss characteristics of your system and the cost savings, per day and per year, will be instantly calculated for you.

Visit [PentairAES.com/CFT-Calculator](http://PentairAES.com/CFT-Calculator) to determine your savings!



## TAURUS 110 ENERGY-EFFICIENT AQUACULTURE DUTY 50HZ CENTRIFUGAL PUMPS

FW SW STOCKED IN BELGIUM

The Taurus 110 moves more water with more efficiency than other comparable industry leading pumps for lower operating cost and super-quiet operation. By performing with less effort, there is less wear and tear—and that means longer life for a higher return on your pump investment. The Taurus 110 meets all the criteria for a superior pump: energy efficient, quiet and easy to maintain. Plus its rugged construction will stand up to the most demanding installation and conditions. Taurus 110 is performance and pressure tested to ensure exceptional operation and quality. Self-priming for a quick and easy start-up. 1½" x 1½" BSP port size (1½" BSP union set included). Not certified for use on swimming pools.

### All Pump Models

- Aquaculture-duty, TEFC motor with corrosion-resistant aluminum construction and anodized finish
- Minimal energy consumption
- Thermal protection built into single-phase motors
- Upgraded mechanical seal for saltwater applications
- All wetted metal components are 316 stainless steel.
- See-through lid permits easy inspection of strainer basket
- Corrosion resistant, high-grade stainless steel motor shaft and parts
- Easy-access field wiring compartment for quick, easy installation servicing
- 1 and 3-Phase models with TEFC Pentair motors
- IP55 rated, CE approved
- Unions included for both 50mm connections

50 HZ MODELS	HP/KW	VOLTAGE	HZ	PHASE	AMPS	MOTOR	DIMENSIONS (CM)		
							L	W	H
P-TRS-051-AQ	0.50/0.37	230	50	1	3.3	TEFC	54.0	30.5	28
P-TRS-071-AQ	0.75/0.55	230	50	1	4.2	TEFC	54.0	30.5	28
P-TRS-073-AQ	0.75/0.55	400	50	3	1.8	TEFC	54.0	30.5	28
P-TRS-101-AQ	1.00/0.75	230	50	1	5.2	TEFC	58.4	30.5	28
P-TRS-103E2-AQ	1.00/0.75	400	50	3	2.0	TEFC	54.0	30.5	28
P-TRS-151-AQ	1.50/1.10	230	50	1	7.4	TEFC	58.4	30.5	28
P-TRS-153E2-AQ	1.50/1.10	400	50	3	3.2	TEFC	56.0	30.5	28
P-TRS-201-AQ	2.00/1.50	230	50	1	9.6	TEFC	56.0	30.5	28
P-TRS-203E2-AQ	2.00/1.50	400	50	3	3.6	TEFC	56.0	30.5	28
P-TRS-301-AQ	3.00/2.20	230	50	1	10.2	TEFC	59.0	30.5	28
P-TRS-303E2-AQ	3.00/2.20	400	50	3	4.3	TEFC	59.0	30.5	28

**SPARUS 160 ENERGY-EFFICIENT AQUACULTURE DUTY 50HZ CENTRIFUGAL PUMPS** FW SW STOCKED IN BELGIUM

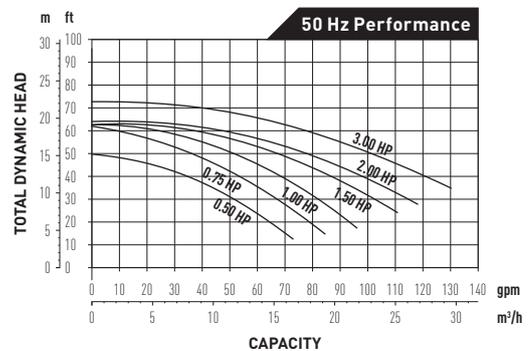
Pentair Aquatic Eco-Systems Sparus 160 pumps offer extremely high water flow in a quiet, energy-efficient package making them effective in a wide range of Aquaculture applications. Saltwater compatible, corrosion-resistant plastic construction, 316SS stainless steel internal fasteners, oversized anti-blocking strainer basket and volute, and 2-inch female BSP inlet/outlet ports. EPDM/316SS mechanical seal. Compatible with a wide assortment of cleaning and filtration systems. Clear lid for easy inspection. Self-priming, also suitable for flooded suction applications. Not certified for use on swimming pools.

**Features**

- Single body design provides for quiet/durable operation
- High-temperature thermoplastic withstands harsh conditions and prevents corrosion
- Saltwater compatible construction
- Thermal protection built into single-phase motors
- Easy installation and trouble-free servicing
- Corrosion resistant, high-grade stainless steel motor shaft and internal fasteners
- 1-Phase and 3-Phase models with TEFC Pentair motors. IP55 rated. CE approved
- Unions included for both 50mm and 63mm connections



50HZ



50HZ MODELS	HP/KW	VOLTAGE	HZ	PHASE	AMPS	MOTOR	DIMENSIONS (CM)		
							L	W	H
<b>P-SPR-071-AQ</b>	0.75/0.55	230	50	1	4.2	TEFC	54	30.2	31.1
<b>P-SPR-073-AQ</b>	0.75/0.55	400	50	3	1.8	TEFC	54	30.2	31.1
<b>P-SPR-101-AQ</b>	1.00 /0.75	230	50	1	5.2	TEFC	54	30.2	31.1
<b>P-SPR-103E2-AQ</b>	1.00 /0.75	400	50	3	2.0	TEFC	54	30.2	31.1
<b>P-SPR-151-AQ</b>	1.50 /1.10	230	50	1	7.4	TEFC	55.9	30.2	31.1
<b>P-SPR-153E2-AQ</b>	1.50 /1.10	400	50	3	3.2	TEFC	55.9	30.2	31.1
<b>P-SPR-201-AQ</b>	2.00 /1.50	230	50	1	9.6	TEFC	55.9	30.2	31.1
<b>P-SPR-203E2-AQ</b>	2.00 /1.50	400	50	3	3.6	TEFC	55.9	30.2	31.1
<b>P-SPR-301-AQ</b>	3.00 /2.20	230	50	1	10.2	TEFC	59	30.2	31.1
<b>P-SPR-303E2-AQ</b>	3.00 /2.20	400	50	3	4.3	TEFC	59	30.2	31.1

## H3-PLUS SERIES ENERGY EFFICIENT LOW TO MEDIUM HEAD PUMPS

FW SW STOCKED IN BELGIUM

The new H3-PLUS SERIES are engineered using best-in-class technology. A rugged plastic construction delivers durable pumps at an affordable price. Not certified for use in swimming pool applications.

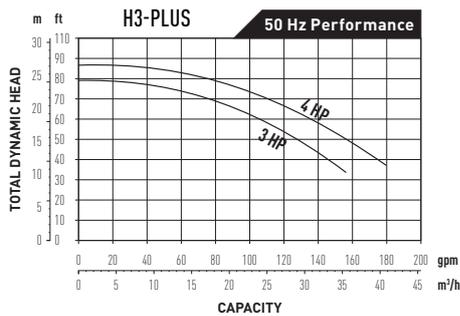
The H3-PLUS pump is a medium-head/high-performance, aquaculture-duty pump designed for maximum up-time and reliable performance. This pump features an ultra-heavy-duty TEFC (totally enclosed fan cooled) motor with an all-aluminum construction and an anodized finish for maximum corrosion resistance.

### Features:

- Freshwater and Saltwater compatible, 316SS internal fasteners, EPDM/Stainless mechanical seal
- Union connectors included
- O-ring seals are made of oxidation-resistant, EPDM rubber for increased durability and tighter seal
- Extra-large, robust basket with smooth surface for easy debris removal
- Easy-carry handle; easily removable, ergonomic lock ring; and see-through lid for easy basket inspection
- H3 pumps have IP55-rated enclosures for wet locations and harsh conditions



H3-Plus 50 Hz



### H3-PLUS SERIES

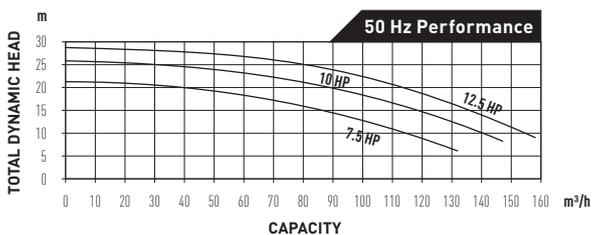
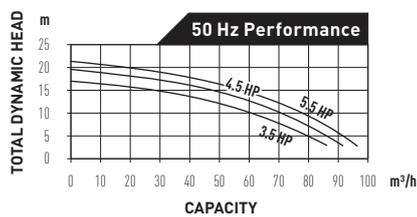
MODEL	HP	VOLTAGE	HZ	PHASE	FULL LOAD AMPS	MOTOR	DIMENSIONS (CM)		
							L	W	H
P-H3-301	3	230V	50	1	12.8	TEFC	74	37	37
P-H3-303E2	3	400V	50	3	4.2	TEFC	74	37	37
P-H3-401	4	230V	50	1	17.0	TEFC	74	37	37
P-H3-403E2	4	400V	50	3	5.6	TEFC	74	37	37

**VELOX AQUACULTURE DUTY PUMPS** STOCKED IN BELGIUM

The new VELOX-pump series, designed especially for aquaculture applications. VELOX offers a high water flow in a energy-efficient package for a wide range of applications.

