



ELOXIRAS

Electrochemical Oxidation in the Recirculating
Aquaculture Systems Industry





THE COMPANY

Introduction

In APRIA Systems our main objective is to offer **innovative alternatives for the chemical and related industries**, providing to our clients bespoke solutions to fulfil the environmental regulations.



INNOVATIVE SME

Valid until Nov 20th 2021



- SME innovative company founded in 2006 as a spin-off from R&D projects managed by the University of Cantabria.
- Activity strongly influenced by R&D actions.
- Highly specialized human resources.

Location

APRIA Systems S.L.

Parque Empresarial de Morero

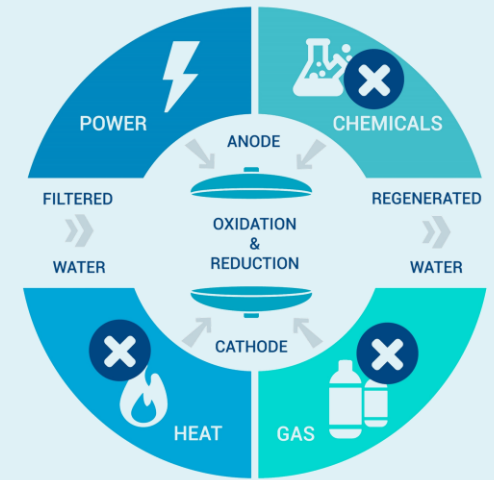
Parcela P.2-12, Nave 1 - Puerta 5

39611 Guarnizo, Cantabria, Spain





ELOXIRAS® is an innovative process for the treatment and reuse of marine and brackish water, developed to enhance the productivity and to reduce the environmental impact of recirculating aquaculture systems (RAS).



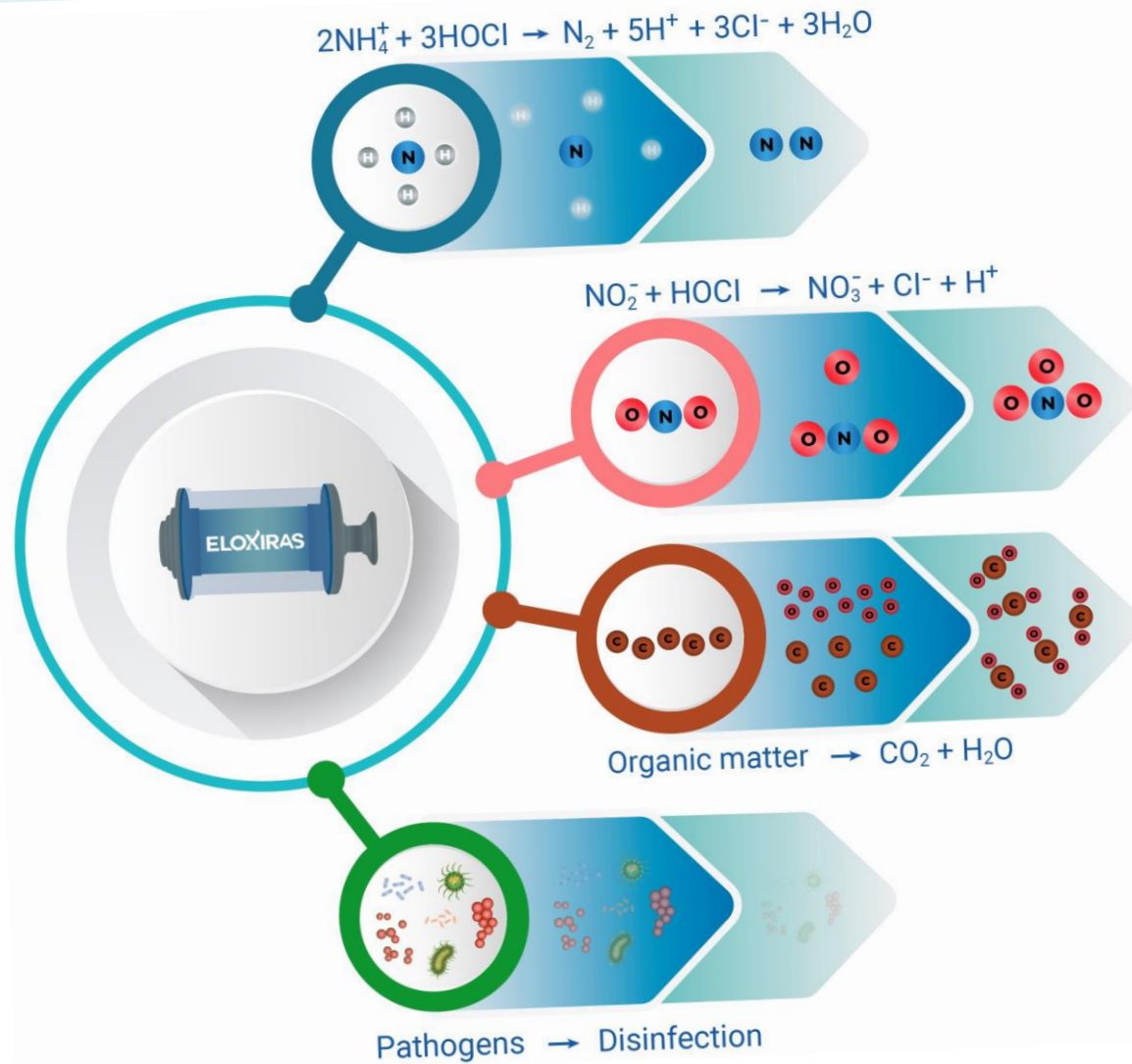
Based on the electrochemical oxidation technology, it only requires an electrical potential between two electrodes in water.

