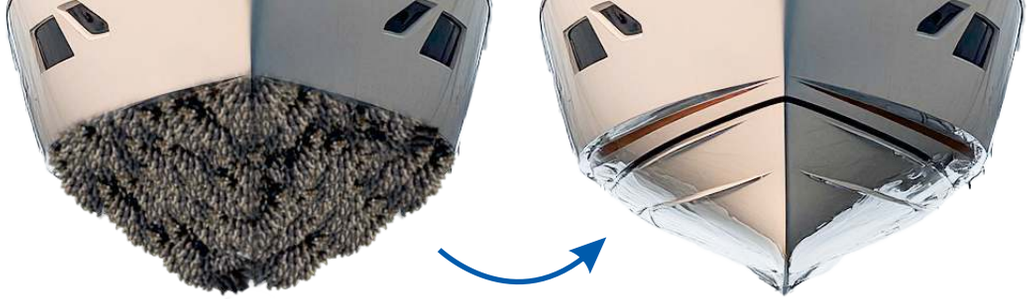
SEAFLO®

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SEAFLO®



Ultrasonic Defense System

Installation & Operation Guide

SEAFLO

Ultrasonic Defense System



SFUAS1-01



SFUAS1-02

The SEAFLO Ultrasonic Defense System provides comprehensive, adaptable, and dependable protection against marine fouling for hulls, drives, and other vulnerable parts of a boat.

12.7V-18.0V	12.0V-12.6V	BELOW 12.0V	15Ft (4.6m)
Full Power Output Range	Reduced Power Range	Sleep/idle Range	Wire Length

Continuous Protection
Ultrasonic Defense System operate around the clock, efficiently repelling most types of marine fouling.

Simple Installation
Installation is simple and straight forward and does not require specialist knowledge.

Save Time & Money
Reduce costs and time spent on haul-outs, bottom painting, and abrasive cleaning.

Boost Performance
A clean hull reduces drag, enhances fuel efficiency, and increases top-end speed.

Eco-Friendly
Replacing conventional toxic bottom paints and pollutants is kinder to marine life and reduces environmental impact.

Enhance Resale Value
Boats equipped with automated antifouling systems tend to have a higher resale value.

Using the SEAFLO Ultrasonic Defense System, enjoy around-the-clock antifouling protection. This system harnesses the power of ultrasound to keep the hull and propulsion system clean. Our fully automated solution provides continuous protection 24/7, giving you peace of mind.

SEAFLO



SFUAS1-03



Color Box

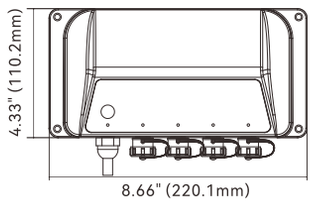
Technical parameters

Model	Volts	Number of Transducers	Number of Signal Cables	Number of Signal Cable Extensions	Frequency Range	Wire Length
SFUAS1-01	12 V	1	1	N/A	20 kHz to 45 kHz	15 ft
SFUAS1-02	12 V	2	2	N/A	20 kHz to 45 kHz	15 ft
SFUAS1-03	12 V	4	4	2	20 kHz to 45 kHz	15 ft

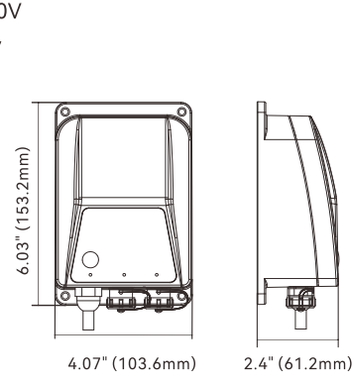
The SEAFLO Ultrasonic Defense System consists of a control unit that operates at 12V, equipped with one, two, or four transducers that transmit ultrasound to the hull and its protected surfaces. The controller has an IP67 protection rating, while the transducers have an IP68 protection rating.

