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# INSTALLATION AND OPERATION MANUAL

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**SONIHULL**  
ULTRASONIC ANTI-FOULING SYSTEM



## Welcome to Sonihull

Thank you for choosing the Sonihull ultrasonic anti-fouling system to protect your vessel from bio-fouling like algae, weeds and molluscs.

In this manual we will guide you through the best practices for fitting your Sonihull system. Please read the printed fitting instructions before you start your installation.

For further guidance, you can download the Sonihull app on your tablet or smartphone (Android and iOS devices supported).

In the Sonihull app you will find fitting guides for all the items you can protect from marine bio-fouling. Everything from hulls, box coolers and seachests to propellers, waterjets and pipework.

Alternatively, you can contact your local Sonihull supplier, or contact us direct at [info@sonihull.com](mailto:info@sonihull.com).

### Sonihull – the Smart anti-fouling choice

Sonihull is suitable for use on all materials that transmit ultrasound well, including: steel, aluminium, stainless-steel, titanium, FRP & GRP composites, and rigid plastic constructions.

**IMPORTANT** – If your vessel is made from FRP or GRP Sandwich Construction (two rigid composite surfaces separated by a foam core) fitting the transducers will involve cutting through the inner skin and removing some core material in order to get access to the dry side of the outer skin. **IF IN DOUBT, CONTACT A PROFESSIONAL MARINE TECHNICIAN.**

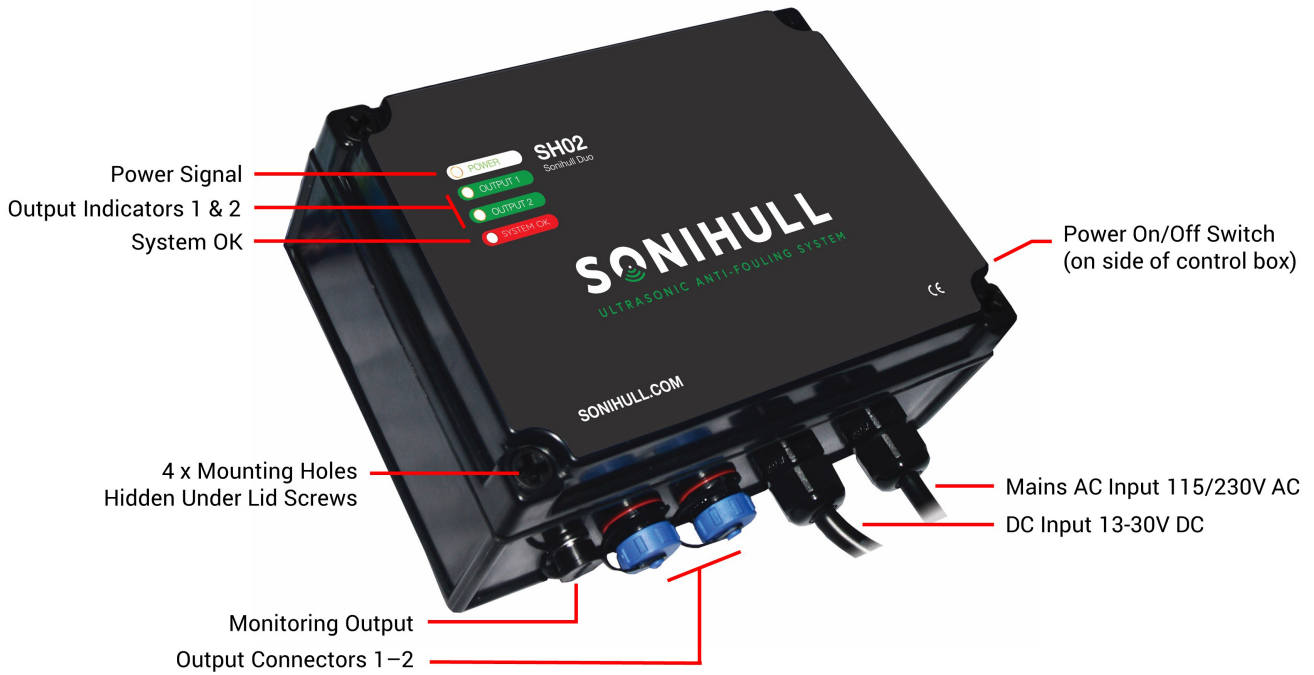
## SAFETY INSTRUCTIONS

**DANGER** – We recommend that the electrical installation of this system is carried out by a qualified Marine Electrician. When mounting the control box, please find a suitable dry location. Connect all AC connections in accordance with all the relevant Wiring Regulations. When connecting to a DC supply, ensure the control box is wired directly via a 5A breaker.