**Features:**

- Especially designed aquaculture applications
- Seawater approved up to 4% salt concentration
- Standard available without pre-filter. Pre-filter ca be ordered separately
- Injection molded components of high quality glass-reinforced thermoplastic
- CE & TUV Approved, IP55 protected, IE3 compliant TEFC motor, 2850RPM
- Corrosion resistant, high grade stainless steel motor shaft
- High resistance with all metal internal components being stainless steel



VELOX 3,5-4,5-5,5HP with optional pre-filter



VELOX 7,5-10-12,5HP with optional pre-filter

MODEL	DESCRIPTION	WEIGHT (KG)	BOX DIMENSIONS (CM)
VEL5-350-AQ	PUMP VELOX 3,5HP/3P/50HZ/λ380V WITHOUT PRE-FILTER	26,4	86 X 37,5 X 60
VEL5-450-AQ	PUMP VELOX 4,5HP/3P/50HZ/λ380V WITHOUT PRE-FILTER	29,6	86 X 37,5 X 60
VEL5-550-AQ	PUMP VELOX 5,5HP/3P/50HZ/λ380V WITHOUT PRE-FILTER	29,70	86 X 37,5 X 60
VEL5-750-AQ	PUMP VELOX 7,5HP/3P/50HZ/Δ380V* WITHOUT PRE-FILTER	78	103 X 48 X 74
VEL5-1000-AQ	PUMP VELOX 10HP/3P/50HZ/Δ380V* WITHOUT PRE-FILTER	84	103 X 48 X 74
VEL5-1250-AQ	PUMP VELOX 12,5HP/3P/50HZ/Δ380V* WITHOUT PRE-FILTER	88	103 X 48 X 74
VEL-STR1-AQ	VELOX STRAINER POT ASSY 4" X 4" (FOR 3,5-4,5-5,5HP)	7	50 X 24 X 24
VEL-STR2-AQ	VELOX STRAINER POT ASSY 4" X 4" (FOR 7,5HP)	9	50 X 40 X 40
VEL-STR3-AQ	VELOX STRAINER POT ASSY 4,5" X 4" (FOR 10-12,5HP)	9	50 X 40 X 40

## VERUS PLUS HIGH-EFFICIENCY AQUACULTURE DUTY PUMPS, 15-30 HP

FW SW

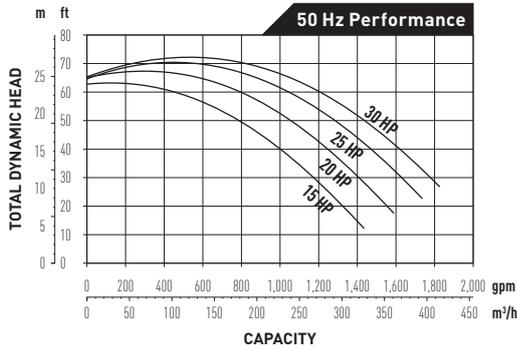
Pentair Aquatic Eco-Systems Verus Plus pumps offer breakthrough performance at an unprecedented value. Providing exceptionally-high flow rates for a wide range of applications, Verus Plus pumps operate quietly and efficiently, and they are lightweight for their size; eliminating the need for unwieldy hoists and large installation crews. Sold without pre-filter (strainer pot available separately as an accessory item). One-year warranty.

### Features

- Aquaculture-duty TEFC motor, IP55 rated, Class F Insulation
- IE3 Motor Rating
- Robust injection-molded components made of glass reinforced thermoplastic
- Salt/Seawater approved up to 40 ppt salt concentration
- All pumps are TUV and CE certified
- Suitable for use with Variable Frequency Drives
- 316SS Mechanical seals and 304SS hardware
- 8" ANSI flange suction and discharge ports
- Extremely quiet with very low vibration during operation



Pump with optional Strainer Pot



Pump without optional Strainer Pot

MODEL	HP	VOLTAGE	HZ	PHASE	FULL LOAD AMPS*	MOTOR	DIMENSIONS (CM)			
							L	W	H	
<b>50 HZ MODELS</b>										
VERPL5-60-AQ	15	380/660	50	3	22.5/13.0	TEFC	101	71.8	74.2	STOCKED IN BELGIUM
VERPL5-80-AQ	20	380/660	50	3	29.8/17.2	TEFC	101	71.8	74.2	STOCKED IN BELGIUM
VERPL5-100-AQ	25	380/660	50	3	36.5/21.0	TEFC	108.5	71.8	74.2	STOCKED IN BELGIUM
VERPL5-120-AQ	30	380/660	50	3	44.5/25.7	TEFC	108.5	71.8	74.2	STOCKED IN BELGIUM
<b>FLANGE KIT &amp; OPTIONAL STRAINER POT</b>										
VERPL-STR-AQ	OPTIONAL STRAINER POT ASSEMBLY									STOCKED IN BELGIUM
350808	8" ANSI FLANGE ASSEMBLY KIT									—

\*This value may vary slightly depending upon motor manufacturer and motor design type.

◀ **VERUS MAX HIGH-EFFICIENCY  
AQUACULTURE DUTY PUMPS, 40-60 HP**

The newest line of Verus pumps is the biggest one yet! Available with flow rates up to 2,000 gpm, Verus Max pumps are designed for large commercial applications where flow rate and turnover demands are high. Pumps in the same class are often times over-engineered resulting in unnecessary costs being passed onto the customer. Utilizing a practical and robust design approach, Verus Max pumps offer exceptional value without compromising on quality or performance. Thanks to its relatively light weight for its size, installation and maintenance of Verus Max is simple compared to metallic pumps with similar capacities. Designed for the most challenging of aquatic system environments, Verus Max pumps are constructed using rugged and reliable components which include an IE2-rated TEFC motor, stainless steel hardware and glass reinforced thermoplastic housing. Please allow up to twelve weeks for delivery. One-year warranty.

**Features**

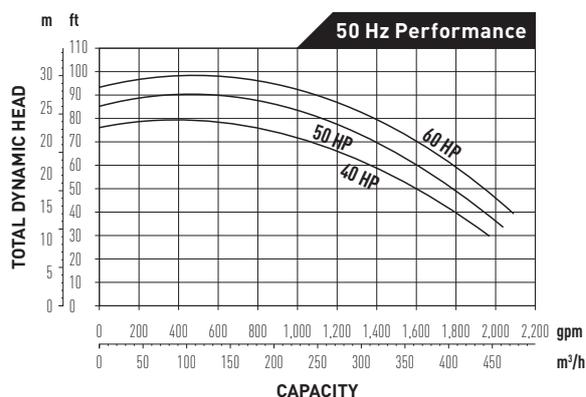
- Aquaculture-duty TEFC motors, with IP55 rating
- Class F Motor Insulation, IE3 rated
- Suitable for use with Variable Frequency Drives
- 316SS internal hardware, saltwater-rated
- Heat-resistant mechanical seal with 316SS construction
- Robust injection-molded components made of glass reinforced thermoplastic
- ANSI 8" suction and discharge ports
- Optional strainer pot and flange kits available
- Available in three-phase ratings. All models are CE and TUV approved
- Salt/Seawater approved up to 40ppm salt concentration



Optional Strainer Pot

Verus Max without optional Strainer Pot

6' (183 cm) person used for size reference



MODEL	HP	VOLTAGE	PHASE	FULL LOAD AMPS*	L* (IN/MM)	W (IN/MM)	H (IN/MM)	
<b>50 HZ MODELS</b>								
VERMX5-160-AQ	40	400/690	3	55.7	58/1474	31/788	38/960	STOCKED IN BELGIUM
VERMX5-200-AQ	50	400/690	3	69	59/1504	31/788	38/960	STOCKED IN BELGIUM
VERMX5-240-AQ	60	400/690	3	83.3	59/1504	31/788	38/960	STOCKED IN BELGIUM
<b>FLANGE KIT &amp; OPTIONAL STRAINER POT</b>								
VERPL-STR-AQ	OPTIONAL STRAINER POT ASSEMBLY							STOCKED IN BELGIUM
350808	8"ANSI FLANGE ASSEMBLY KIT							—

\*This value may vary slightly depending upon motor manufacturer and motor design type.

### VAKI BIOMASS DAILY

#### Accurate information to ensure optimal decisions

With a VAKI Biomass Daily frame placed in each cage, fish are continually measured with pinpoint accuracy. For every site and every cage, the daily overview of average weight, size distribution, condition-factor and growth is available 24/7. All measurements are available in a web-based reporting application, which can automatically send daily detailed reports to selected recipients. With VAKI Biomass Daily, the fish farmer has more time to attend other tasks and fish are not exposed to unnecessary stress.

