INSTALLATION AND OPERATION MANUAL

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ECHO TECH
ULTRASONIC ANTIFOULING TECHNOLOGY

Proudly Manufactured By: GAT Group
German American Technology Group

Welcome to Echo Tech

Thank you for choosing the Echo Tech PRO series ultrasonic anti-fouling system to protect your vessel from bio-fouling like barnacles and mollusks.
In this manual we will guide you through the best practices for fitting your PRO series. Please read the printed fitting instructions before you start your installation.
Alternatively, you can contact your local Echo Tech supplier, or contact us direct at info@echotechpro.com.
Echo Tech – the Smart anti-fouling choice
Echo Tech is suitable for use on all materials that transmit ultrasound well, including steel, aluminum, 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 transducer s 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.
Mains power cable color codes: Red = Live Black = Ground Yellow = Aux LED IF IN DOUBT, CONTACT A PROFESSIONAL MARINE
ELECTRICIAN.

LED	COLOUR	NORMAL STATUS	FAULT STATUS	COMMENTS
Status 1	Green /Red	Flashing Green	Flashing RED	This LED monitors CH1-4. Under normal operation the LED will flash GREEN once each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
Status 1	OFF			If the LED is OFF, that indicates low voltage or no power supply

COMPONENTS INCLUDED

PRO-2

- The Echo Tech PRO-2 can control up to two (2) transducers.

TECHNICAL SPECIFICATIONS

PRO-2

Power Supply Approvals	UL and CE
Voltage	24V DC
Avg. Power Consumption	30W
DC Supply Breaker	5A
Ultrasonic Frequencies	19.5 - 55 kHz
Control Box IP Rating	IP65
Transducer IP Rating	IP68
Transducer Cable Length	20m
Weight	1.94 kg (4.28lbs)
Control Box Dimensions	179 H x 230 W x 133 D (mm)
Transducer Dimensions	59 H x 73 D (mm)

Maximum Operating Temp 52C (125F)

3 YEAR WARRANTY

LED	COLOUR	NORMAL STATUS	FAULT STATUS	COMMENTS
Status 1	Green /Red	Flashing Green	Flashing RED	This LED monitors CH1-4. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
Status 1	OFF			If the LED is OFF, that indicates low voltage or no power supply

COMPONENTS INCLUDED

PRO-4

- The Echo Tech PRO-4 can control up to four (4) transducers.

TECHNICAL SPECIFICATIONS

PRO-4

Power Supply Approvals	UL and CE
Voltage	24V DC
Avg. Power Consumption	30W
DC Supply Breaker	5A
Ultrasonic Frequencies	19.5 - 55 kHz
Control Box IP Rating	IP65
Transducer IP Rating	IP68
Transducer Cable Length	40m
Weight	2.80 kg (6.17lbs)
Control Box Dimensions	230 H x 280 W x 94 D (mm)
Transducer Dimensions	59 H x 73 D (mm)

Maximum Operating Temp 52C (125F)

3 YEAR WARRANTY

LED	COLOUR	NORMAL STATUS	FAULT STATUS	COMMENTS
Status 1	Green/Red	Flashing Green	Flashing Red	This LED monitors CH1-4. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
Status 2	Green/Red	Flashing Green	Flashing Red	This LED monitors CH5-8. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
BOTH	OFF			If the LED is OFF, that indicates low voltage or no power supply

COMPONENTS INCLUDED

PRO-6

- The Echo Tech PRO-6 can control up to six (6) transducers.

TECHNICAL SPECIFICATIONS

PRO-6

Power Supply Approvals	UL and CE
Voltage	24V DC
Avg. Power Consumption	45W
DC Supply Breaker	5A
Ultrasonic Frequencies	19.5 - 55 kHz
Control Box IP Rating	IP65
Transducer IP Rating	IP68
Transducer Cable Length	80m
Weight	3.83 kg
Control Box Dimensions	(8.44lbs) 285 H x 349 W x 145 D (mm)
Transducer Dimensions	59 H x 73 D (mm)

Maximum Operating Temp 52C (125F)

3 YEAR WARRANTY

LED	COLOUR	NORMAL STATUS	FAULT STATUS	COMMENTS
Status 1	Green/Red	Flashing Green	Flashing Red	This LED monitors CH1-4. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
Status 2	Green/Red	Flashing Green	Flashing Red	This LED monitors CH5-8. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
BOTH	OFF			If the LED is OFF, that indicates low voltage or no power supply

COMPONENTS INCLUDED

PRO-8

- The Echo Tech PRO-8 can control up to eight (8) transducers.