### Mains power cable colour codes:

Brown = Live  
Blue = Neutral  
Green & Yellow = Earth

**IF IN DOUBT, CONTACT A PROFESSIONAL MARINE ELECTRICIAN.**



LED	COLOUR	NORMAL STATUS	FAULT STATUS	COMMENTS
Power On	Red	ON	Flashing	Flashing is normally due to incorrectly seated transducers.
Outputs 1-2	Green	ON	OFF	OFF when not connected or in fault.
System OK	Green	ON	OFF	Fault indication, check power & transducers.



## COMPONENTS INCLUDED

### Sonihull 2

- Sonihull ultrasonic Control Box with 2 outputs
- 2 x Ultrasonic Transducers each with 6.5m of cable and transducer mounting rings
- Mains cable with standard UK 3-pin fused plug
- Marine grade epoxy for bonding transducer mounting rings to surfaces
- Transducer gel



## TECHNICAL SPECIFICATIONS

### Sonihull 2

Power Supply Approvals	UL and CE
Voltage	115/230V AC 50/60Hz (50mA) or 13-30V DC (0.6A)
Avg. Power Consumption	10 Watts AC or 8 Watts DC
DC Supply Breaker	5 Amps
Ultrasonic Frequencies	19.5 kHz – 55 kHz
Control Box IP Rating	IP65
Transducer IP Rating	IP68
Transducer Cable Length	6.5m (extendable up to 30m)
Weight	Control Box 2kg, Transducers 2.4kg, Total Boxed 5.4kg
Control Box Dimensions	175 x 130 x 75mm (W x H x D)
Mounting Ring Dimensions	95 x 24mm (Ø x H)
Transducer Dimensions	76 x 75mm (Ø x H)



(AC Power Rating is measured during operation at 230V AC.)

Built-in automatic AC Voltage Selector, switches between 115V or 230V (depending on AC supply characteristics)

### BUILT-IN DC POWER WARNING FEATURE

If the DC supply voltage is between 11.9V and 12.4V, the power LED will flicker to notify the user.

**In battery-powered installs, this is indicative of poor battery condition.**

**Humidity Preconditioning** 40°C at 96% RH

**Maximum Operating Temp** 40°C (104°F)

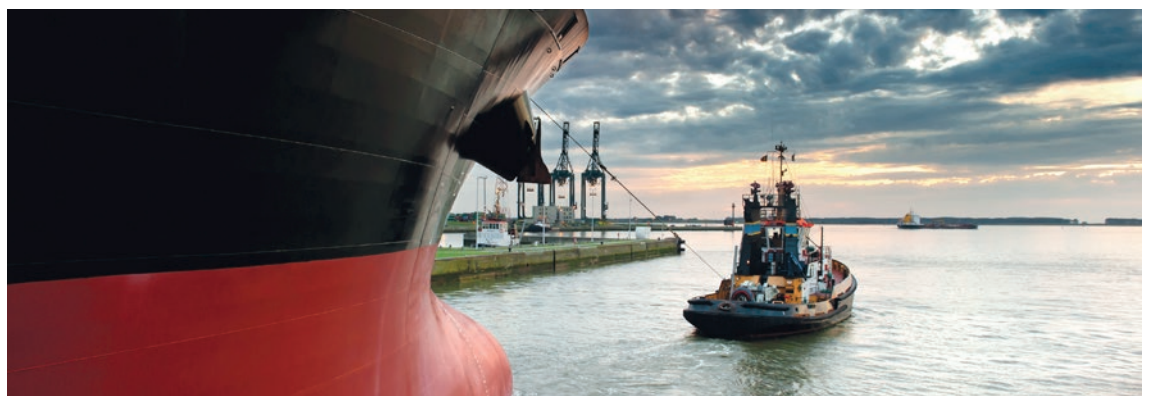
**Altitude Rating** Precautions must be taken for systems that are to be installed at an altitude of over 2000m.