#### Biomass Daily provides you with:

- Overview of all cages and live data
- Larger samples, more accuracy
- Daily information on average weight and size distribution
- Average condition factor and distribution
- Simple but powerful analysis of data
- No stress to the fish and no disturbance to the feeding

#### Accurate information ensures optimal decisions

- Real time comparisons between cages and sites
- Changes in growth patterns detected as soon as they occur
- Select optimum cages and dates for harvest
- Optimize grading and splitting
- Lower Conversion Factor with better utilization of feed

#### Two frame sizes available:

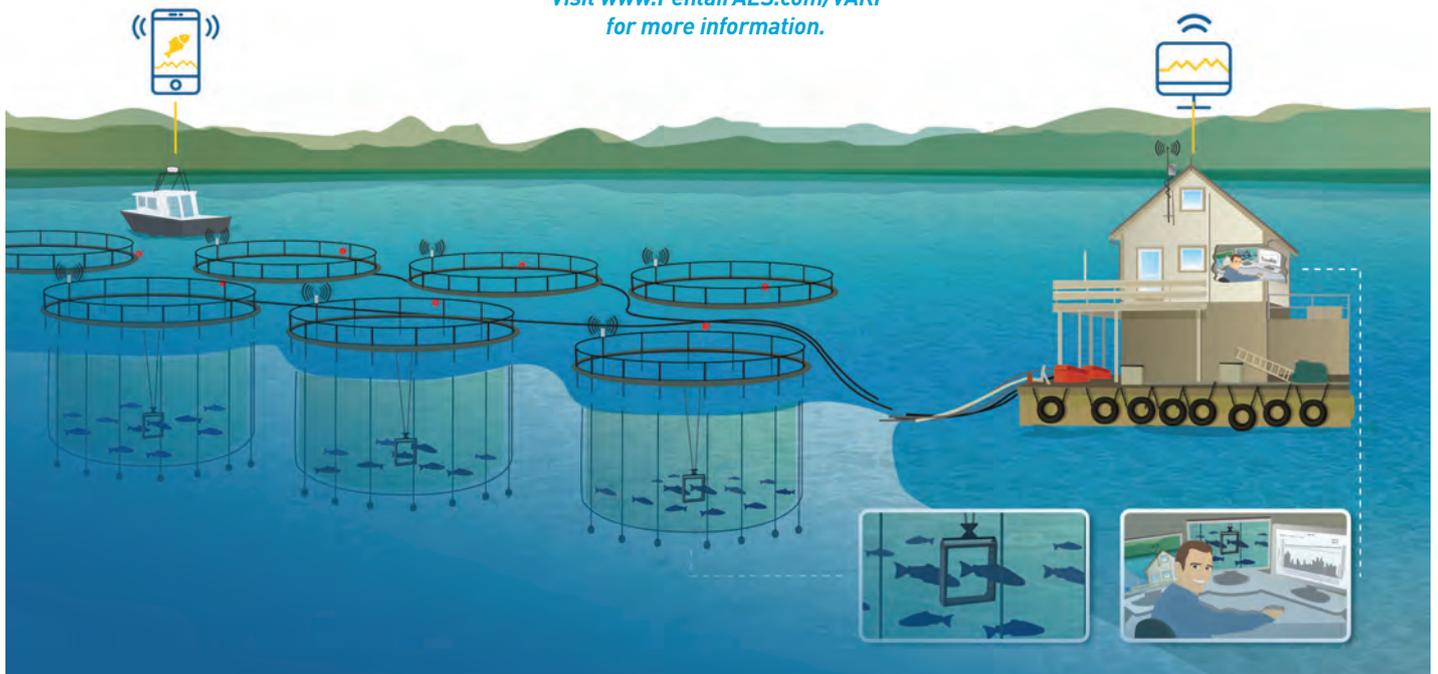
- Three sizes of frames depending on cage size, fish density and size
- The **FR800** frame is optimal for those cages that have low density or may have difficulties with low fish numbers in the measured sample
- The **FR550** frame is widely used in smaller cages or where the density is high
- The software is the same for all frame versions

CALL FOR MORE INFORMATION AND PRICING.



Biomass Daily measures 24/7 regardless of visibility or time of day, ensures that the measured fish are a good mix from the whole population in the pen.

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.



All measurements are available in a web-based reporting application, which can automatically send daily detailed reports to selected recipients.

Time since last farm connection: an hour ago

**P01**  
411x 2 hours  
📄 (1)

**P03**  
39x 10 hours  
📄 (1)

**P04**  
42x 2 hours  
📄 (1)

**P05**  
1753x 2 hours  
📄 (1)

**P07**  
419x 2 hours  
📄 (1)

**P08**  
0x 4 days  
📄 (1)

**Population: P01**

Fish measured in last 24 hours: 411x  
 Time since last fish measured: 2 hours ago  
 Time since last frame data: 1 hour ago

**Organisation:** VAKI Aquaculture Systems Ltd.  
**Farm:** Akralind 4

**Color coding:**

- Green: 100 or more fish measured in the last 24 hours.
- Yellow: 1 - 99 fish measured in the last 24 hours.
- Red: No fish measured in the last 24 hours.

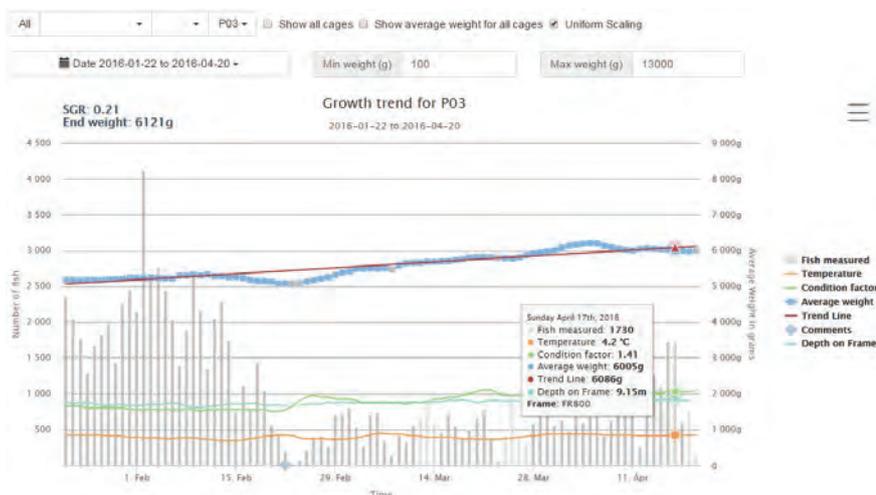
**Frame type:** Large  
**Frame serial number:** 1337  
**Last known frame visibility:** OK  
**Last known frame connection status:** OK

**Contact phone:** +354 595 3007  
**Contact information:** Hermann Kristjánsson, hermann@vaki.is

## VAKI BIOMASS DAILY SOFTWARE

Provides powerful analytics:

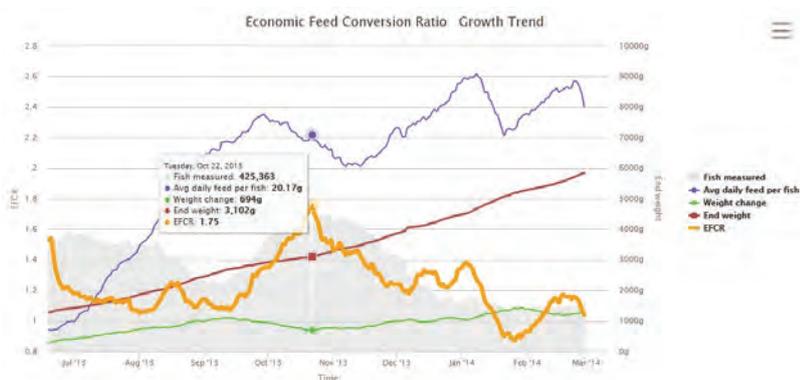
- Reporting accurate weight and size distribution to harvest
- Lower overall FCR with focus on periodic FCR
- Monitoring growth, comparing to environmental factors
- Controlling production with regard to Maximum Biomass Allowance
- Correcting growth models with data on real growth
- Decisions on grading or splitting
- Correct insurance value and for internal reporting



## The Growth Trend

Daily measurements for thousands of fish are accrued over extended periods.

Biomass Daily measures and records fish stock growth data continuously for extended periods of time making it possible to identify trends and establish a growth curve. Insights that can assist with the optimization of growth and feed conversion through the correlation of data such as water temperature, feeding and other impacting factors.



Through utilization of Biomass Daily, highly-accurate feed conversion data can be measured and interpreted.

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

## Biomass Control is considered a serious challenge in fish farming

Now, why is it a challenge? Everybody can agree that poor biomass control can lead to unnecessary negative environmental impact. But also important is the challenge of getting the most out of production.

### How to achieve maximum yield with minimum cost?

In order to achieve maximum yield at minimum cost, higher industrialisation of the farming process is required. Tight monitoring and control of factors, that can be controlled, is also important. We need to collect as much data as possible and go into as much detail as possible monitoring exact weights and numbers all the way from hatching to harvest.

### Smolt delivery

One of the most critical points in production from a Biomass Control perspective is the smolt delivery. The number and weight of smolts introduced into each cage is absolutely critical because it represents the starting point in an ongoing production.

### Accuracy needed

The ongoing part of the production is also very challenging for biomass control.

Taking a manual sample of 100 fish from a cage is both physically challenging for the fish and the fish farmer and it is just not accurate nor reliable enough. When the information about the Biomass in individual cages is not available or inaccurate, growth cannot be monitored and feeding cannot be controlled, which hinders the effort to obtain the lowest feed conversion rate (FCR) possible. Low FCR is of course one of the most important indicators of low production cost.

Therefore, monitoring the FCR based on real growth is essential if one wants to control the feeding. Monitoring the periodic FCR based on real growth is also essential if you want to analyse high FCR periods and takes some actions or implement improvements before the next production period.

### Biomass control helps industrialize salmon farming further

The only way to monitor and improve FCR is to measure real growth continuously and accurately. Biomass Daily can be used to monitor the biomass from hatching to harvest. Biomass control is one of the biggest challenges in salmon farming. Biomass control is also one of the biggest opportunities in salmon farming as a part of increased "industrialization" of the fish farming process which needs to take place in order to meet future challenges.



PentairAES.com

EVERYTHING YOU NEED ON EVERY DEVICE

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

## VAKI CHANNEL COUNTERS

### When Transporting, grading, and general stock control

The Channel Counter is ideal for the accurate counting and size estimation of large numbers of live fish from 500g upwards. Designed to accurately count at the high capacities achieved by modern fish pumps and fish transport systems when splitting, grading and harvesting.

