



UG SERIES COMMERCIAL ULTRASONIC ANTIFOULING SYSTEM

OPERATORS MANUAL



How Does Ultraguard Work

The microbiome and larvae that are the early stages of marine growth require a number of environmental criteria to be in an optimum state to allow them to begin the colonisation process. These criteria include water temperature, salinity, light levels, time of year, concentration of larvae and seed in the water and many other criteria can affect colonisation depending on the species and type of growth. A suitable substrate to attach to is also essential.

Our goal is to use ultrasonic sound waves to create a resonance in the substrate which causes a vibration in the surface of the substrate. This, in turn, becomes a sub-optimal location for the colonisation process to begin. This vibration can only prevent the colonisation at the larval stage. Mature growth creates bonds that are too strong to be affected by the vibrations. To this end, ultrasonic antifouling systems can only keep a clean substrate clean, they can not clean a heavily fouled surface.

It sounds like a simple process but acoustically there are many challenges to overcome, especially on acoustically complex structures such as coolers. It is the research and development that MGPS and our partners have undertaken that sets Ultraguard apart from the competition.

Each transducer acts like an audio speaker. In the control panel, each transducer has its own control board and power supply. These generate ultrasonic acoustic signals which are then boosted via an amplifier and sent down the cable to the transducer. The transducer is attached to the structure being protected by an adhesive bond. It is essential that there is always full surface to surface contact between the transducer head and the protected structure. This is why we choose the bonding method over methods such as a screw in ring welded or attached to the surface. In that method the ultrasonic waves can loosen the transducer in the mounting ring.

By causing each transducer to resonate at the correct frequency we induce the required vibrations which prevent the larvae from attaching themselves to the surface being protected.

Ultraguard's design means that if a transducer cable, power supply or control PCB is damaged or fails it can be swapped out by ship's staff in a matter of minutes. The rest of the system can operate as normal until the replacement takes place so there is minimum downtime and minimum loss of antifouling effect.

Installation Instructions

Transducer Location

Locate where your installation plan recommends fitting the transducers. For box coolers these should be on the top of the water manifold of the cooler taking care to avoid the flow directing baffles inside the manifold lid. On pipes the transducers should be attached with the use of a pipe adapter which Ultraguard can supply. On hulls you should locate the transducers as equidistant from hull frames as you can to allow the maximum resonance response.

- Remove the paint and any coatings right back to the bare substrate.
- Ensure the surface is smooth and free of gouges or dimples that could cause an air gap between the transducer and the surface.
- Clean the surface and the head of the transducer with acetone until both surfaces are, "Surgically," Clean.
- Once the surfaces are clean **DO NOT TOUCH** them again with fingers or skin as the oils in your skin affect the bond. If you do, re-clean thoroughly.
- Ensure you are happy with the location and practice dry fitting the transducer.
- Once you are happy with location, get into position to apply the transducer. The adhesive will cure in seconds and you have to place the transducer onto the surface **IMMEDIATELY** once the adhesive is applied. (You will not have time to move from a work bench or other location before the adhesive cures!)
- Fit the supplied nozzle to the adhesive syringe
- Have a spatula or similar implement ready to spread and smooth adhesive.
- Apply a serpentine bead across the face of the transducer and immediately smooth it across the transducer face with the spatula. The aim is to have an even coverage of 2mm-3mm thick with no bare spots which could form air gaps.
- **IMMEDIATELY** place the transducer into location and hold in place for 30 seconds.
- Leave the transducer to fully cure for 24 hours before connecting its cable to the control unit.
- Whilst waiting you can run the main section of transducer cable back to the control unit. Ultraguard recommends using suitable cable trays and conduits to achieve this.