**94/9/EC ATEX Certified** Transducers approved for use in Zone 0.

Control Box certified for use in Zones 1&2, if fitted in a separate cabinet.

### Warranty

Warranted for 12 months from the date of purchase against manufacturer defects.  
with an additional 12 months once you have registered your purchase online.  
(Please scan this QR Code or refer to the enclosed warranty card)



## SYSTEM INSTALLATION

### *Job order for typical installation:*

1. Plan the layout of your system and your cable runs
2. Ensure you have sufficient room for transducer and control unit installation
3. Prepare the surface where your transducers are going to be mounted
4. Bond the Transducer Mounting Rings in place (Follow the guides on following pages and allow enough time for the epoxy to cure fully)
5. Mount the Control Box and attach the AC and/or the DC supplies
6. Screw the transducers into the Transducer Mounting Rings
7. Run cables back to the control box (leaving enough slack for future transducer inspection)
8. Plug the transducer cables into the control box outputs and switch the system on

## Control Box Location

Once installed your Sonihull system requires very little maintenance, so the control box can be fitted out of sight in a suitable cabinet.

Find a suitable dry and clean location with access to AC and/or DC power supplies. Please also consider access and routing for the transducer cables and space for connecting the cable connectors to the control box.

To mount the control box, carefully remove the lid to expose the four mounting holes and screw/bolt into place. Replace the lid and connect the unit to the AC and/or DC supplies. **Please consult a qualified marine electrician to carry out the electrical installation.**

Once installed the control box should be periodically checked to ensure that it is powered and working correctly.

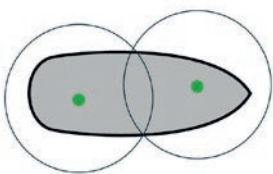


## Tranducer Location - HULLS

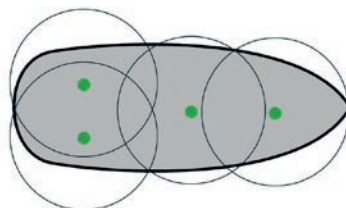
When using Sonihull to protect hulls from bio-fouling, it is important to consider the size of the wetted area at rest and the optimum transducer spacing. Below are some suggested transducer locations for workboat hulls. The number and spacing of your transducers will depend on a number of factors. The hull material, joins, welds, the presence of stringers and stiffeners, etc.

As a general rule, in most steel or aluminium hulls, each transducer will protect a circular area with a diameter of about 6-7m. The protective process relies on the transmission of ultrasound through to the surface of the hull that is in contact with the water. Refer to the diagrams below before you plan your installation and ensure that you consider 'breaks' in transmission for items like stern gear and propulsion systems.

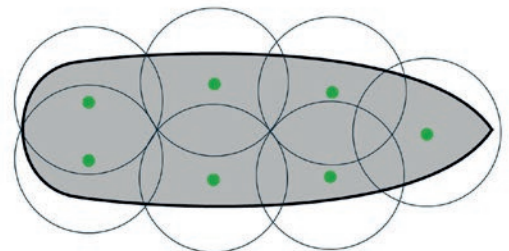
### Workboat Hulls



Up to 50ft. (15 metres)



50-70ft. (15-21 metres)



60-100ft. (18-30 metres)

## Transducer Location – STORAGE TANKS

For large potable water storage, Sonihull can be used to keep water fresher for longer. Sonihull systems can also be used to protect fuel tanks against Diesel bug.

Look to fit transducers in the middle of the tank sides, avoiding voids, air gaps and weld seams.

## Transducer Location – KEEL COOLERS

Underwater heat-exchangers are prone to heavy bio-fouling by weeds, barnacles and mussels. This fouling impedes water flow and reduces the effectiveness of the cooling system, putting extra strain on your main engines and adding to maintenance costs.

For Sonihull to provide effective anti-fouling protection in Keel Coolers two areas should be considered. The hull and the keel cooler itself.

