

Next level anti-fouling solution

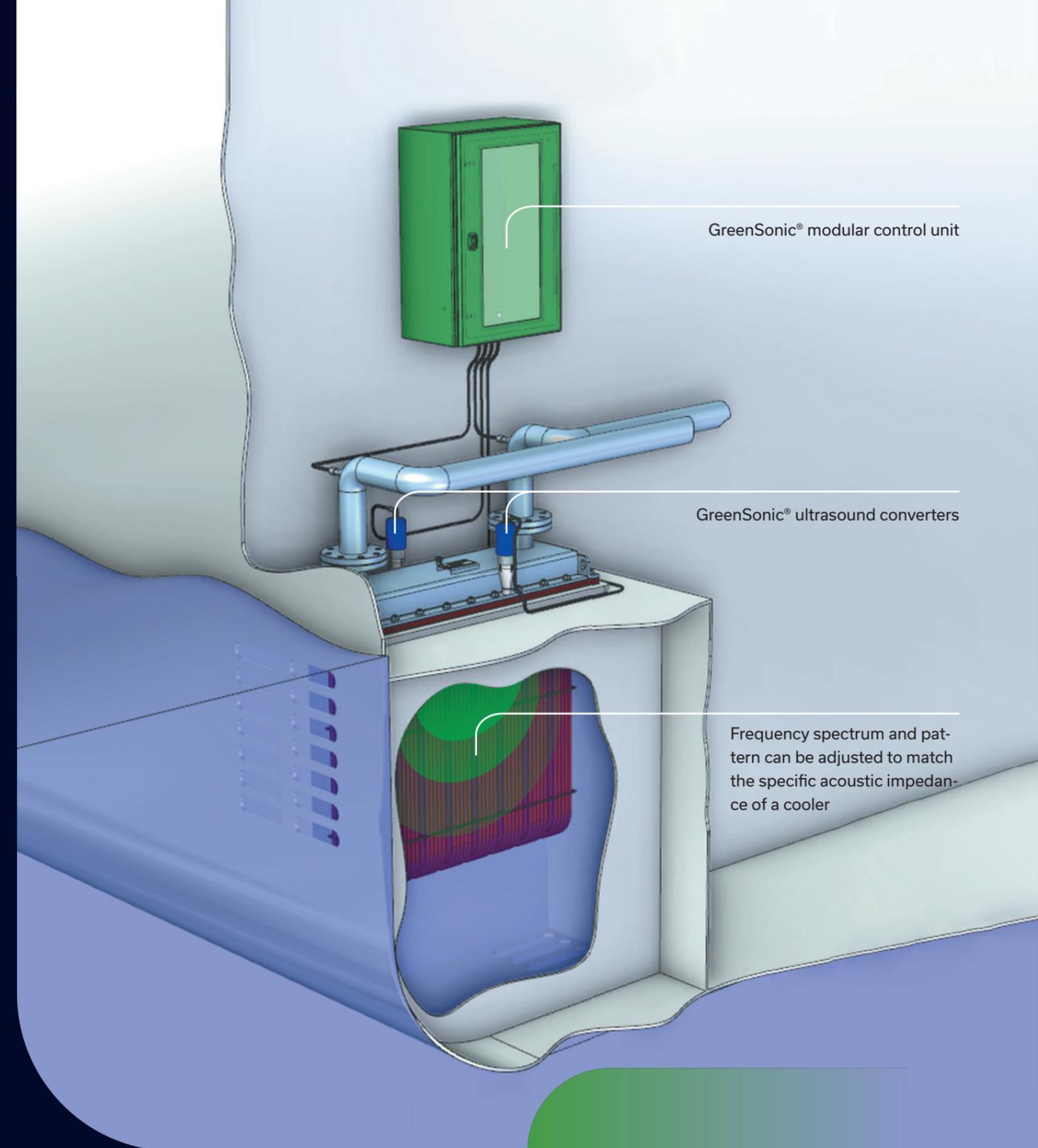
 GREENSONIC®



To achieve global climate goals, the maritime industry must make a significant contribution. This has consequences for the way in which we intensively use the world's seas for transport and leisure. GreenSonic® offers you a whole new perspective on sailing anytime, anywhere. We provide shipowners with the latest innovation in the field of ultrasonic anti-fouling technology. Our technology reduces the emission of poisonous and harmful substances, increases reliability and is very cost-effective.