Operating settings

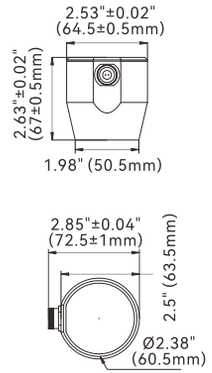
Full power output range: 12.7V to 18.0V
Reduced power range: 12.0V to 12.6V
Sleep/idle range: below 12.0V



SFUAS1-03



SFUAS1-01 / SFUAS1-02



The Problem

Marine biofouling has multiple impacts on vessels, including:

Reduced Fuel Efficiency:

The accumulation of fouling increases the hull's hydrodynamic resistance, causing the engine to consume more fuel to maintain speed, thereby reducing fuel efficiency.

Frequent Maintenance and Cleaning Costs:

Regularly cleaning the hull to remove fouling requires significant manpower and resources, increasing maintenance costs.

Wear on Bottom Paint and Coatings:

Fouling can lead to excessive wear on bottom paint and coatings, shortening their lifespan and necessitating more frequent repainting, which raises maintenance costs.

Increased Transportation Costs:

Frequent hauling and cleaning are required, which increases transportation and docking costs.

Environmental Impact:

The paint and fouling removed during abrasive cleaning processes can pollute waterways, negatively affecting marine ecosystems.

Hull Structural Damage:

Long-term fouling can cause corrosion or damage to hull materials, compromising the safety and longevity of the vessel.

Legal and Compliance Issues:

Toxic bottom paints and abrasive cleaning can harm the environment, and stricter environmental regulations are emerging in many areas. The maritime industry is seeking more effective methods to prevent marine biofouling on vessels and equipment.





The Solution

The SEAFLO Ultrasonic Defense System actively removes marine fouling before it attaches, providing 24/7 protection. By continuously emitting sound wave pulses, it reduces the attachment of marine fouling, enhancing vessel performance and fuel efficiency.

Additionally, the ultrasonic technology extends the lifespan of bottom paint, prolongs the cleaning intervals for the hull, and decreases the frequency of diver cleaning, significantly reducing maintenance costs. At the same time, it effectively minimizes the impact of abrasive paints and other chemicals on marine ecosystems.

How It Works

The SEAFLO Ultrasonic Defense System emits sound wave pulses at frequencies ranging from 20 kHz to 45 kHz, physically repelling aquatic organisms, such as algae and barnacles. The vibrations and pressure changes generated by these sound waves affect the organisms in the water, preventing them from stabilizing and adhering to the hull or other surfaces. This effectively reduces biofouling and disrupts the breeding and spreading abilities of the fouling organisms on the protected surfaces, thereby minimizing the accumulation of fouling and maintaining surface cleanliness.



Cost Effect

The Ultrasonic Defense System can remove fouling before it attaches, reducing the frequency of cleaning by divers, protecting the antifouling paint, and extending the lifespan of the coatings. Therefore, this system not only saves costs associated with divers but also reduces additional expenses related to the application of new antifouling paint, including shipping fees, shipyard charges, paint materials costs, hazardous waste disposal fees, and labor costs.

Cost Reduction:

The Ultrasonic Defense System extends the cleaning cycle of the hull, reducing the frequency of cleaning and maintenance, which significantly lowers expenses.

Savings on Transportation:

By decreasing the frequency of towing and cleaning, it further reduces transportation and docking costs.

Coating Protection:

Effectively prevents fouling, extends the lifespan of the antifouling paint and coatings, and reduces the need for reapplication.

Hull Protection:

Minimizes fouling, lowers the risk of corrosion and damage, and extends the lifespan of the vessel.

Improved Fuel Efficiency:

By reducing fouling attachment, it decreases water resistance, enhances fuel efficiency, and saves fuel.

By adopting the Ultrasonic Defense System, the economic and performance efficiency of the vessel can be significantly enhanced, ensuring excellent performance in various environments.