The recessed hull surface in which the keel cooler is located should be protected from the dry side of the hull as described in the hull section. The keel cooler itself can be protected by using Sonihull Keel Cooler Adaptors.

These patented adaptors create a strong physical contact between a Sonihull transducer and the keel cooler's pipe fittings inside the hull. There's no need for any plumbing or cooling system drainage. A split collar (smooth or threaded) clamps snugly around the inlet and outlet pipes.

Most keel coolers in commercial vessels will be very well protected by one transducer on each of the inlet and outlet pipes and enough transducers to cover the recessed hull area behind the cooler elements.

Keep the total number of transducers in mind when you are planning the whole anti-fouling system for your box cooler, propeller, sea chests etc... This will help you select the correct control box(es) or provide enough transducer connection outlets.

**Before**



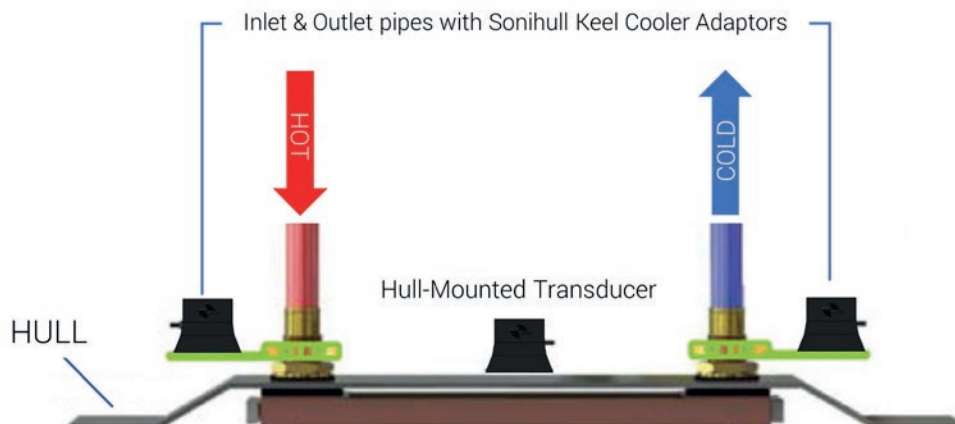
**After**



### Typical Results in Keel Coolers

**Before** - 12 months of normal operation with existing anti-fouling systems and regimes

**After** - 12 months of normal operation after cleaning & fitting Sonihull system



**Typical Layout Protecting a Keel Cooler**



## Transducer Location – BOX COOLERS

Most box coolers can be protected from bio-fouling by two or more Sonihull transducers.

One transducer should be mounted directly to the top plate of the box cooler, preferably close to the coolant inlet. Avoid any welded seams.

On smaller box coolers, there may not be enough room to locate a transducer on the top plate. In these cases, consider fitting the transducer to the coolant inlet pipe with a Sonihull Pipe Adaptor.

The second transducer should be mounted as close to the box cooler coils as possible – consider the dry side of transverse and longitudinal walls of the seachest to determine the location that offers the best coverage.



**Above** - Typical box cooler setup  
**Below** - External view of seachest

## Transducer Location – SEACHESTS

For Seachests without box coolers, transducers should be mounted on the dry side of the vertical sides of the sea chest. Avoid any stiffeners or welded seams and try to position the transducers in the middle of the seachest walls. [Do not mount transducers on the horizontal top of the seachest if there is any chance of an airgap, or if an air bleed valve is fitted.]



## Transducer Location – PROPELLERS

To protect commercial vessel propellers, you should refer to your vessel's General Arrangement drawings and determine the best transducer locations for good transmission of ultrasound to the prop shaft and to the propeller.

The photo opposite is from a VLCC with a single 10m diameter propeller mounted to a 1m prop shaft. A total of twelve Sonihull Transducers are used. Eight are installed on the Stern Tube Flange (shown opposite) with four more fitted on the Intermediate Bearing.