GreenSonic's key features

- | | |
|--|---|
| <p>1 Low Costs</p> | <p>2 No consumables</p> |
| <p>3 Care for the environment</p> | <p>4 Ultrasound converters directly mounted on the tube plate (!)</p> |
| <p>5 Frequency/energy plots to determine highest possible power output</p> | <p>6 Plug and play, also for existing systems. No dry docking needed</p> |
| <p>7 Frequency spectrum and pattern can be adjusted to match the specific acoustic requirements of an object</p> | <p>8 Optional monitoring of inlet and outlet temperatures of cooling medium</p> |



GreenSonic® modular control unit

GreenSonic® ultrasound converters

Frequency spectrum and pattern can be adjusted to match the specific acoustic impedance of a cooler

The Power Of Green

Using ultrasound to prevent objects from fouling isn't a new technology. However, we succeeded in realizing an entire new anti-fouling solution. GreenSonic® was initially developed to protect cooling systems against marine

fouling. GreenSonic® systems provide fouling prevention for other applications as well. Our advanced, programmable, ultrasound system not only reduces the emission of harmful and poisonous materials, but also costs.

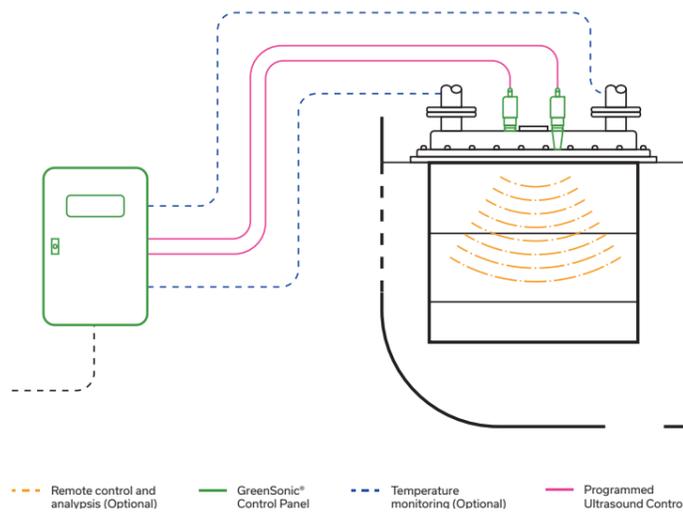
GreenSonic® is an environmental friendly alternative for copper based impressed current anti-fouling systems (ICAF). The GreenSonic® anti-fouling system will prevent your cooling

system from overheating caused by marine fouling. The advanced, programmable, ultrasound system assists in keeping operational costs low and improves the heat transfer factor.

Interested?

Discover the possibilities of GreenSonic® anti-fouling for your ship. Start today and contact the experts at GreenSonic®.

Call +31 (0)184 413 508 or email to sales@greensonic.nl



Components and functions

A central control module with display (TFT screen), which can be readout directly on the power unit and is further equipped with an ethernet connection, email service and internal data storage. It provides communication between the various generator modules in the same cabinet and/or coupled additional cabinets.

On request, the system can also be expanded with an external monitoring system. In that case, GreenSonic® system can be read, monitored and managed remotely.

Each box cooler will be equipped with two converters (small boxcoolers with one converter), connected to a generator module. These rail mounted modules can easily be exchanged if needed.

Each generator module can also function independently, so in the event of a failure of the central unit or another generator module, the remaining generator modules will continue to function independently.

GreenSonic® anti-fouling systems



GreenSonic® modular control cabinet 5 N

This cabinet has a modular structure and is provided with a standard GreenSonic® controller. A maximum of 5 generator modules can be installed in a plug and play configuration. The unit will have a standard 24 V DC – 10 Amp. supply.