The Ultrasonic Defense System for the 50-foot cruiser pays for itself within a year and is expected to save approximately $5,000 in maintenance costs each year.





Eco-friendly

Traditional antifouling coatings often contain biocides, which are designed to slowly release into the ocean to prevent the attachment of organisms. However, this release can potentially pollute the environment, impacting both target organisms and other marine life.

Ultrasonic Antifouling Technology - Chemical-Free, Pollution-Free

(1) The Ultrasonic Defense System physically prevents the formation of fouling and biofilms by utilizing ultrasound. It disrupts the growth environment of target microorganisms without the need for chemical biocides or toxins, thus avoiding marine pollution.

(2) This system effectively prevents hull fouling, extends the lifespan of the underlying paint, and reduces the frequency of abrasive cleaning and repainting, further mitigating the risk of environmental pollution. Additionally, it can be used in conjunction with biocide-free coatings, significantly enhancing both environmental protection and antifouling efficacy.

(3) Through precise control of sound wave frequencies, the ultrasonic system minimizes its impact on water bodies and organisms, reducing harm to non-target species.

(4) The ultrasonic antifouling equipment is designed for high efficiency, operating at low energy consumption, thereby reducing overall carbon emissions.

Easy Installation

The SEAFLO Ultrasonic Defense System is user-friendly and designed for quick installation, typically completed within a day without the need for specialized skills. The installation process only requires securing the transducer with epoxy resin and connecting it to the controller via a signal cable. SEAFLO cables are equipped with waterproof connectors on both ends, compact and flexible, making them suitable for wiring in tight spaces.

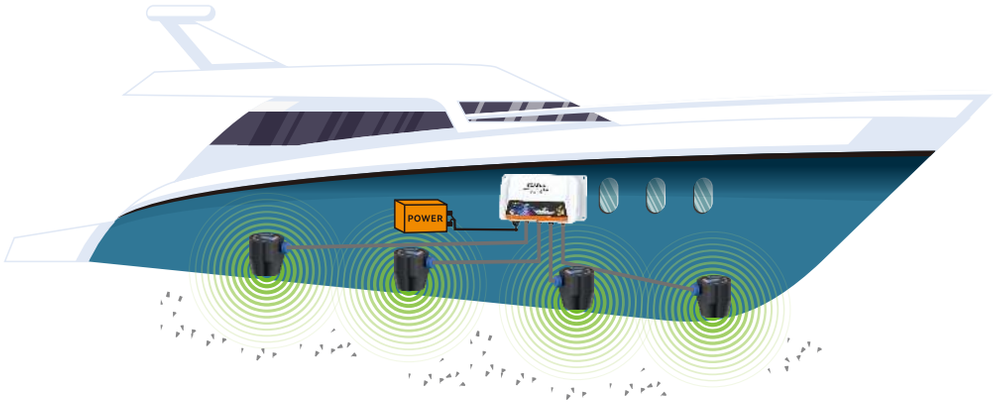






J-B Weld Marine Epoxy
is recommended.

The transducer has an IP68 waterproof rating, making it suitable for both wet and submerged environments. Under specific conditions, the transducer can also be placed externally, such as on floating docks and external connections, including in restricted areas like bilge passages.



Protected Area

Each transducer provides coverage for approximately 200 square feet (18.58 square meters) of protected underwater surface area.

	20ft	30ft	40ft	50ft	65ft
Mono hull	Less than 20' 1x transducer	20' to 30' 2x transducers	30' to 40' 3x transducers	40' to 50' 4x transducers	50' to 65' 6x transducer

	34ft	50ft	65ft
Catamaran	Up to 34' 2x Transducers	34' to 50' 4x Transducers	50' to 65' 6x Transducers

Hull Protection

Ultrasound will repel fouling on any type of hull and are compatible with most materials, regardless of the hull's shape or geometric features. As long as the hull material is dense, sound waves can propagate across the entire surface.