**Above** - Propeller installation on VLCC  
**Below** - Diagram showing mounting locations for waterjets

## Transducer Location – WATERJETS

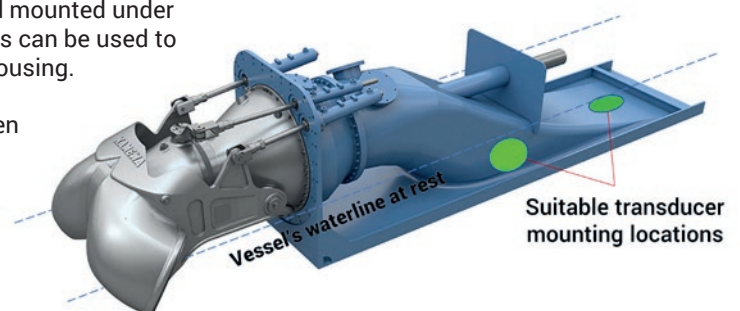
Fouling in water jets has a very detrimental impact on jet performance and vessel speed. Even very light bio-fouling can reduce top speed by about 20% and create a corresponding spike in fuel consumption.

Sonihull can keep a clean waterjet fouling-free using the power of ultrasound. The number of transducers required, depends on the size of the water jet.

For jets with large impellers (superyachts, patrol vessels and fast ferries) you may need to use two or three transducers.

Transducers should be mounted to the dry side of the water jet and mounted under the waterline of the vessel at rest. If required Sonihull Pipe Adaptors can be used to mount transducers to suitable uniform curved surfaces in the jet housing.

Be sure to consider how many transducers you will need in total when protecting your, keel coolers, box coolers, etc. This will help you select the correct number of control boxes and provide sufficient transducer channels.



## FITTING THE TRANSDUCERS - To Steel and Aluminium Surfaces

The effectiveness of your system depends on correct installation. Below are the instructions for bonding the Transducer Mounting Rings to Aluminium or Steel surfaces.

The surface must be **flat, smooth & clean** prior to installation.

### Do not fit:

- On a weld seam.
- On top of weld spatter
- On a concave surface
- On a convex surface
- Within 150mm of a bulkhead or stiffener
- On a rough, oxidised or rusty surface



### The surface can be prepared as follows:

1. Once the desired location has been established remove any loose paint or coatings from the surface. Ensure you clear an area about 30% larger than the footprint of the Transducer Mounting Ring.
2. Key the metal surface and the mounting surface of the transducer with 80-grit sandpaper. (if using power tools, be careful not to score the surface, it must remain flat and smooth).
3. Clean both surfaces with a clean cloth to ensure they are both dust-free and grease free. Isopropyl alcohol can be used to clean the surfaces.
4. At this stage, protect the screw threads inside the transducer mounting ring from any stray epoxy by applying a thin layer of the supplied transducer gel. Ensure that none of the gel gets onto the surfaces you have just cleaned.
5. Mix the 2-part epoxy as per the instructions provided.
6. Apply a small amount of the finished epoxy mix to the prepared bare metal surface and spread it with a flat-edged scraper.
7. Clean the scraper blade as you go and remove the excess epoxy from the surface. This process will fill any voids on the surface and ensure a good key for the mounting ring.
8. Now apply epoxy mix to the base of the mounting ring. Do not go beyond the built-in gutter on the underside of the ring.
9. Press the mounting ring firmly into place on the prepared metal surface. Ensure that no stray epoxy is visible inside the ring, on the prepared metal surface or in the screw threads of the mounting ring.
10. Tape or clamp in place and allow the epoxy to fully cure. Usually 12-24 hours.
11. Once fully cured, apply a thin layer of transducer gel onto the contact face of the transducer and screw it into the mounting ring.

### TRANSDUCER FITTING TIPS

**Do not apply too much gel** to the contact face of the transducer, as this may insulate the ultrasonic signal.

**Ensure that the transducer is rotated about 6 times anti-clockwise** prior to screwing it into the mounting ring. This will ensure that the cable is not twisted once the transducer is screwed into place.

**When you first fit the transducer, screw it in finger-tight** and remove it to observe the swirl marks in the transducer gel on the metal surface and the corresponding marks on the contact face of the transducer. This will give you a good indication of the quality of surface contact.

**Do not over-tighten the transducer** this could break the bond between the mounting ring and the steel or aluminium surface.