INTRODUCTION

POLLUTANT	CONVENTIONAL TREATMENTS	ELOXIRAS®
TAN	Moderate	Excellent
Nitrite	Moderate	High
Organic matter	Low	High
Pathogens	No removal	Excellent

High removal rates of contaminants are achieved, such as total ammonia nitrogen (TAN), nitrite and dissolved organic matter, together with high disinfectant efficacy.

Main reactions



Features and benefits



High efficacy

Removal of high concern pollutants, even bacteria and viruses, contributing to increase RAS capacity and productivity in a cost-effective way.



Reduced environmental impact

The impact of the RAS system is minimized due to lower water exchange requirements with the surrounding media.



Efficient energy process

Adaptable to optimize energy through a fine tune-up of the treatment intensity to the daily change of the pollutant production rate.



Compact design

Allowing to save investment costs and to maximize the integration possibilities (logistic applications in trucks and well-boats).



Easy automatization

Possibility of including a control system with remote alert procedures and supervision of the system condition and operation.



Easy to operate

Allowing to reach 100% of performance without start-up and adapting periods typical of the biological systems.



Modular and easy to scale-up

Allowing to increase treatment capacity with the maximum simplicity and the minimum investment cost.



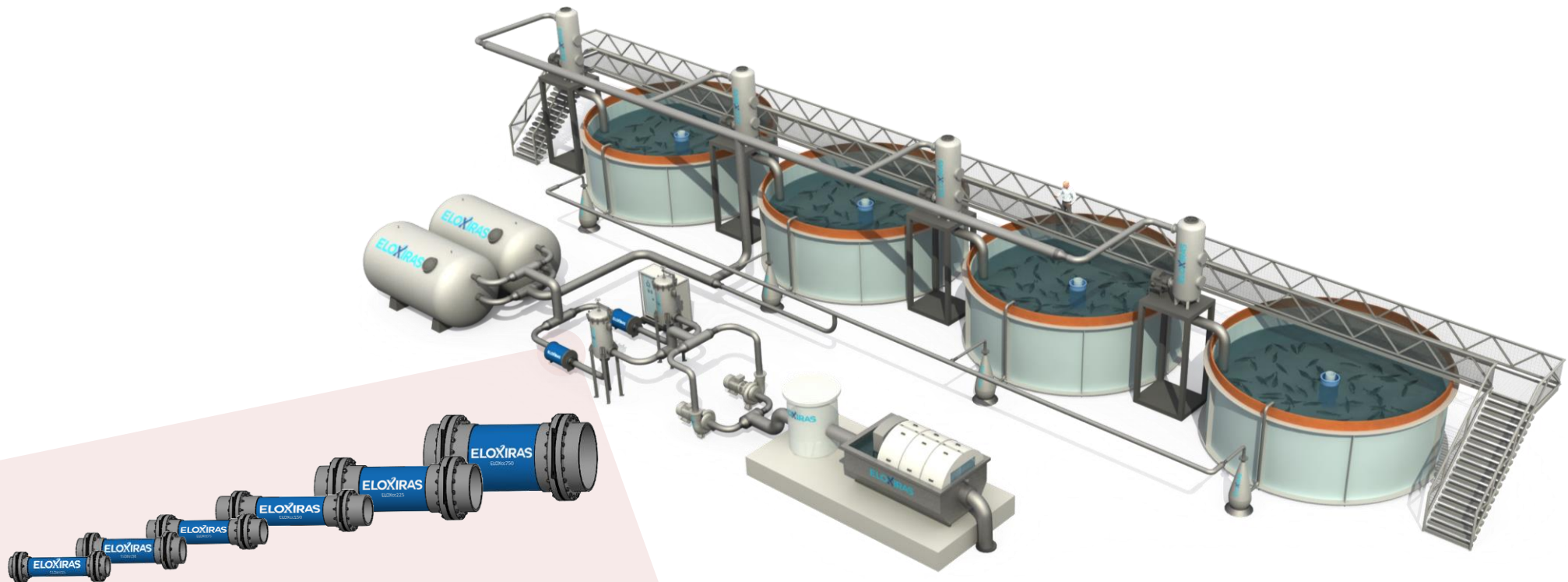
Safe process

High safety for the farmed species, ideal for isolated applications as quarantine and bio-security.



Stages of the treatment

- 1 Pre-treatment by filtration of the water.
- 2 Main treatment by means of electrochemical oxidation reactors for the removal of ammonia, nitrite, organic matter, and pathogens.
- 3 Post-treatment for the elimination of oxidation by-products and the balance of gases.



ELOXIRAS® has a vast range of standard models, allowing to cover a wide range of treatment capacities.

[ELOXIRAS® 3D video](#)





ELOXIRAS® is commercialized in several standardized models, based on its market application, its treatment capacity, and its functionalities, thus, offering the clients the possibility of make up a customized product adapted to the specific needs of their RAS system.



🔗 Nomenclature of the models

MODELS

ELOXIRAS® (1)-(2)-(3)

- 1 Market applications
MINI, HYBRID, LOGISTIC, and BIO.
- 2 Maximum treatment capacity
30, 150, 300, 600, 1500, 3000, etc.
- 3 Functionalities
Concept, Basic, Comfort, and 4.0.

Market applications

HYBRID Series

Ideal for new or existing **large RAS facilities**. It contributes to the increase of current production capacity, as well as to the decrease of water use.