Hull Types:



Monohulls



Catamarans



Sailing



Keel



Pontoon

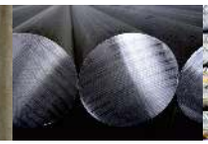


Barge

Hull Materials:



Fiberglass



Aluminum



Steel



Carbon fiber

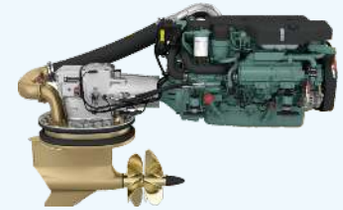


Kevlar

Please note: The SEAFLO Ultrasonic Defense System will not work on boats with wooden or plastic hulls.

Drive Protection

The SEAFLO Ultrasonic Defense System not only targets the hull but also effectively protects your drive system. The drive system is isolated from the hull by materials such as motor mounts, gaskets, and seals, which can impede the transmission of ultrasonic signals to the shaft and propeller. Therefore, specialized transducers are needed to ensure effective protection of the drive system. Regardless of whether it is an inboard engine, outboard drive, stern drive, or sailboat drive, corresponding transducers can be installed for comprehensive protection. Additionally, the isolation of the rudder from the hull is similar, so specialized transducers are also required to ensure effective antifouling.



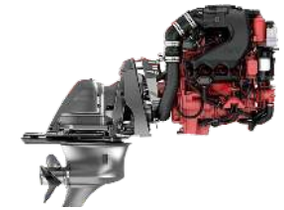
Pods
One transducer per drive



Inboards
Two transducers per drive
(one for each propeller and one for each rudder)



Sail-Drives
Two transducers per drive
(one for each propeller and one for each rudder)



Sterndrive
One transducer per drive

Comprehensive Protection

No matter if your vessel uses shaft drive, pod design, or features a keel structure on a catamaran, made from fiberglass, steel, or aluminum alloy, the SEAFLO Ultrasonic Defense System can meet your diverse needs. By choosing the SEAFLO Ultrasonic Defense System, you will achieve comprehensive protection, helping ensure your vessel maintains optimal performance in various water conditions.

This includes protection for inboards, pods, sail drives, rudders, trim tabs, parts, and more, providing all-around defense for your entire vessel.





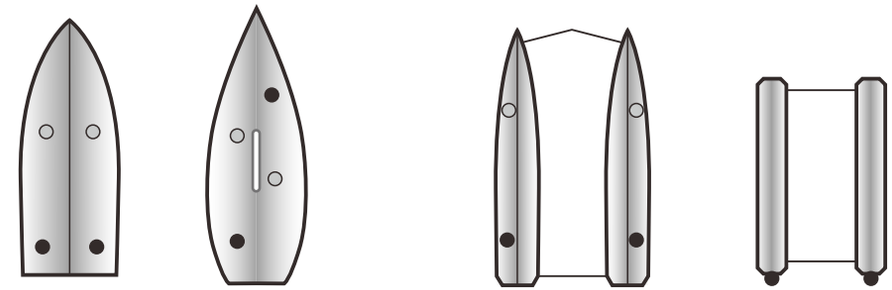
Hull Installation Location

The SEAFLO ultrasonic transducers are typically installed inside the hull below the waterline, with the placement chosen to maximize efficiency and ensure uniform coverage. With proper installation, the system can deliver outstanding antifouling results. The specific location of the transducers should be adjusted based on the shape, size, and required number of transducers of the hull to achieve optimal performance.

These images provide basic guidance for transducer placement. Your final choice of location will depend on the available space in these areas.