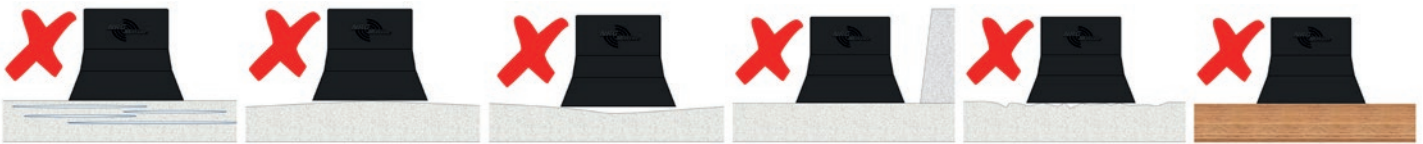
## FITTING SONIHULL - To GRP/ FRP Surfaces

The effectiveness of your system depends on correct installation. Below are the instructions for bonding the Transducer Mounting Rings to GRP (Glass Reinforced Plastic (or 'fibreglass') and FRP (Fibre Reinforced Plastic, like Carbon-fibre, Kevlar structures).

The surface must be **flat, smooth & clean** prior to installation.

### Do not fit:

- If there is any damage or delamination below the transducer.
- On a convex surface.
- On a concave surface.
- Within 150mm of a bulkhead or stiffener
- On a rough or uneven surface
- On a wooden or ply-wood structure – wood insulates the ultrasound signal.



NB - For 'Foam-Core' or 'Sandwich' constructions please refer to the instructions at the end of this section.



### The surface can be prepared as follows:

1. First, ensure that there is enough clearance to replace floor boards or access panels after fitting the transducers and that there is good access for running cables back to the control box.
2. Once the desired location has been established, remove any loose paint or coatings from the surface. Ensure you clear an area about 30% larger than the footprint of the Transducer Mounting Ring.
3. It is best to fit directly to the GRP so carefully remove any gelcoat or surface coating until you have a flat uniform layer of GRP to bond to, as shown in the photo. If using power tools, be careful not to score the surface, it must remain flat and smooth.
4. Clean the GRP and Transducer Mounting Ring surfaces with a clean cloth to ensure they are both dust-free and grease free. Isopropyl alcohol can be used to clean the surfaces.
5. At this stage, protect the screw threads inside the transducer mounting ring from any stray epoxy by applying a thin layer of the supplied transducer gel. Ensure that none of the gel gets onto the surfaces you have just cleaned.
6. Mix the 2-part bonding epoxy as per the instructions provided.
7. Now apply epoxy mix to the base of the mounting ring. Do not go beyond the built-in gutter.
8. Press the mounting ring firmly into place on the prepared GRP surface. Ensure that no stray epoxy is visible inside the ring, on the prepared GRP surface or in the screw threads of the mounting ring.
9. Tape or clamp in place and allow the epoxy to fully cure. Usually 12-24 hours.
10. Once fully cured, apply a thin layer of transducer gel onto the contact face of the transducer and screw it into the mounting ring.

### TRANSDUCER FITTING TIPS

**Do not apply too much gel** to the contact face of the transducer, as this may insulate the ultrasonic signal.

**Ensure that the transducer is rotated about 6 times anti-clockwise** prior to screwing it into the mounting ring. This will ensure that the cable is not twisted once the transducer is screwed into place.

**When you first fit the transducer, screw it in finger-tight** and remove it to observe the swirl marks in the transducer gel on the GRP surface and the corresponding marks on the contact face of the transducer. This will give you a good indication of the quality of surface contact.

**Do not over-tighten the transducer** this could break the bond between the mounting ring and the GRP or FRP surface.



## FITTING THE TRANSDUCERS - In 'Foam Core' or 'Sandwich' FRP GRP Constructions

**DANGER** – Consult a qualified marine technician with GRP/FRP expertise before fitting Sonihull to Foam Core or 'Sandwich' structures.