#### B-Type Channel Counter

Refers to the box design and is used when it is not required to lead the fish into a pipe after counting. This version is commonly used on barges when fish are being pumped directly from one cage to another.

#### Y-Type Channel Counter

Used on large grading machines when the fish are transported from the grader into a pipe after counting. The pipe diameter can be up to 20".

CALL FOR MORE INFORMATION AND PRICING.

#### VAKI B-TYPE CHANNEL COUNTER

	B2000	B1400
Dimensions (L x W x H)	0.63 m x 2.1 m x 0.68 m	0.6 m x 1.5 m x 0.67 m
Counting width	2.0 m	1.4 m

#### VAKI Y-TYPE CHANNEL COUNTER

	Y1900	Y1300
Dimensions (L x W x H)	2.14 m x 3.04 m x 0.68 m	1.64 m x 2.38 m x 0.67 m
Counting width	1.9 m	1.3 m



B-Type Channel Counters



Y-Type Channel Counter



## VAKI WELLBOAT SMOLT COUNTERS

Specially designed for use with big vacuum pumps or pressurized flow on wellboats. The well proven technology on hatcheries all over the world, has been adapted to use on wellboats, and it gives accurate count that can be verified with images of every fish.

	S2100	S1400
Dimensions (L x W x H)	4.2 m x 1.64 m x 2.4 m	2.3 m x 1.2 m x 1.7 m
Counting width	2.1 m	1.4 m

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### VAKI MACRO EXEL COUNTER

The newest and biggest fish counter in the VAKI Macro Range. It has a 120cm wide counting area and has 25% higher capacity, wireless Internet, logging system and a faster camera connection. The VAKI Macro Exel can be delivered in either single-channel or four-channel configuration.

Fish size	0.2–800 g
Capacity	1.250.000 1g fish /hr 250.000 50g fish/hr
Accuracy	Over 99%



### VAKI MACRO COUNTER

Especially effective when delivering large amount of fish for transport. The VAKI Macro has a 100 cm wide counting area and has a capacity of 200,000 smolts or 1 million 1g fry per hour. With a range from 0.2g–400g the VAKI Macro is ideal for accurate and fast delivery of fry and smolts. The VAKI Macro can be delivered in either single-channel or four-channel configuration.



### VAKI MICRO COUNTER

Ideal for the internal handling of smaller fish or delivery of fry. The VAKI Micro is exceptionally good for hatcheries counting small fish between 0.2g and 200g. The counting area is 50 cm wide with a capacity of 500,000 1 g fish per hour. The VAKI Micro can be delivered in either single-channel or three-channel configuration



### VAKI NANO COUNTER

Designed for counting small batches and smaller fish. The VAKI Nano is best-suited for applications where fish are hand-netted or brought to the counter via bucket. The VAKI Nano can count fish down to 0.05g. Capacity up to 200.000 1g fish/hr.



### MAIN ADVANTAGES OF VAKI COUNTERS:

- Accurate counting
- High capacity
- Images are saved for verification
- Counting report
- Fish in water at all times
- Usb port for accessories
- Overload alarm
- Removable counter head for servicing and storing
- Remote monitoring and servicing

CALL FOR MORE INFORMATION AND PRICING.

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### VAKI LUMPFISH COUNTER

The fish are accurately counted as they slide through the scanner. The VAKI Lumpfish Counter is available in three different configurations, each using infrared light technology to achieve reliable counting results.

#### Features

- Single channel display unit, powered by 12VDC. External 110/240V power supply available. IP66 waterproof
- 4 channel display unit, mains powered. IP66 waterproof
- PC-based, 4 channel control unit with additional reporting and interfacing capabilities. IP65 waterproof

CALL FOR MORE INFORMATION AND PRICING.

	SINGLE CH. DISPLAY UNIT	4 CH. DISPLAY UNIT	PC-BASED
Easy to install/set up	✓	✓	✓
Accurate counting	✓	✓	✓
High capacity	✓	✓	✓
Robust	✓	✓	✓
Gentle on fish—fish are in the water at all times	✓	✓	✓
Images are saved for verification	✓	✓	✓
Remote monitoring and servicing	—	—	✓
Remote monitoring and servicing	—	—	✓
Counting report	—	—	✓



### VAKI PICO COUNTER

The VAKI Pico Counter is a video-based flow-through system built specifically for the aquaculture industry. The counter is configurable to meet your needs. It does not require nets, water-chilling or statistical guesswork. Lumpfish or shrimp remain in the water at all times and are unharmed by the counting process. Audit function allows replay of previous files to allow users to validate accuracy of the count

#### Features

- Audit function allows recall of previous files to allow users to validate accuracy of the count
- Every image used for sizing is stored and can be retrieved from the report page
- Pictures show size estimate calculations
- Made for 1" and 2" pipes
- Shrimp size: 0.1g–3g
- Lumpfish size 10mg–3g

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#### MAXIMUM COUNTING CAPACITY

	1" COUNTER	2" COUNTER	3" COUNTER
0.1 gr shrimp	20,000 per hour	40,000 per hour	60,000 per hour
0.3 gr shrimp	10,000 per hour	20,000 per hour	30,000 per hour
1 gr shrimp	N/A	10,000 per hour	15,000 per hour
Water flow	2,000 liters per hour	8,000 liters per hour	180,000 liters per hour

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### VAKI COUNTING SOFTWARE

The advanced software is used to count the fish as they pass the counting area. All fish images are stored and can be used for verifying the count. Automatically-generated reports provide users with valuable and detailed information for each counting session. The average weight and size distribution of the counted fish are shown on a graph along with information on the total biomass of the fish.

#### Macro App

Among other features the Macro app provides the user the option to run the counter, view the results and email the count report from a smart phone or tablet.

#### Counter Software

The touch pad screen on the counter head is used to operate the counter. The main screen of the program displays numbers, average weight and through put. A graph shows the rate of fish going through the counter and the maximum capacity. Should the counter be overloaded a warning signal is given.

After each count an image file and a report file are saved. Files can be displayed on screen and transferred to a flash drive or internal network.

#### Recording of Images

The images of the fish are automatically recorded and can be used to validate and check the accuracy of the count. The image file can be given to a customer and/or stored as a permanent record.

The red chart indicates the numbers of fish counted during the entire count and is used to select a time frame for further analyses. The screen displays images of fish passing the camera for each one second interval. Accuracy can be verified by a manual check of the number of fish images to the count shown on the screen.

#### Counting Report

The counting report is produced after each count with the total number of fish counted, number in each group, total counting time, average fish/min and any counter overload time. The counting throughput graph is shown on the report and the name of site, tank, company logo, comments, and other information can be included.

With the optional size measurement function the average weight and size distribution is also included. A hard copy of the report can be printed or stored.

#### Size Measurements

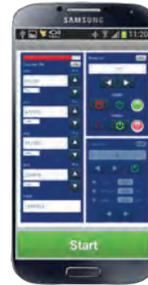
An optional feature to the counting program, the size measurement module, presents accurate average weight and size distribution of the counted fish.

In one simple operation complete data on number and size of fish is obtained without handling or stress.

### VAKI ONLINE SERVICE CONTRACT

Online Service Contracts provides you with inclusive service checks carried out online by our skilled service team, so there are no logistical issues or transport costs to worry about. This also gives us the opportunity to advise and make recommendations on the use of the counter, identify any potential issues that may be affecting the accuracy or any repairs/replacements that should be considered. All VAKI Fish Pumps, Graders and Counters can be connected to Smart Flow.

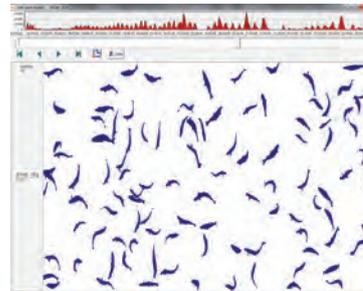
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Macro App



Counter Software



Recording of Images



Counting Report

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#### Online Service Contract Includes:

- Counter registered into Online service history database
- Three routine Online service checks per year with email report
- All settings and systems check
- Visibility check for light strength, head/camera alignment, edge positions and bulkheads
- Calibration check
- Random selection of 2 files from the last service in hard drive checked for quality of images
- Hard drive clean up
- Report that contains recommendations regarding changes to alignment, cleaning and other issues highlighted during the Online checks
- Priority service customer for additional Online support
- 1x count quality report, per year
- All applicable software fix upgrades free
- 25% of additional function change software packages

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

## VAKI PIPELINE (PLC)

The VAKI Pipeline Counter is installed in a pipe leading from a grading machine, or onto the end of a pipe where it empties into a tank. The fish are counted when sliding through the pipeline, using infrared light beams, a technology that VAKI has been using for over 25 years in its other products. The Pipeline Counter is a proven, robust technology suitable for use in harsh applications.

### Features

- Easy to install / set up
- Accurate counting
- Gentle on fish—fish are in water at all times
- Can be mounted directly on the grader or on the end of the pipe into the tank
- Four scanners can be connected to the control unit
- Fish size: 10g - 10kg
- Capacity: 45000 fish/hour (50gr)
- Adaptors: for 110, 160 and 200mm pipes
- Power supply: 110-240V

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## VAKI BIOSCANNER

VAKI Bioscanner for counting both small and large fish. Fish of all species are counted stress free and remain in water at all times. The VAKI Bioscanner is accurate, fast and reliable.

The Scanner Unit "detects" the fish as they pass through the V-channel, counts them and relays data to the Control Unit. Regulates the flow of fish and water and separates the fish, making it possible to count them.

The V-channel 1: For counting small and medium sized fish, 3 g-750 g.