Optional: 240 V AC supply is available

IP 55: as an option, this cabinet can also be supplied in an (certified) IP 55 version

Dimensions: 40 x 40 x 21 cm



GreenSonic® modular control cabinet 2 N

This cabinet has a modular structure and is provided with a standard GreenSonic® controller. A maximum of 2 generator modules can be installed in a plug and play configuration. The unit will have a standard 24 V DC – 5 Amp. supply.

Optional: 240 V AC supply is available

IP 55: as an option, this cabinet can also be supplied in an (certified) IP 55 version

Dimensions: 30 x 30 x 21 cm



GreenSonic® ultrasound converter

The ultrasound converters have a plugged (watertight) connection with oil- and fire retardant cabling. For boxcooler application the converters are mounted directly on the tubeplate (suitable adapters will be provided).

The converters are mounted on a specially designed horn/amplifier. Easy installation on all types of standard boxcoolers. Each box cooler will be equipped with two converters (small boxcoolers with one converter), connected to a generator module, being connected to the central unit by means of a DIN rail.

GreenSonic® controller Touch screen TFT display.

The Generator module is the heart of the system and can operate stand alone. It generates a controlled high frequency AC power with a frequency range between 19 and 50 kHz. Each module has 2 fully programmable channels. Temperature monitoring facilities of 2 Thermocouples per module is available.

GreenSonic® generator module

Ethernet connection to dedicated website with monitoring and reporting facilities. Power plots to determine acoustic impedance of a specific boxcooler. Provides communication between the various generator modules in the same cabinet and/or coupled additional cabinets.

Applications

Take advantage of GreenSonic®'s endless possibilities and let ultrasound helps you to operate your installation efficiently in an environmental friendly way.

The heart of our system consists of a smart ultrasound generator, analysing the acoustic impedance of a constructions and providing optimal frequencies to maximise the effect of fouling prevention, as there is not one frequency against all types of fouling.

Boxcoolers

The system was initially developed for the fouling prevention of boxcoolers, as it is difficult to keep these free of fouling.

Other applications

We are keen to work within the industry to use our technology to also prevent marine growth for specific applications.

Research shows that we provide our customers with the best anti-fouling solution.



Without ultrasound

Results of a cooler without ultrasound after being a couple of months exposed.



Conventional ultrasound system

Results of a cooler with a conventional ultrasound system, installed on the cover, during the same period of exposure.



GreenSonic®

Results of a cooler with the GreenSonic® design converters installed on the tubeplate, during the same period of exposure.

R&D is all about creating new knowledge

With a direct access to the Blokland facilities, with an extensive machine shop, heat exchanger test installations and modern engineering capabilities, we are in a position not only to design, but also to produce tools and modifications and test them in-house. With the knowledge of our own designed, versatile generators and electronic controls we can identify potential improvements and open opportunities for new applications.

Having access to different test basins, we are

able to test and evaluate specific methods of ultrasound distribution on different structures. This allows us to further develop our present knowhow on acoustic impedances and sound energy distribution in different types, sizes and shapes of boxcoolers and other complicated structures.

With the knowledge of our own designed, versatile generators and electronic controls we can identify potential improvements and open opportunities for new applications.



GreenSonic®
anti-fouling systems to
prevent bio fouling from
reducing the efficiency of
your installation.

Environmental friendly alternative for copper based impressed current anti-fouling systems (ICAF). The GreenSonic® anti-fouling system will prevent your cooling system from overheating or blockages caused by marine fouling. The advanced, programmable, ultrasound system assists in keeping operational costs low and improves the heat transfer factor.



Innovation is key

Within the worldwide maritime sector, The Netherlands takes the lead. We are known for our smart solutions, experiences and, above all, innovations. At GreenSonic®, we apply our long-time experiences and expertise with the latest technologies and dedicated software. We continuously invest in R&D and innovation through our well-equipped research department, and keep forging ahead to provide you with the most effective anti-fouling solution.

We care for our planet

We want to leave the world better than we found it. So, caring for our planet matters. With the development of GreenSonic®, we provide shipowners with the option to improve water quality and at the same time avoid the negative effect the improved marine life has on the efficiency of cooling systems. In this way we contribute to a better sea life, without the drawbacks this has on industrial plant. **GreenSonic® – The Power of Green.**

Discover
The Power
Of Green

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