MINI Series

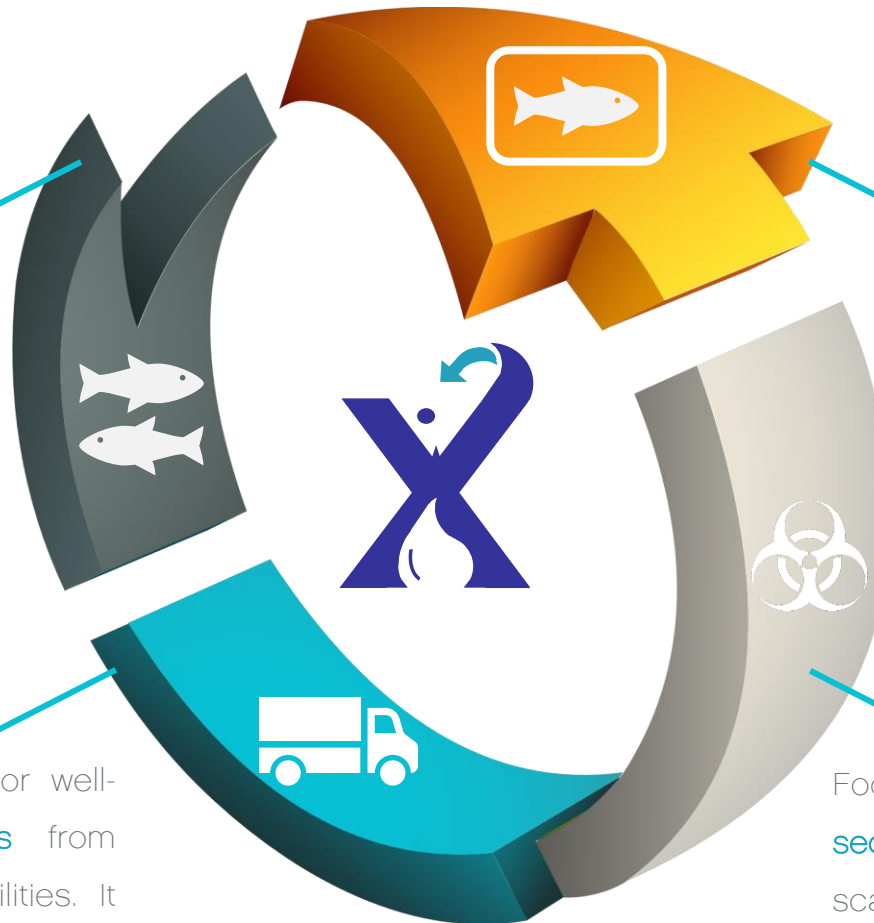
For **small scale RAS facilities**. It offers compactness and adaptable treatment capacity.

LOGISTIC Series

Focused on typical truck or well-boat **transport operations** from hatcheries to growing facilities. It offers major autonomy for long distances and larger biomass capacity thanks to its compact design.

BIO Series

Focused on **quarantine and bio-security facilities** for any RAS scale. It offers an enhanced control of pathogens due to the disinfection capabilities, also contributing to achieve high isolation levels.



Functionalities

CONCEPT

Main technological solution.

BASIC













































System controlled manually.

COMFORT

Fully automated.

4.0

Remote control via web browser.

	ELOXIRAS® Concept	ELOXIRAS® Basic	ELOXIRAS® Comfort	ELOXIRAS® 4.0
Pre-treatment	-			
Buffer tank	-			
Feed pump	-			
Reactor				
Rectifier				
Reactor cleaning system				
Post-treatment				
Electrical control cabinet				
PLC	-	-		
Manual valves				
Automatic valves	-	-		
Compressed air system	-	-		
ORP continuous monitoring	-	Optional	Optional	
pH continuous monitoring	-	Optional	Optional	
TAN continuous monitoring	-	Optional	Optional	Optional
Total chlorine continuous monitoring	-	Optional	Optional	
Temperature control system	-	Optional	Optional	Optional
Oxygenation system	-	Optional	Optional	Optional
Consumption analysis	-	-	-	
Remote monitoring & operation*	-	-	-	
System for protection against moisture and splash	Optional	Optional	Optional	Optional

* Software license not included.

Additional features of ELOXIRAS® 4.0



Remote control of ELOXIRAS® via web browser (smartphone, tablet, and PC): recirculation flow control, cleaning procedures, etc.



Continuous monitoring and registration of the instrumentation displayed.



It allows analyzing the information by means of graphical analysis tools, reports, correlations, maps and synoptics, all of them extensible by the user.



Our remote management application allows to obtain the graphs of any of the parameters measured in different time spaces: hours, days, weeks, etc.



Intelligent control, optimizing the elimination of TAN.



Predictions of the system behavior, allowing to manage an effective preventive maintenance.



Optimization of the energy consumption and its cost.



Sending notifications to the client: high values of pollutants concentration, emergency stop, failures, etc.