The V-channel 3: For counting medium sized to big fish, 500 g-6 kg.

### Features & Benefits

- Accuracy: 99-100%
- High capacity - up to 60,000 fish per hour
- Easy to use
- Accurate information on the number of fish in sea cages, ponds, tanks and raceways
- Exact deliveries of smolt and when harvesting
- Lower manpower costs and increased efficiency
- The number of fish in each size group (when used in conjunction with graders)
- Accurate feeding quantities and proper medical dosages
- Accurate data for insurance assessment

### Control Unit

- Gathers and displays data from up to four scanners
- Single Channel Display Unit
- Multi Display Unit with 4 inputs

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Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### VAKI RIVERWATCHER FISH COUNTER

For reliable river stock management.

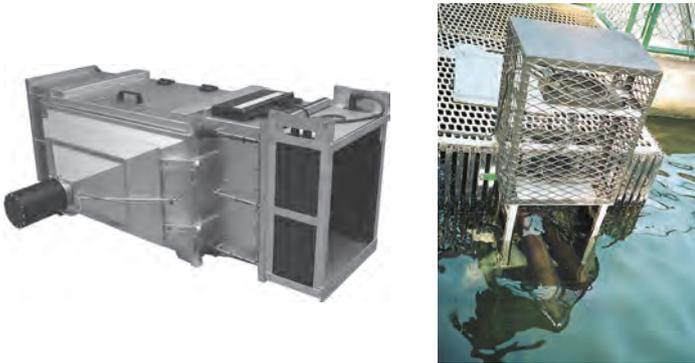
The VAKI Riverwatcher Fish Counter is installed in fish ladders, pools, traps, or similar places where all the fish in the river have to pass. When a fish swims through the scanner, the resulting silhouette image is used to count and estimate the size of each fish.

#### Main Advantages

- Accurate and reliable assessment of fish numbers
- Comparison of the movement pattern of the fish from one year to another
- Comparison of catch figures and Riverwatcher fish counts to calculate catch rates
- Evaluation of the results of rearing and smolt releases
- Assessment of the influence of environmental factors
- Assessment of the efficiency of fish ladders
- Valuable data for better fisheries management

#### Main Features

- Counts fish with more than 98% accuracy
- Measures the size of each fish with more than 95% accuracy
- Stores silhouette images of every fish that passes through the scanner
- Detailed identification of species, sex, etc. of individual fish from the high quality digital images
- The data and time of day that each fish passes the scanner is recorded
- The water temperature is recorded and measured at 3 hour intervals



When a fish swims through the scanner, the resulting silhouette image is used to count and estimate the size of each fish.

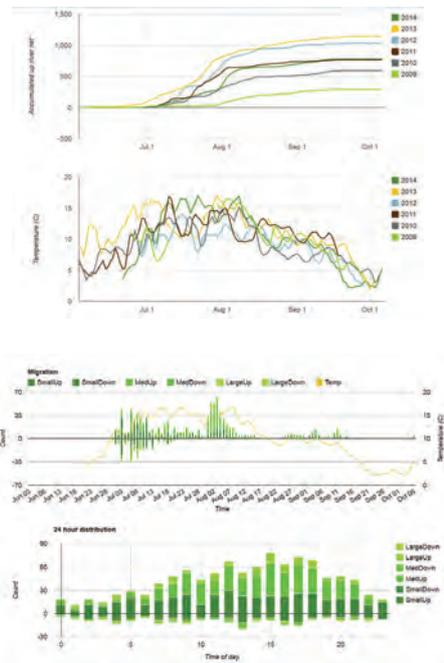
#### Riverwatcher Fish Counter Daily

- Customers can view real-time information and see what is going on in the river at any time
- Counts and charts available without having to download data and start a specific software
- Automatic report
- Easy to share information and easy to compare rivers
- Examine temperature records for a particular period
- Analyze the silhouette images of each fish and sort the fish in different groups and to verify the counting
- Users can easily edit data if needed
- All data securely stored and accessible on your private web account

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Easy to access statistics, silhouettes and videos of all fish in the river. Users can view real-time information from anywhere and see what is going on in the river at any time.



Users can view real-time information. Counts and charts available at all times. Easy to share information and easy to compare rivers.

## VAKI SMART FLOW

### Control and Monitoring System

The VAKI Smart Flow System gathers and stores information about all measured fish for easy analysis of size and number. This facilitates the optimization of every operation as the various devices can be controlled and fine-tuned electronically in order to result in the desired output.

### Integrates to all main VAKI products

- Easy control during the process, resulting in more precise and desired output
- All counting data are automatically saved
- Provides instant access for others within the company to view the data at any time

### How it works

All devices can be controlled and fine-tuned electronically "on the fly", resulting in more precise output.

### Pump speed adjustment

The counter measures the speed of flow and sends the information to the pump in order to regulate the pumping speed.

### Automatic feedback control

The feedback loop between the counter and grader can relieve the user from having to monitor the grading process manually.

### Online database/local server

Stores all data from the measurements.

### Regulating density control

The counter sends the density control information on the measured fish.

### Counting report

The automatic counting report can be supplied to the receiver of fish along with the counting file containing the images of all the fish.

### Controlled "on the fly"

By integrating a feedback loop between the grader and the counter, both opening and rotation settings of the grader can be adjusted to reach the optimal quantity of fish in each category.

As an example, if an equal biomass distribution is preferred between all categories, the counter will adjust the grader so that the category with e.g. small fish receives the largest number of fish with adjust for the relative weight difference of each individual fish.

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All devices can be controlled and fine-tuned electronically, resulting in more precise and desired output.



Easy access and sharing of valuable information.



The devices can interact, for maximum results.

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### VAKI LIVE FISH & SHRIMP PUMPS

Now available in two sizes, the 6" and the 8". The VAKI Fish Pump provides options in capacity, motor type and pump type to deliver the best solution possible. To protect your investment during handling operations, you need a safe, gentle, fast way to transfer fish. Aquaculturists around the world use this pump to move salmon, trout, char, tilapia, hybrid striped bass, mackerel, anchovy, yellowtail, shrimp, and other species. This pump makes it easier to move fish and shrimp efficiently and safely. The continuous pumping action keeps fish in the water at all times minimizing damage and increasing output. One operator can move up to 10 tons per hour, reducing labor costs and eliminating the need to lift heavy nets and buckets.



Available with optional remote control

### Product Highlights

- Developed with advanced finite element analysis processes to increase efficiency and ensure optimized, long-lasting, trouble-free service
- Industrial self-priming pump
- Fish can be transferred over long, horizontal distances
- Cast aluminum, hand-polished, single vane impeller is balanced to ensure precision

### Models and Configurations

- Cart-mounted pumps
- Pumps are easily reduced to multiple inlet and outlet configurations:
  - 6" Pump - 150 mm (6 in), 100 mm (4 in) and 50 mm (2 in)
  - 8" Pump - 203 mm (8 in) and 254 mm (10 in)



Fish Pump with 6-inch to 4-inch camlock reducers



Easy-to-change fittings

### 6" PUMP FISH PUMP TECHNICAL SPECIFICATIONS

WEIGHT	200 kg (440 lbs)
DIMENSIONS (LxWxH)	170 x 81 x 119 cm (67 x 32 x 47 in)
INLET SIZE	150 mm (6 in) reduce to 100 mm (4 in) or 50 mm (2 in)
OUTLET SIZE	150 mm (6 in) reduce to 100 mm (4 in) or 50 mm (2 in)
MIN. FISH SIZE	0.05 g
MAX. FISH & SHRIMP SIZE	400 g (0.88 lbs) (based on Salmonid), Greater than U-10 size
MAX. PUMP OUTPUT	2,400 lpm (635 gpm)
PUMP SPEED	200 to 800 rpm
MAX. PUMP HEAD	5 m (17 ft)
MAX. PUMP SUCTION	3 m (10 ft)
HORIZONTAL TRANSFER	500 m (1,500 ft)
POWER OPTIONS	50 or 60 Hz 1 or 3 phase electric motor

### 8" PUMP FISH PUMP TECHNICAL SPECIFICATIONS

WEIGHT	730 kg (1,600 lbs)
DIMENSIONS (LxWxH)	203 X 132 X 152 cm (80 X 52 X 60 in)
INLET SIZE	203 mm (8 in) or 254 mm (10 in)
OUTLET SIZE	203 mm (8 in) or 254 mm (10 in)
MIN. FISH SIZE	0.05 g
MAX. FISH & SHRIMP SIZE	1.2 kg (2.6 lbs) (based on Salmonid) Greater than U-10 size
MAX. PUMP OUTPUT	1,892 lpm (500 gpm)—at max. elev. 5,678 lpm (1,500 gpm)—8 in 7,570 lpm (2,000 gpm)—10 in
PUMP SPEED	200 to 500 rpm
MAX. PUMP HEAD	9 m (30 ft)
MAX. PUMP SUCTION	3 m (10 ft)
HORIZONTAL TRANSFER	2,000 m (6,562 ft)
POWER OPTIONS	20 hp, 50 or 60 Hz, 3 Phase

### VAKI FISH GRADER

The VAKI Fish Grader has been designed and developed for high speed grading of small fish. The size range is 0.2g up to 200g and the capacity is up to 6,000kg per hour. The grader is circular and requires less floor space than other grading machines. The grader is very simple to operate and is currently available in 2 size options (96cm and 140cm). Both graders are constructed from stainless steel, have height adjustable legs and are fully portable on rubber wheels.