Control Unit Installation

- Find a suitable location for the control unit within 40m of cable run from the transducers. The control units should be located in a dry position off the deck that allows easy access.
- Using the dimensional diagram on the following sheet, set out the mounting points required on your vessel. You may need to manufacture a suitable bracket to mount the control unit on.
- Mount the control unit onto the vessel using the supplied mounting brackets.
- Run a fuse protected 240v AC 1 Phase power supply from the vessel's power distribution system into the control panel via the cable gland and connect it to the power terminals.
- Connect the transducer main cables in order to the transducer outlet connectors on the bottom of the panel.
- Once the transducers have had 24 hours to bond to the protected surface, Connect the transducer tail cable to the control panel via the main cables.
- Turn on the main **RED** isolation switch on the front of the control unit.
- Switch the transducer operating switches to **ON** one at a time. Wait until each LED turns green before switching on the next switch.
- Once every transducer is switched **ON** and the LEDs are **GREEN** go to each transducer and ensure that you can hear it operating. If they are located in a noisy environment put your ear to the back of the transducer. You should hear a high pitched tone as the transducer re-starts each frequency sweep. You may also hear a scratchy clicking sound as the transducer operates.
- If there is a problem or not all of the LEDs are **GREEN**, please refer to the Operators Manual supplied with your Ultraguard system.

Basic System Fault Finding

When switching on each transducer circuit switch (Fig 1), it is normal for the LED on the panel front (Fig 1) to remain blank for a few seconds whilst the control circuit initializes and pulse width modulation (PWM) begins. The LED should then turn **GREEN** and remain so throughout operation.

Amber LED at Switch On

If the LED turns **AMBER**, check that the transducer cable is properly connected to the panel and that there is no damage to the cable.

Blank LED at Switch On

If the LED does not illuminate and remains blank, check that power is properly applied to the panel. If it is, isolate power from the panel and open the panel to locate the affected PCB. Check the fuse on the PCB has continuity across it. If it doesn't, change the fuse.

Red LED at Switch On

There is a major PCB Fault. Contact Ultraguard technical support.

Green LED During Operation

System is operating normally

Amber LED during Operation

There is a minor fault on the system. Switch off circuit. Check transducer cable is properly connected and that the cable is not damaged or broken along its length. Switch circuit back on, fault should have cleared. If fault reappears contact Ultraguard technical support. If you have the Ultraguard TCB APP you can follow the directions in the next section to pinpoint the fault.

Red LED During Operation

System has a major fault. Switch off circuit, wait 30 seconds and switch the circuit back on. Fault should clear. If fault reappears please contact Ultraguard technical support. If you have the Ultraguard TCB APP you can follow the next section to pinpoint fault.

System Fault Finding With TCB App

Connecting to the PCB

To connect your Ultraguard system to the app, you need to use the supplied Ultraguard UG-TCB Serial Cable.

This has a USB at one end and a three pin micro connector at the other end. There is a programmed chip in the USB end so please do not use a non Ultraguard supplied cable.

- First, switch off each transducer circuit, wait for the circuit LEDs to extinguish and isolate the power from the panel via the red isolator switch on the panel front.
- Open the panel with the supplied panel key and locate the PCB you want to connect to.
- Locate the 3-pin serial connector on the PCB and connect the serial cable to it with the orange wire towards the

- adjacent hold down screw and the black wire towards the adjacent battery holder.
- Plug the USB end into your computing device.
- From outside the panel, switch the power back on to the panel, then switch on the relevant transducer circuit (**Do not put your hands into the panel whilst power is live!**)
- Follow the procedures in the TCB user guide.
- Once you have completed using the app, switch off the transducer circuit and isolate power from the panel before removing the serial cable.
- Close the panel, switch the power back onto the panel, then switch each transducer circuit back on one at a time. Wait until each circuit LED turns green before switching on the next.

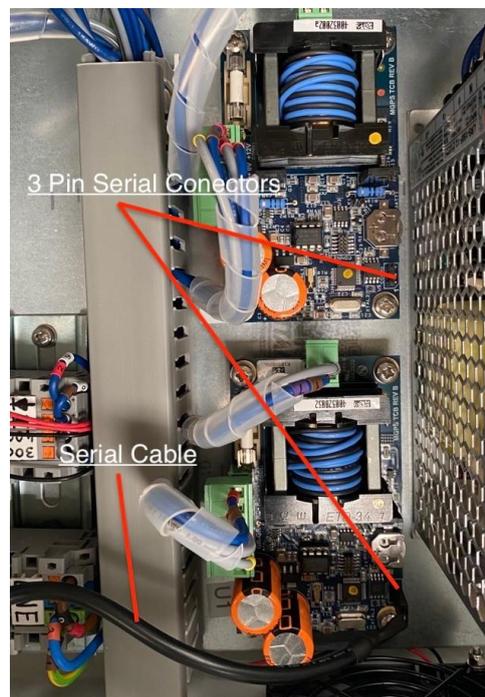


Fig 1

Please Refer to the Ultraguard TCB APP User Guide Before Connecting APP Device.