● Installation of Two (2) Transducers

● ○ Installation of Four (4) Transducers



Optional External transom and pontoon attachment

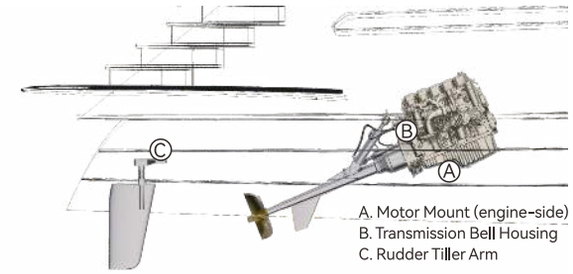
The Ultrasonic Defense System transducers can be submerged underwater and installed on the external surfaces of the hull. This is required for pontoon boats. Exterior attachment can also be an ideal location for cored-hull boats under 32 feet.

For exterior attachment on monohull transoms, two transducers are attached to the transom below the water - one per side.

For exterior attachment on pontoons, one transducer is attached to the rear face of each pontoon below the water.

Drive & Accessory Attachment Locations

The drive system and other peripheral components (such as rudders, swim platforms, and trim tabs) are isolated from the hull using sound-dampening materials. Due to this isolation, each component requires a dedicated ultrasonic transducer for protection.



For straight drive shafts and props, transducers can be installed on the engine side of the engine mount (Position A) or directly on the transmission bell housing (Position B). The rudder is also isolated from the hull and requires a specialized transducer. A transducer can be directly connected to the tiller arm/quadrant (Position C). Ensure that the transducer does not interfere with the rotation of the tiller/quadrant.

For pod drives, one transducer is required for each pod, which should be attached directly to the hydraulic gearbox on the pod.
For stern drives, each drive requires one transducer, which is directly mounted on the engine/transmission or motor bracket.
For sail-driven propeller attachments, one transducer is required, mounted directly on the gearbox of the vertical intermediate shaft.

Installation

The Ultrasonic Defense System works by preventing fouling from attaching to surfaces. Existing fouling that has accumulated prior to the installation of the Ultrasonic Defense System must be removed. Even if the surface appears clean, microscopic fouling can adhere to it and later become visible.
The Ultrasonic Defense System can operate 24/7. To ensure your Ultrasonic Defense System provides continuous protection, your battery system must be properly maintained and charged. Power can be supplied via a standard battery maintainer or a dedicated shore-power connection. Alternative power sources, such as solar and wind energy, are also viable options, but additional precautions may be needed to minimize downtime when using them.

Controller Installation

The Ultrasonic Defense System controller provides the necessary power and signals to operate the ultrasonic transducers.
Place the controller in a location where it can access a 12-volt DC power source and facilitate cable routing. The power line can be extended using 16-gauge twin-core wire.
Ensure the controller is installed in a location where all transducer cables can connect.
The controller should be mounted above the waterline.
The controller module features a flanged design with holes, facilitating various installations using fasteners.. Before drilling, ensure there are no cables or pipes on the other side.
When connecting to power, make sure the controller is in the off position.
Connect the black wire to the negative terminal of the battery and the red wire to the positive terminal.
The controller includes a built-in fuse.





Transducer Installation Steps

The transducers must be directly attached to the hull. Most vessels have composite stringer and bulkhead systems that provide structural support for the hull and deck. Since composite materials typically do not have good ultrasonic conductivity, it is advisable to avoid installing transducers in these materials or locations. Ultrasound can only propagate through solid or dense materials and cannot be transmitted through porous materials such as wood, foam, and air.

Remove all paint from metallic surfaces at the bonding locations.
Expose bare metal at all mounting locations.
Sand and clean the base of the transducer prior to applying the epoxy.
Have all tools and clamps prepared and ready before starting.

The placement of the transducer is crucial; the better the chosen location, the more effective the results will be.