#### Features

- Accurate grading of fish from 0.2g
- High capacity
- 4 grades
- Compact
- Easily adjustable
- Gentle on fish
- Can be connected to VAKI Smart Flow

#### VAKI FISH GRADER

	96 CM FISH GRADER	140 CM FISH GRADER
Box length (cm)	40	50
Fish size	0.2-100 g	5-200 g
Capacity	Up to 1,000 kg/hour	Up to 6,000 kg/hour
Weight (kg)	150	200



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The inlet can be angled to increase or slow down the fish flow into the grader.



The grading gaps can be set from fully closed up to 50mm wide.



The grader is circular and requires less floor space than other grading machines.



There is a 360° adjustment in the direction of the inlets from the grader.

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### VAKI FEEDING SYSTEM

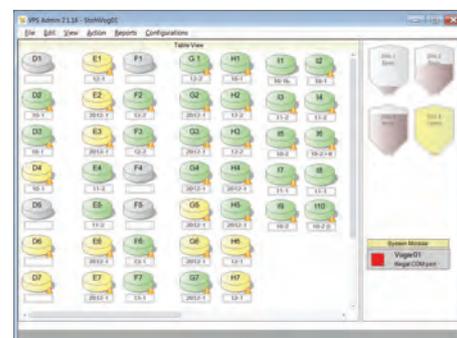
VAKI Feeding System is an automatic system. It is simple to operate and can be used as free-standing unit or installed in a container. It is specially designed for smaller farms. The system utilizes one or more feed storage silos, which is useful when different sizes of feed are being used.

The feeding system is designed to blow feed pellets from a feeding station to pens or cages with an air compressor through pipes. The system consists of at least one silo, auger, blower, airlock and distributor. The feed is transported from the silo via an auger where it falls into a funnel that sits on top of an airlock. The airlock separates the funnel from an air pressured pipe underneath. The air pressure comes from an air compressor which blows through the airlock. The pressure line then connects to a distributor which can be connected to up to 32 different pipes leading to different cages or pens. The system is controlled by a PLC computer which controls the augers, airlock and distributor. The PLC is controlled by software on a separate PC running the VAKI feeding program. The system can be used in all sizes of aquaculture farms depending on variation. The system can handle feed pellets from 1mm to 12mm diameter.

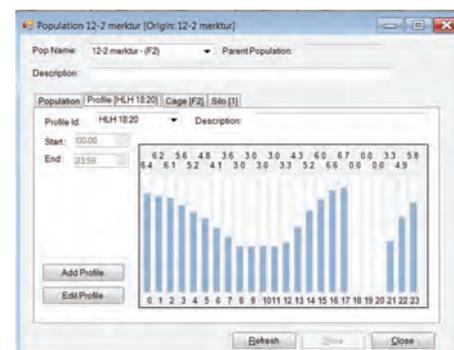
### Maximum Fish Growth

The VAKI Feeding System controls the quality of the feeding and thereby helps attain maximum fish growth and health. In other words, the feeding control system ensures that feed usage is optimized toward growth targets, while a minimum amount of nutrients are lost to waste. A more efficient uptake of nutrients in the fish doesn't only benefit the environment, but it also improves farm economy.

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The interface, here the operator can monitor, interface, reprogram or override the automatic operation of the system.



Graph showing the quality of the feeding and thereby helps attain maximum fish growth and health.

Visit [www.PentairAES.com/VAKI](http://www.PentairAES.com/VAKI) for more information.

### HATCHING JAR STOCKED IN BELGIUM

This McDonald-type hatching jar has become the industry standard. One-piece molded design allows a smooth interior—no lips or gaps for eggs to get caught on or bacteria to grow. It is a high-impact, all-plastic egg hatching system. Simply direct about 1 gpm of water (depending on the weight of the eggs) into the center. The eggs will be uniformly rotated.

The fish hatching jar comes with a 1,000-micron top screen that prevents the loss of eggs. When the fish hatch, remove the screen to let the fish swim out. Use it for trout, salmon, hybrid striped bass, catfish, tilapia and many others. Height 18", diameter 6¼", 6 liter capacity for up to 20,000 eggs, dependent on species and egg diameter. Case quantity is 4.

#### MODEL

**J30** HATCHING JAR, 6 LITER

**J6** REPLACEMENT TUBE

**J8ES** REPLACEMENT SCREEN

### JAR HANGER STOCKED IN BELGIUM

The all-plastic hanger allows above jars to be used without a bench or stand. Accepts up to 1½" hanging lip.

#### MODEL

**JH**



Jar and hanger sold separately.

Top Screen (J8ES)

**CUSTOMER ORDER ACCEPTANCE**

All orders are subject to acceptance by Pentair Aquatic Eco-Systems Inc. or Pentair Aquatic Eco-Systems (Canada) Inc., as the case may be (each, "PAES" or "Seller") and are not accepted by or binding upon PAES unless a signed notice of such acceptance is forwarded to the Buyer in writing or upon fulfillment of the order by PAES. The terms and conditions of sale are only those stated herein, which with the information contained in the face of the quote or acknowledgment shall constitute the complete agreement between the parties and may not be altered or modified except in writing duly executed by each party. The parties agree there are no agreements, representations or warranties between the parties, oral or written, with respect to the products sold hereunder (including any made or implied from past dealings) except as expressed herein. No terms and conditions stated in or attached to Buyer's communications to PAES, including but not limited to Buyer's purchase orders the terms of which are hereby rejected, are applicable to these terms and conditions in any way and in no event shall such Buyer's or any other terms and conditions be considered valid exceptions to the provisions of these terms and conditions. Trade custom, trade usage and past performance are superseded by these terms and conditions and shall not be used to interpret these terms and conditions.

**GOVERNING LAW; SOLE JURISDICTION AND VENUE**

These terms and conditions and any quote, order or agreement subject to these terms and conditions shall be interpreted in accordance with the commonly understood meaning of the words and phrases hereof in the United States of America. These terms and conditions and any quote, order or other agreement subject to these terms and conditions and the performance of the parties hereto, shall be construed and governed according to the laws of the State of Florida, without regard to conflicts of laws principles. The parties hereby irrevocably consent to jurisdiction in, and to the service of process, pleadings and notices in accordance with, the laws of the State of Florida and the federal laws of the United States of America in connection with any and all actions and processes initiated in courts situated in Orange County, State of Florida, U.S.A. It is the express intent and agreement of the parties that the United Nations Convention for the International Sale of Goods shall not apply to this agreement or to purchase orders submitted hereunder. Each party hereby irrevocably waives any objection which it may now or hereafter have to the laying of venue of any suit, action or proceeding relating to these terms and conditions and any quote, order or other agreement subject to these terms and conditions in the state or federal courts situated in Orange County, State of Florida in the United States of America, and further irrevocably waives any claim that Orange County, State of Florida in the United States of America is not a convenient forum for any such suit, action or proceeding.

**LIMITATION OF LIABILITY**

PAES SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES, INCLUDING BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFITS, GOODWILL, USE, DATA OR OTHER INTANGIBLE LOSSES (EVEN IF PAES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES), WITH RESPECT TO THIS AGREEMENT OR ANY OTHER MATTER RELATING TO THE PRODUCTS OR SERVICES.

IN NO EVENT SHALL PAES' MAXIMUM AGGREGATE LIABILITY EXCEED THE TOTAL FEES PAID BY BUYER TO PAES WITH RESPECT TO THE SPECIFIC QUOTE, ORDER OR AGREEMENT TO WHICH THESE TERMS AND CONDITIONS APPLY. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THE LIMIT.

SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF CERTAIN WARRANTIES OR THE LIMITATION OR LIMITATION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CERTAIN CIRCUMSTANCES. ACCORDINGLY, SOME OF THE ABOVE LIMITATIONS MAY NOT APPLY TO BUYER.

**LIMITED WARRANTY**

PAES warrants that upon completion of the services or at the time of delivery, as the case may be, and for a period of twelve (12) months thereafter: (i) professional services, if any, will be performed in a good and workmanlike manner in accordance with generally acceptable industry standards, and (ii) products specifically manufactured by PAES, except for filters, chemicals and consumables (which shall not be warranted) shall be free from all material defects in materials and workmanship. With respect to the professional services warranty, Buyer's sole and exclusive remedy for PAES' breach of the warranty shall be for PAES to re-perform the services at PAES' sole cost and expense. With respect to the PAES manufactured product warranty, if the PAES manufactured product shall prove to be defective in material or workmanship under normal intended usage and maintenance during the warranty period, upon examination by PAES or its authorized representative, then PAES shall repair or replace, at its sole option, such defective products at its own expense; provided, however, that the Purchaser shall be required to ship each such defective product, freight prepaid, to PAES' designated facility. The warranty on products and/or components not manufactured by PAES is limited to the warranty, if any, provided by the original manufacturer of said product or component which can be passed onto Buyer. PAES DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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

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

**NON-WARRANTY REPAIRS**

In the event Buyer desires to have Seller perform a non-warranty repair of equipment sold by Seller, Buyer shall contact Seller's customer service representative at 877 347 4783. If Seller is capable of performing such non-warranty repair of the equipment and Buyer decides to move forward with having Seller perform such repair, Seller will generate a return number which Buyer shall reference in its shipment to Seller of the equipment for evaluation by Seller. Buyer is solely responsible for any and all costs and expenses, customs fees, duties and taxes associated with shipping the equipment for evaluation. Buyer will be charged an up-front evaluation fee in order for Seller to assess the extent and ability of Seller to perform the necessary repairs. The evaluation fee must be paid in advance and will be credited toward the repair fee if Buyer elects to have Seller perform the repair. If Seller is capable of performing the repairs, then Seller shall provide Buyer with a quote for the cost of the repairs. Upon Buyer's consent to move forward based upon the quote, Seller shall make the repairs outlined in the quote and return the equipment to Buyer in accordance with Seller's Shipping Policy. If Seller does not wish to move forward with the repairs or Seller cannot otherwise perform the repairs, Buyer shall arrange for the pick-up of the equipment at Seller's facility at Buyer's sole cost and expense. Any equipment sent in for a repair evaluation and which is left for more than ninety (90) days after notice is given that either (i) Buyer does not wish to move forward with the repairs or (ii) Seller is unable to perform the repairs, shall be considered abandoned. Certain equipment may be subject to additional documentation or evaluation criteria at Seller's sole discretion.