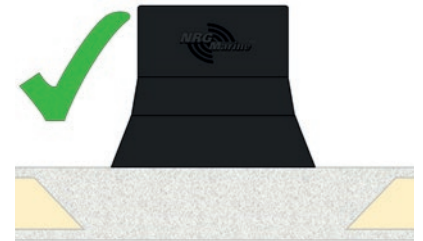
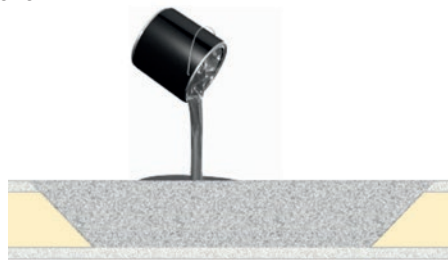
### DO NOT FIT TRANSDUCERS TO THE INNER LAYER OF THE SANDWICH CONSTRUCTION

The foam core will dampen the Ultrasound signal and the wetted surface will not be protected from bio-fouling. The transducer must have a clear line of transmission direct to the outer layer of the sandwich.

To do this, the inner layer (and some of the core material below) must be removed.

Once the outer layer of the sandwich is reached, ensure a clean flat surface and bond to it with fresh GRP and resin mix. Fill the void up to the level of the inner layer with new GRP. Ensure that there are no bubbles of air gaps.

Allow the new GRP and resin to cure and then follow the usual process for bonding the Transducer Mounting Ring to GRP or FRP.



## FITTING THE TRANSDUCERS – Using the CONTACT DISK method (rough surfaces)

For fitting on very large curvatures or on surfaces that are sound but cannot be ground flat. Prepare the mounting ring and surface as normal ensuring clean grease-free contact.

(For illustrative purposes only, curvature and gaps are exaggerated to show correct fitting)

Press the mounting ring onto the curved or uneven surface as required, ensuring a good bond. Follow the usual precautions to avoid epoxy getting onto the contact surface or into the screw threads in the mounting ring. Allow the mounting rings to cure fully before moving on to the next stage.

Ensure that the mounting ring has bonded correctly to the surface. Clean the curved or uneven surface inside the ring again in case any dirt or grease has got in during the curing process. Use Isopropyl alcohol and a clean cloth.

Now clean the Aluminium Contact Disk and prepare it with a 1.5cm spherical bead of fresh epoxy in the centre of the disk. Place the disk, epoxy side down, into the mounting ring.

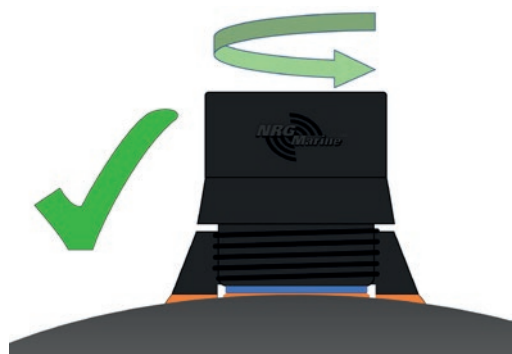
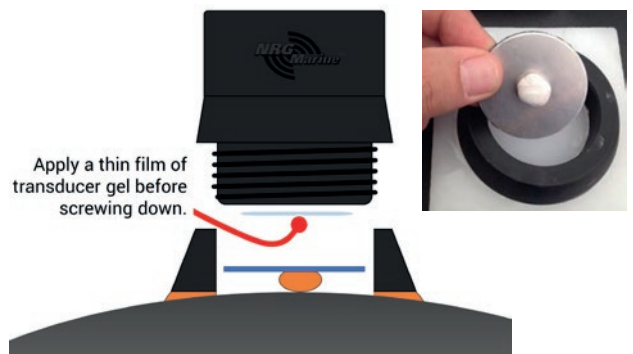
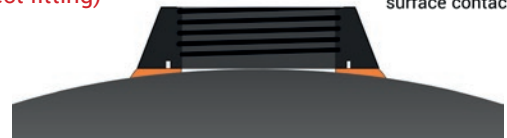
Before screwing the transducer into the mounting ring, apply a thin film of transducer gel onto the transducer contact face.

Screw the transducer into the secure mounting ring. The transducer contact face will engage the aluminium disk and squeeze the fresh epoxy onto the clean contact surface.

Once it is fully cured (usually 12-24 hours) gently tighten the transducer again to ensure good contact between the contact disk and the transducer contact face.

**DO NOT OVERTIGHTEN THE TRANSDUCER** - As this may damage the bond between the mounting ring and the curved/rough surface that it is bonded to.