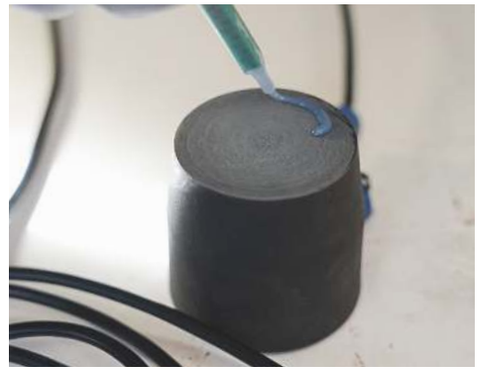
1. Identify a suitable location for mounting the transducer, ensuring it is installed on a solid and flat area where 100% of the transducer's mounting surface contacts the hull.



2. Use sandpaper to remove paint, dirt, grease, and other contaminants from the bonding surface, ensuring it is clean. Some mounting surfaces may contain materials that are unsuitable for ultrasonic transmission, such as faux bottom panels, so these materials need to be thoroughly cleared.



3. Sand the base of the transducer to expose fresh material, and remove sanding dust before cleaning the surface again.



4. Mix equal parts of A and B epoxy resin on a disposable mixing surface, stirring thoroughly until a uniform consistency is achieved. Ensure that you prepare enough to cover the transducer's base. J-B Weld Marine Epoxy is recommended.



5. Apply a generous amount of adhesive to the transducer, ensuring an even and sufficiently thick coverage over the entire surface.



6. Immediately place the transducer in the designated position after applying the adhesive (the adhesive will set quickly). You can gently apply downward pressure to ensure even contact between the base and the surface, avoiding gaps and bubbles at the bonding surface.



7. Secure the transducer using tape or clamps.



8. Allow the epoxy resin to cure for 24 hours, and do not disturb the transducer during the curing process.

Connecting the Transducer to the Controller

Use the cable to connect the transducer to the controller. Insert the waterproof connector at the end of the cable into the input ports on the transducer and controller, then rotate the blue locking ring clockwise to secure the connection. Do not overtighten! If you need a longer cable, please contact us to purchase.



Operation and Maintenance

Your new Ultrasonic Defense System is designed for fully automatic operation and provides maintenance-free functionality. After connecting all signal wires to the controller, you can power on the system and start using ultrasonic protection for your vessel.
After connecting the power, press the button to turn on the device, and the power indicator will remain solid green. Press the button again to turn off the device, and the power indicator will turn off.



Auto Calibration

When the system is first powered on, an initial calibration will begin to fine tune and customize the output of the transducer. During this process, the LED indicator will remain solid green. After the initial calibration, the system will recalibrate approximately every 6 hours to ensure the transducer receives an optimal signal.

Automatic Operation

After calibration, the system will enter an automatic program that will transmit a unique pattern of ultrasonic signals to each transducer. The transducers operate in sequence. When a transducer is active, the corresponding LED indicator will light up green. If one or more of the indicators do not light up, a fault is detected—see FAULT EVENTS below.



Power Saving Mode

Under normal conditions (when docked or underway), vessels equipped with maintenance batteries will maintain a charge above 12.7V. However, if the controller detects that the battery is running low, it will begin to conserve power by increasing the time interval between ultrasonic pulses. Power saving starts at 12.6V. If the voltage level continues to drop, the Ultrasonic Defense System will further increase the time interval between pulses at a linear rate to conserve power.

Low Battery Indicator

When the battery voltage drops below 12.0V, the system will enter a standby sleep mode to conserve battery power for other essential boating operations. When the battery voltage rises above 12.2V, the system will automatically resume operation. In sleep mode, the LED indicator will briefly flash green once every 2 seconds.

Fault Events

Transducer Not Detected - If the controller does not detect the transducer or if the connection to the transducer is interrupted, the system will enter a fault state. In this fault state, the indicator light will not illuminate. If the connection is reestablished, the controller will automatically recover and clear this fault.

Maintenance

No regular maintenance is required for the transducers or the system.
For all marine electronic devices, we recommend regularly inspecting cables and connections to ensure there is no damage.
We suggest checking the transducers for tightness every six months.