**SEVERABILITY**

In the event a provision of these Terms and Conditions is held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall not be affected.

**SHIPPING**

Shipping dates are estimates only and are not guaranteed. Seller will use every effort to make shipments as scheduled and may make partial shipments. Seller shall not be liable for any loss or damage ensuing from late delivery. - Prices quoted, unless otherwise agreed to by PAES, are Incoterms 2010 EXW-Seller's Factory for United States domestic transactions and FCA-Seller's Factory for international transactions. In the event of shipping damage, PAES must be notified, in writing, within three (3) business days of shipment receipt. Buyer must hold all products and packing materials intact, until further disposition is provided by PAES in writing.

**TITLE AND RISK**

On domestic sales, transfer of both title and risk of loss shall occur upon pickup from Seller's site. On international sales, transfer of both title and risk of loss shall occur upon entry into international waters, international airspace, or the crossing of an international border with the sole exception of banked transactions (L/C, DM, DAP), in which case the transfer of title occurs upon exchange of documents at the bank window, and the transfer of risk of loss occurs upon entry into international water, international airspace, or the crossing of an international border.

**INSPECTION**

Within three (3) business days after receipt of shipment of the product, Buyer shall inspect the shipment for obvious damage to or violation of the shipping container. Buyer shall also confirm that the type and quantity of the products received are consistent with the type and quantity specified on the related shipping documents and order. Buyer shall promptly notify Seller of any discrepancies in accordance with the terms hereof. If a notice of discrepancies is not received by PAES within three (3) days after receipt of the shipment by Buyer, the shipment shall be deemed to have been completely and correctly fulfilled, and all claims by Buyer shall be deemed waived and released, except for any Product defect that a visual inspection would not disclose.

**CANCELLATION; PENALTY**

No products may be returned without prior written approval of Seller. Orders placed with and accepted by Seller may not be cancelled except upon Seller's written consent prior to shipment and Buyer's acceptance of Seller's cancellation charges which shall protect Seller against all costs and losses, but not higher than the price quoted. Seller reserves the right to cancel any sale hereunder without liability to Buyer (except for refund of monies already paid) if the manufacture or sale of the products is or becomes technically or economically impractical. A cancellation fee equal to thirty percent (30%) of the stipulated price for non-stocked or custom products which have already been manufactured will be charged for any cancellations of non-stocked or custom products that have not been shipped to the Buyer. "Non-stocked or custom products" are defined as goods that are made to order.

**PAYMENT; OVERDUE INVOICES**

All payment terms are subject to PAES' Credit Department's approval. Unless otherwise agreed to by the parties, payment terms are net thirty (30) days from date of invoice. PAES RESERVES THE RIGHT TO ADD, AND PURCHASER AGREES TO PAY, INTEREST AT THE RATE OF 18% PER ANNUM OR THE HIGHEST RATE PERMITTED BY APPLICABLE LAW, WHICHEVER IS LESS, FROM DATE OF SHIPMENT, ON AMOUNTS INVOICED AND UNPAID IN ACCORDANCE WITH THE PAYMENT TERMS.

**COLLECTION AND ATTORNEY'S FEES**

In the event of any alleged dispute, breach or default of this Agreement necessitating PAES to retain an attorney to represent it, the Purchaser agrees to pay the PAES' costs and expenses including reasonable attorney's fees, incurred in connection with, related to or arising out of enforcement of any term or provision of this Agreement, whether or not in connection with any legal or administrative proceedings, plus pre- and post-judgment interest and costs incurred, through appeal, and such shall be in addition to any other remedies or damages to which the PAES may be entitled. Failure to pay these fees automatically voids any Warranty Provisions to which the Purchaser would otherwise be entitled.

**TAXES**

Prices quoted, unless otherwise expressly stated in writing do not include sales, use, excise, value added or similar taxes or duties. Buyer shall pay these taxes directly if the law permits or will reimburse Seller if it is required to pay them. Buyer will provide tax exemption certificates or evidence of tax payment on request. The price quoted is based on the cost of raw materials, wage rates, shipping charges, freight, insurance premiums, landing charges and duties, railage and cartage applicable on the date on which a contract, acceptance, confirmation, tender or quotation is issued. Accordingly, any increase in such costs after such date and prior to the fulfillment of the contract may result in a price adaptation in good faith and in proportion to the changed circumstances, and shall thus be for the account of Buyer.

**EXPORTATION**

If the products ordered are to be exported from the country of Seller, the quoted shipping dates are subject to receipt of all export documents and authorizations. Regardless of ultimate destination, the prices quoted are based on packing for domestic shipment unless otherwise stated in writing. Buyer agrees to provide Seller in writing with the ultimate destination and identity of the end-user prior to shipment if the products are to be exported. Notwithstanding any other provision of this Agreement to the contrary, Buyer agrees that it will not sell, reexport or transfer any products or technical information or Services supplied under this Agreement to IRAN, NORTH KOREA, SYRIA, CUBA and SUDAN, including any entities or persons in those countries, either directly or indirectly ("Seller's Position"). Buyer agrees that it will not sell, reexport or transfer any products or technical information or Services supplied under this agreement to any other countries except in full compliance with all applicable governmental requirements, including but not limited to applicable economic sanctions and constraints administered by the U.S. Treasury Department and applicable export control measures administered by the U.S. Department of Commerce and U.S. Department of State, any other U.S. government agencies, and measures administered by the Foreign Affairs, Trade and Development Canada, European Union or the government agencies of any other countries. Any violation by Buyer of the applicable laws or regulations of the U.S., Canada or any other government, or where Buyer breaches Seller's Position notwithstanding whether or not this is contrary to any aforementioned applicable laws or regulations, shall be deemed a material breach of this agreement and sufficient basis for the Seller to reject any or all orders or to terminate this agreement. Compliance with applicable legal requirements and Seller's Position is a prerequisite for Buyer to perform its obligations under this Agreement, and if the Buyer fails to comply with such legal requirements, it is incapable of meeting its obligations under this Agreement. The Seller reserves the right to refuse to enter into or perform any order, and to cancel any order, placed under this Agreement if the Seller in its sole discretion determines that the entry into such order or the performance of the transaction to which such order relates could violate any applicable law or regulation of the United States, Canada or any other governments and/or Seller's Position. Buyer agrees that any such refusal or cancellation of any order, or termination of the Agreement by the Seller, as described above, will not constitute a breach of any of the Seller's obligations under this

Agreement, and Buyer hereby waives any and all claims against the Seller for any loss, cost or expense, including, but not limited to, claims of third parties, any loss of profit, loss of business, loss of or damage to goodwill and/or similar losses, loss of anticipated savings, or increased costs or for any indirect, special or consequential losses, or pure economic loss, costs, damages, charges or expenses howsoever arising, that Buyer may incur by virtue of such refusal or cancellation of any order or termination of this Agreement.

**FORCE MAJEURE**

Except for the obligation to make payments, a party is not liable to fulfill its obligations under the agreement if performance is materially prevented as a consequence of natural catastrophes, terrorism, civil unrest, war, explosions, fire, breakdowns or damages to installations, constructions or machines, disruption to public transport, labour market conflicts (such as strikes and lock-outs) or other similar circumstances or acts of God. In the event of force majeure a party is not obligated to fulfill its obligations as long as, and to the extent, the force majeure continues. The party invoking force majeure shall inform the other party immediately in writing. If a force majeure continues for more than six months the other party may terminate the agreement with immediate effect by sending a written notice to the other party.

**CONFIDENTIAL**

Buyer acknowledges that it may gain access to or otherwise learn Confidential Information (as hereinafter defined). Buyer agrees that it will use the Confidential Information only for purposes of performing its obligations under these Terms and Conditions (the "Permitted Purpose") and shall not transfer or otherwise disclose the Confidential Information to any third party except as expressly permitted by these Terms and Conditions. Buyer shall: (a) give access to Confidential Information solely to those of its employees and approved subcontractors with a need to know such information for the Permitted Purpose; and (b) take the same security precautions to protect against disclosure or unauthorized use of Confidential Information that Buyer takes with its own confidential information, but in no event shall Buyer apply less than a reasonable standard of care to prevent such disclosure or unauthorized use. Confidential Information means any and all information relating to PAES or its affiliates that may be accessed by or disclosed to Buyer including but not limited to quotations, price sheets, engineering and product designs, manuals, equipment and business specifications, trade secrets, reports, or other proprietary data.

**INTELLECTUAL PROPERTY RIGHTS**

All patents, copyrights, designs, drawings and other technical or commercial information relating to the products, including any software provided by Seller pursuant to any proposal, tender or the contract, and the intellectual property rights therein made or acquired by Seller prior to or during the preparation of the proposal or tender or in the course of work on the contract shall be and remain the exclusive property of Seller.