Mounting Ring Shown in cross-section to illustrate bonding & surface contact



## FITTING PIPE ADAPTORS

Once you have determined the outside diameter of the pipe you are fitting to, protecting pipework from biofouling is relatively straightforward.

Take the correctly-sized Sonihull Pipe Adaptor and find a suitable location for bonding it to the pipework that's being protected. Ensure you are at least 250mm from a pipe flange, valve-body or bulkhead.

Consider accessibility for ease of installation and in the event of future maintenance checks.

Prepare the pipe surface by sanding down any exterior coating. The goal is to provide a smooth, solid surface and a good 'key' for the epoxy resin to bond the pipe adaptor to the pipe.

Mix the epoxy resin and hardener as per the supplied instructions. Apply the mixed epoxy to the concave surface of the pipe adaptor, paying close attention to the middle of the curve. Ensure that there are no air bubbles in the epoxy.

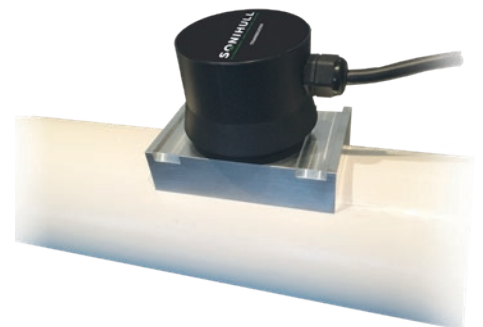
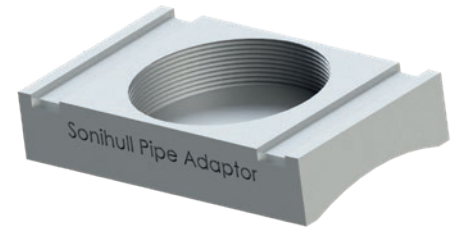
Press the adaptor onto the prepared portion of the pipe, ensuring that the epoxy spreads evenly.

Take care not to get any of the excess resin onto the threaded portion on the other side of the adaptor. Use heavy-duty zip ties or Jubilee clips to hold the pipe adaptor securely in place while the resin cures.

Once the epoxy has set, apply a thin uniform layer (about 1 mm) of transducer gel to the face of the transducer.

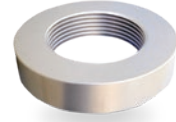
Screw the transducer into the threaded portion of the pipe adaptor. Ensure good contact with the inside of the pipe adaptor, but do not over-tighten as this may damage the transducer.

[NB - If the transducers are to be fitted before the resin is fully-cured, hold the pipe adaptor firmly to ensure it does not move while the transducer is screwed into place.]

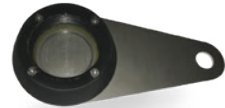


## TRANSDUCER MOUNTING ACCESSORIES

**ALUMINIUM MOUNTING RING** - These marine-grade weldable aluminium mounting rings are ideal for larger aluminium hulls, jet drives, sea chests or other aluminium structures. The rings can be fitted as part of the standard build where Sonihull systems are offered as a buyer option.



**OFFSET (IPS) ADAPTOR** - This bolt-on device allows ultrasonic transmission into surfaces that are hard to reach or acoustically isolated. The Offset (IPS) Adaptor is ideal for smaller applications where fitting access may be an issue.

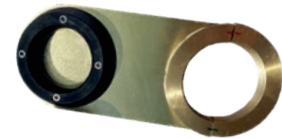


This simple solution allows you to offset a transducer wherever you can get a bolt-down metal-to-metal contact on the inboard part of item being protected from bio-fouling.

**PIPE ADAPTOR** - With our full range of standard-diameter pipe adaptors, Sonihull can be attached to almost any kind of pipework. Protecting valves, inlets, ballast transfer systems or other raw water handling equipment from being clogged by unwanted marine bio-fouling.



**KEEL COOLER ADAPTOR** - These patented adaptors create a strong physical contact between a Sonihull transducer and the keel cooler's pipe fittings inside the hull. There's no need for any plumbing or cooling system drainage. A split collar (smooth or threaded) clamps snugly around the inlet and outlet pipes.



**SONIHULL**

ULTRASONIC ANTI-FOULING SYSTEM

SAVING THE OCEANS, ONE VESSEL AT A TIME.