System Fault Repair

REPLACING A PCB

⚠ THIS PROCEDURE SHOULD ONLY BE ATTEMPTED BY PERSONNEL WHO ARE COMPETENT AND EXPERIENCED WITH ELECTRONIC COMPONENTS.

Before starting the PCB replacement procedure, switch off every transducer on the control panel (Fig 2) one at a time then switch off the main **RED** isolator switch (fig 2) on the front of the control panel and lock the isolator switch off with a suitable padlock. Now switch off and lock out the system power supply breaker at the vessel's power distribution panel.

- Open the control unit panel door and locate the faulty PCB
- Unplug the green two pin transducer plug. This is located on the PCB in line with the transformer core (Fig 3).
- Unplug the green six pin power plug. This is located on the edge of the PCB next to the fuse housing (Fig 3).
- Unscrew the four Pozidrive hold down screws. These are located one at each corner of the PCB.
- Lift out the old PCB.
- Make sure any static charge you may have built up is minimised by touching the earth connection on the control unit door.
- Remove the new PCB from its anti-static packaging.
- Place the PCB into position and loosely re-fit the four Pozidrive hold down screws.
- Once you are happy with the final position of the PCB, tighten the four Pozidrive hold down screws to a firm hand tightness. **DO NOT OVERTIGHTEN!**
- Re-connect the green six pin power plug.
- Re-connect the green two pin transducer plug.
- Re-check everything is secure, remove all tools from the control unit and close and secure the control unit door.
- Unlock the power supply and the red isolator switch and re-admit power to the control unit.
- Switch on **ONLY** the new PCB circuit and watch the LED turn **GREEN** (Fig 2) after the PCB goes through its automatic initialisation process.
- Turn on the other transducer circuits one at a time allowing each one to turn **GREEN** before switching on the next circuit.

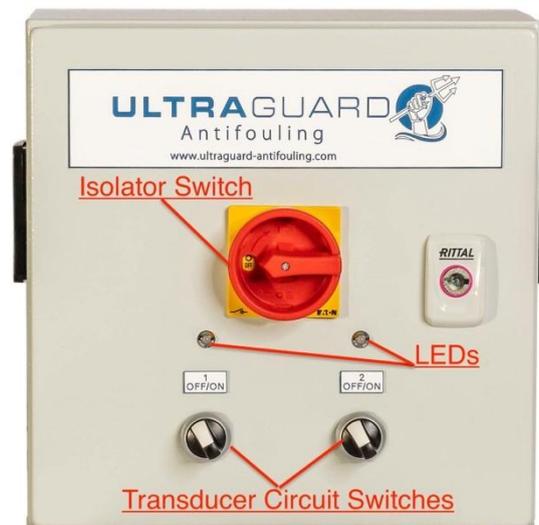


Fig 2



Fig 3

System Fault Repair

Replacing a Power Supply

⚠ THIS PROCEDURE SHOULD ONLY BE ATTEMPTED BY PERSONNEL WHO ARE COMPETENT AND EXPERIENCED WITH ELECTRONIC COMPONENTS.

Before starting the Power Supply Unit replacement procedure, switch off every transducer on the control panel (Fig 2) one at a time then switch off the main **RED** isolator switch (fig 2) on the front of the control panel and lock the isolator switch off with a suitable padlock. Now switch off and lock out the system power supply breaker at the vessel's power distribution panel.