If a product furnished to Buyer becomes or, in Seller's opinion, may become the subject of any claim, suit or proceeding for infringement of any intellectual property rights, Seller may at its option and expense (i) obtain for Buyer the right to use, lease or sell the product, (ii) replace the product, (iii) modify the product, or (iv) remove the product and refund the purchase price paid by Buyer less a reasonable amount for use, damage or obsolescence. Seller will not be liable for any infringement arising from the combination of products or from the use of a product in practicing a process. Seller's total liability to Buyer will not, under any circumstances exceed the purchase price paid for the allegedly infringing product. Buyer agrees, at its expense, to protect and defend Seller against any claim of intellectual property right infringement arising from compliance with Buyer's designs, specifications or instructions and to hold Seller harmless from damages, costs and expenses attributable to any such claim.

**INDEMNITY**

Buyer agrees to defend, indemnify and hold the Seller (and its agents, representatives, employees, officers, related companies, successors and assigns, and customers) harmless from all claims, demands, actions, damages and liabilities (including legal fees and consequential and incidental damages) arising out of any injury (including death) to any person or damage to any property in any way connected with any act or omission of Seller, its agents, employees, or subcontractors.

**WAIVER**

No failure to exercise and no delay in exercising on the part of Seller any right, power or privilege hereunder will operate as a waiver thereof nor will any single or partial exercise of any right, power or privilege hereunder preclude further exercise of the same right, power or privilege.

**VALIDITY OF PROVISIONS**

In the event any provision or any part or portion of any provision of these Terms and Conditions shall be held to be invalid, void or otherwise unenforceable, such holding shall not affect the remaining part or portions of that provision, or any other provision hereof.

**SUSPENSION**

If Buyer fails to make any payment when due or to perform on time any of its other obligations under this contract Seller shall be entitled to suspend performance of the contract until the failure is remedied.

**ASSIGNMENT**

Buyer shall not be entitled to cede, transfer and/or assign any of its rights or delegate any of its obligations under this contract, without the prior written consent of Seller. Seller may cede, transfer and/or assign its rights or delegate any of its obligations under this contract without the prior approval of the Buyer.

**TERMINATION**

Seller shall be entitled to terminate the quote, purchase order or other agreement to which these Terms and Conditions form a part in the event Buyer is in breach of any of its obligations hereunder and fails to remedy the breach within fifteen (15) days after receiving written notification thereof from Seller or if Buyer goes into liquidation, receivership, administration or makes any voluntary arrangement with any of its creditors. Any party may terminate the agreement with immediate effect if the other party is in material breach of the agreement. Any termination of the contract in accordance with the terms hereof shall become effective upon service of a written notice of termination on the other party. Upon termination, howsoever arising, Seller shall be entitled forthwith to suspend any further deliveries under the contract without any liability to Buyer. Within 14 days of such a notice of termination, howsoever arising, Buyer shall pay to Seller:

- the outstanding balance of the contract price for products which have been delivered and for those products which are then capable of being delivered, and
- the costs incurred or committed by Seller up to the date of notice of termination in performing work on products which are not then in a deliverable state plus a reasonable margin to be agreed between the parties which shall not be less than 15%, and
- the costs reasonably incurred by Seller as a result of the termination.

**COMPLIANCE**

**(1) No Improper Means of Obtaining Business.** The Seller and the Buyer intend that no payments or transfers of value shall be made which have the purpose or effect of public or commercial bribery, acceptance of or acquiescence in extortion or kickbacks, or other unlawful or improper means of obtaining business. **(2) No Bribes.** The Buyer will not, directly or indirectly, pay, offer, authorize or promise any monies or anything of value (such as gifts, contributions, travel, or entertainment) to any person or organization (including any employee or official of any governmental authority, government owned or controlled entity, public international organization or political party; any candidate for political office; or any employees of any of the Buyer's or the Seller's customers) for the purpose of improperly influencing their acts or decisions in violation of any antibribery or anti-corruption laws, including the United States International Corrupt Practices Act, laws under the OECD Anti-Bribery Convention and local anti-corruption laws (collectively, "**Anti-Corruption Laws**"). The Buyer will take appropriate actions to ensure that any person representing or acting under its instruction or control ("**Buyer's Agents**") will also comply with this Section. **(3) No Kickbacks.** No part of the payment of any amounts payable under this Agreement will be distributed to the Seller, its affiliates or customers, or any of its employees or their family members. **(4) No Conflicts.** Except as disclosed in writing to the Seller (in a questionnaire response or otherwise), the Buyer represents that it does not have any reason to believe that there are any potential conflicts of interest regarding its relationship with the Seller, such as family members who could potentially benefit from the commercial relationship established by this Agreement; and neither the Buyer, nor any of the Buyer's Agents, have any family members who are government officials or political party candidates in a position to influence the Buyer's commercial relationship with the Seller. **(5) Accurate Books and Records.** The Buyer will maintain complete and accurate books and records regarding its transactions with Seller. **(6) Notification.** The Buyer will notify the Seller promptly if (a) the Buyer or any of the Buyer's Agents have reason to believe that a breach of this Section has occurred or is likely to occur; or (b) if any conflicts of interest arise after the signing of this Agreement, including if any of the Buyer's Agents or their family members become a government official or political party candidate in a position to influence the Buyer's commercial relationship with the Seller. The Buyer will send all such notices to ethics@pentair.com or to such other location as the Seller may designate in writing. **(7) Compliance Certification.** The Buyer will, when and as may be requested by the Seller from time to time, provide to the Seller a written certification in form and substance satisfactory to the Seller that the Buyer is in compliance with this Section. **(8) No Payments for Improper Activities.** The Seller will not be required under any circumstances to take any action or make any payments that the Seller believes, in good faith, would cause it or its affiliated companies to be in violation of any Anti-Corruption Laws. If the Seller at any time believes, in good faith, that a breach of any of the representations and warranties in this Section has occurred or may occur, the Seller may withhold any

commission, compensation, reimbursement, or other payment until such time as the Seller has received confirmation to its reasonable satisfaction that no breach has occurred or will occur. The Seller shall not be liable to the Buyer for any claim, losses, or damages whatsoever related to the Seller's decision to withhold any commission, compensation, reimbursement, or other payment under this provision. **(9) Audit Rights.** If the Seller at any time believes, in good faith, that the Buyer has breached the warranties, representations or agreements in this Section, then the Seller will have the right to audit the Buyer's books and records related to this Agreement in order to verify the Buyer's compliance with the provisions of this Section. The audit will be performed by individuals selected by the Seller. However, upon request by the Buyer, the Seller will select in its sole discretion an independent third party to conduct an audit in order to certify to the Seller that no breach has occurred or will occur. The Buyer will fully cooperate in any audit conducted by or on behalf of the Seller. **(10) Termination Rights.** Any breach of the warranties, representations or agreements in this Section will constitute grounds for immediate termination of this Agreement for cause by the Seller and no commission, compensation, reimbursement or other payment will be due to the Buyer. The Buyer will indemnify and hold the Seller harmless against any actions, legal claims, demands, proceedings, losses, damages, costs, expenses and other liabilities of whatever nature resulting from the Buyer's breach of the representations, warranties and agreements contained in this Section. **(11) Data Privacy Consent.** The Buyer consents to the collection, processing and international transfer of data and information related to the business relationship between it and the Seller, including the transfer of personally identifiable data (for example names, email addresses, telephone numbers) to and between the Seller and its affiliates wherever they may be located, for the purposes of allowing the Seller and its affiliates to evaluate the Buyer's experience and qualifications and implement any business. The Buyer has the right to: (a) request access to this data; (b) rectify or cancel any inaccurate or expired data; and (c) object to any processing that does not conform to these purposes. The Buyer may exercise its rights by writing to the Seller at ethics@pentair.com or to such other location as the Seller may designate.

# PAESWATER.COM LIVE EVENTS

## CHECK OUT PAES W.A.T.E.R. LIVE EVENTS AT PAESWATER.COM

An additional highlight of PAESWATER.com includes the ability to access live streaming cameras with views of fish in the multiple systems. The video connectivity component will also be host to future live events and educational demonstrations. With research and education as the focus of this facility, the website will also provide visitors real-time information from the monitoring systems, including Dissolved Oxygen, ORP, Conductivity, pH and Temperature statistics.

In the past year we experienced the first fish harvest at PAES W.A.T.E.R. and streamed it live on our website! A team of Pentair employees worked diligently to ensure complete success on this project. In total, 10,564 lbs. of tilapia were transferred from Pentair's indoor Recirculating Aquaculture System (RAS) to tanks on the live fish hauling truck. When the truck arrived, the first hour was spent loading clean water into the hauling tanks to ensure the fish had a healthy environment while being transported.

Fish were harvested from the tanks with seafood baskets and transferred to the truck in tanks of water, important in maintaining product quality, keeping them calm to reduce damage and loss of scales on themselves or other fish being transferred. This cohort of fish, the first grow-out from the PAES W.A.T.E.R. facility, was grown for 242 days from fingerlings of 0.73 grams to approximately 682 grams (1.5 pounds) each. They were then held on a maintenance diet – a technique where fish are fed an amount which keeps them healthy but does not encourage growth. The survival rate of this cohort was much higher than anticipated. Initial planning, purchasing, and stocking numbers anticipated a ten percent mortality rate during the overall growout period; our mortality rate, however, was just over one percent.

This sort of activity is exactly what we want people to experience on PAESWATER.com or in person at one of our many training courses held throughout the year. Training and education are important focal points for Pentair AES at PAES W.A.T.E.R. In the past year we have held multiple workshops, both English and Spanish-language, at the facility. It is perfect for live demonstration of equipment and techniques, as well as providing hands-on experience in RAS operations and systems management in extended sessions.

For more information, visit [PAESWATER.com](http://PAESWATER.com)



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