Available standardized models

MINI series

Model		Tank volume (m³)	Max. treatment capacity (kg feed/day)	Recirculation flowrate (m³/h)	Pre-treatment	Main treatment	Post-treatment
ELOXIRAS® MINI-30	Concept	1	0.5	1 – 2	-	1 x ELOXrc2 reactor	GAC-Filter
	Basic				Skimmer + AGFM filter		GAC-Filter + Degasser
	Comfort						
	4.0		1				
ELOXIRAS® MINI-150	Concept	5	2.5	5 – 10	-	1 x ELOXrc15 reactor	GAC-Filter
	Basic				Skimmer + AGFM filter		GAC-Filter + Degasser
	Comfort						
	4.0		5				
ELOXIRAS® MINI-300	Concept	10	5	10 – 20	-	1 x ELOXrc15 reactor	GAC-Filter
	Basic				Skimmer + AGFM filter		GAC-Filter + Degasser
	Comfort				Drum filter + skimmer + AGFM filter		
	4.0		15				
ELOXIRAS® MINI-600	Concept	20	10	20 – 40	-	1 x ELOXrc38 reactor	GAC-Filter
	Basic				Skimmer + AGFM filter		GAC-Filter + Degasser
	Comfort				Drum filter + skimmer + AGFM filter		
	4.0		30				

HYBRID series

Model		Tank volume (m³)	Max. treatment capacity (kg feed/day)	Recirculation flowrate (m³/h)	Pre-treatment	Main treatment	Post-treatment
ELOXIRAS® HYBRID-1500	Concept	50	25	50 – 100	-	2 x ELOXcc75 reactor	GAC-Filter
	4.0		50		Drum filter + skimmer + AGFM filter		GAC-Filter + Degasser
ELOXIRAS® HYBRID-3000	Concept	100	50	100 – 200	-	2 x ELOXcc150 reactor	GAC-Filter
	4.0		100		Drum filter + skimmer + AGFM filter		GAC-Filter + Degasser
ELOXIRAS® HYBRID-6000	Concept	200	100	200 – 400	-	2 x ELOXcc225 reactor	GAC-Filter
	4.0		200		Drum filter + skimmer + AGFM filter		GAC-Filter + Degasser
ELOXIRAS® HYBRID-12000	Concept	400	200	400 – 800	-	4 x ELOXcc225 reactor	GAC-Filter
	4.0		400		Drum filter + skimmer + AGFM filter		GAC-Filter + Degasser
ELOXIRAS® HYBRID-18000	Concept	600	300	600 – 1,200	-	2 x ELOXcc750 reactor	GAC-Filter
	4.0		600		Drum filter + skimmer + AGFM filter		GAC-Filter + Degasser

Equipment references

ELOXIRAS® MINI-300-4.0, Rodecan, Cantabria, Spain.



Characteristics

- Cultivated specie: turbot.
- Culture tanks: two units ($V_{\text{total}} = 8 \text{ m}^3$).
- Maximum treatment capacity: $20 \text{ m}^3/\text{h}$.
- Continuous online measurement of pH, temperature, O_2 , total Cl_2 , and TAN.
- PLC cabinet.
- Control systems of the energy consumption.
- Remote control via web browser.

ELOXIRAS® MINI-600-4.0, Instituto de Investigación y Tecnología Agroalimentarias (IRTA), Tarragona, Spain.



Characteristics

- Cultivated species: sea bream and sea bass.
- Culture tanks: two units ($V_{\text{total}} = 20 \text{ m}^3$).
- Maximum treatment capacity: $50 \text{ m}^3/\text{h}$.
- Continuous online measurement of pH, temperature, O_2 , total Cl_2 , and TAN.
- PLC cabinet.
- Control systems of the energy consumption.
- Remote control via web browser.



COMPLEMENTARY SERVICES

Previous consulting

APRIA Systems performs studies to define the ELOXIRAS[®] model that best suits to the specific requirements of the client.

Funding advice

We review and evaluate funding opportunities, present at regional, national, and European level, that allow our clients to implement ELOXIRAS[®].

Technological advice

Some clients may need a specific ELOXIRAS[®] equipment not included in the brochure. In this case, our team of engineers evaluates the best solution, defining an equipment tailored to the needs of their RAS system.

Installation and start-up

Upon request, we carry out the installation and start-up of the equipment.

Specialized training

Specialized training for the operation of ELOXIRAS[®] is available. In addition, for the models that include 4.0 functionalities, specific training for the remote management application is offered.

Maintenance support

An annual maintenance pack for the electrochemical reactors is available.

Remote control

For models with 4.0. An expert of our team supervises the correct functioning of ELOXIRAS[®]. The client receives reports about the operation state of the equipment: pollutants evolution, energy consumption, etc.



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