- Take photographs of or draw diagrams of the wiring terminations on the power supply. Connection drawings are available from Ultraguard Technical Support and will be included in your Owners pack.
- Remove the hold down screws from the power supply unit (Fig4).
- Double check you have a record or the terminal layout so as to make sure you know which wire goes where on replacement.
- Undo the termination screws and remove the wires from the power supply unit (Fig 4).
- Connect the wires from the PCB to the new power supply unit terminals. Take care to ensure these are connected in the same manner as on the old unit.
- Place the new power supply unit into place in the control panel.
- Replace and tighten the hold down screws.
- Double check the control unit is free from tools and old components or any debris.
- Close the control panel and reintroduce power via the RED isolator switch.
- Turn on only the replaced power from the panel front circuit switch.
- Check the operation LED turns GREEN.
- If OK, switch the other circuits back on and resume normal operation.

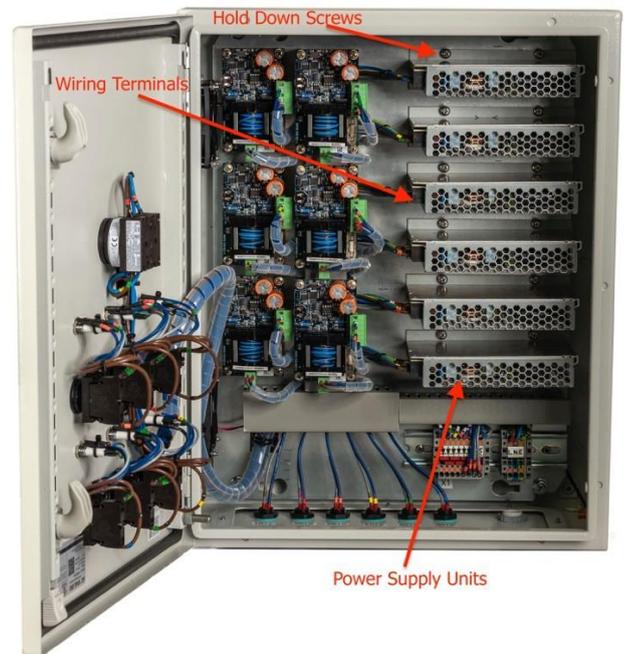


Fig 4

Routine System Maintenance

To ensure that your Ultraguard UG Series commercial ultrasonic antifouling system gives optimum service over many years we recommend that certain maintenance tasks and inspections are carried out on a monthly basis:

- Remove power from the control unit via the RED isolator switch and lock off the isolator. Switch off the power supply to the control panel at the vessel's distribution board and lock off.
- Inspect the transducers. Check that they remain secure to the protected surface and that the housings and cable glands are not damaged.
- Inspect the transducer cables for condition and security. If there is any damage to the cable such as a cut to the insulation sheathing or a damaged connector, please replace with a new cable or connector.
- Check the security of the transducer cable connections on the bottom of the control unit.
- Open the control panel with the supplied panel key.
- Check that the internals of the panel are clean and free from dust, debris and oils. Clean with a dry paint brush or a small vacuum cleaner suitable for electrical enclosures.
- Remove the filter from the fan housings and gently blow off any dust from the filter element.
- Use a dry paint brush or similar to clean the fan blades
- Replace the fan filters and their housings.
- Check the security of the control panel mounts.
- Visually inspect the power cable is not damaged and that the terminations in the control panel are secure.
- Close the control panel door securely
- Unlock power supply and isolator switch and reintroduce power to the panel.
- Switch the transducer circuits back on one at a time and ensure the operation LEDs turn GREEN.

System Safety



Installation, maintenance and repairs of Ultraguard Antifouling systems should **ONLY** be carried out by competent personnel who is familiar with marine electrical systems!



There is a risk of severe injury or death when working in the vicinity of live electrical equipment. **ALWAYS** ensure proper isolation and safety lock out procedures are followed!



Ultraguard control panels and transducers are heavy items. **DO NOT** lift items which weigh more than 25kg (55lbs) alone!



Always ensure you are wearing correct PPE before working on or with Ultraguard Antifouling systems including but not limited to; Protective toe cap footwear, flame retardant clothing and eye protection!

Contact Details

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Ultraguard Antifouling is a brand of Marine Growth Prevention Specialists Ltd.