TECHNICAL SPECIFICATIONS

PRO-8

Power Supply Approvals	UL and CE
Voltage	24V DC
Avg. Power Consumption	60W
DC Supply Breaker	5A
Ultrasonic Frequencies	19.5 - 55 kHz
Control Box IP Rating	IP65
Transducer IP Rating	IP68
Transducer Cable Length	100m
Weight	3.99 kg (8.80lbs)
Control Box Dimensions	285 H x 349 W x 145 D (mm)
Transducer Dimensions	59 H x 73 D (mm)

Maximum Operating Temp 52C (125F)

3 YEAR WARRANTY

LED	COLOUR	NORMAL STATUS	FAULT STATUS	COMMENTS
Status 1	Green/Red	Flashing Green	Flashing Red	This LED monitors CH1-8. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
Status 2	Green/Red	Flashing Green	Flashing Red	This LED monitors CH8-16. Under normal operation the LED will flash GREEN once for each channel. In the event of a fault, a RED flash will occur on the channel which contains the fault
BOTH	OFF			If the LED is OFF, that indicates low voltage or no power supply

COMPONENTS INCLUDED

PRO-16

- The Echo Tech PRO-16 can control up to sixteen(16) transducers.

TECHNICAL SPECIFICATIONS

PRO-16

Power Supply Approvals	UL and CE
Voltage	24V DC
Avg. Power Consumption	75W
DC Supply Breaker	5A
Ultrasonic Frequencies	19.5 - 55 kHz
Control Box IP Rating	IP65
Transducer IP Rating	IP68
Transducer Cable Length	200m
Weight	5.70 kg (12.57lbs) 203 H x 406 W x 330 D (mm)
Control Box Dimensions	59 H x 73 D (mm)
Transducer Dimensions	

Maximum Operating Temp 52C (125F)

3 YEAR WARRANTY

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 u nit intallation
3. Prepare the surface where your transducers are going to be mounted
4. Bond the Transducer 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 DC supplies
6. Run cables back to the control box (leaving enough slack for future transducer inspection)
7. Plug the transducer cables into the control box outputs and switch the system on

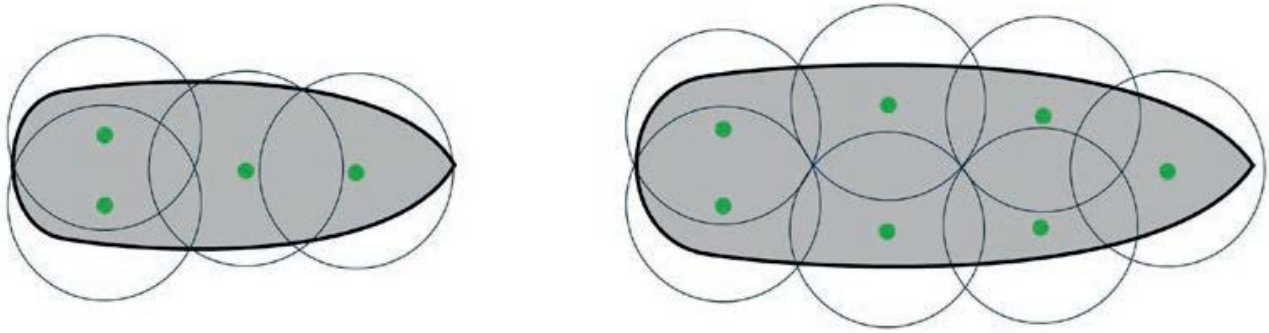
Control Box Location

Once installed your Echo Tech system requires very little maintenance, so the control box can be fitted out of sight

Find a suitable dry and clean location with access to 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, locate the four mounting holes and screw/bolt into place. **Please consult a qualified Marin 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.

Transducer Location - HULLS

When using Echo Tech PRO 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 examples of transducer layouts just for reference. 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 aluminum hulls, each transducer will protect a circular area with a diameter of about 9m. 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.



Transducer Location – STORAGE TANKS

For large potable water storage, Echo Tech can be used to keep water fresher for longer. Echo Tech 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.

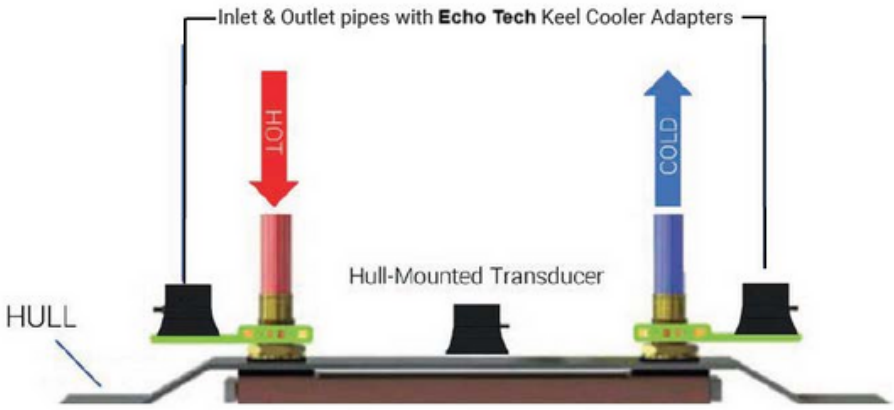
Transducer Location – KEEL COOLERS

Underwater heat-ex changers 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 Echo Tech 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 Echo Tech Keel Cooler Adaptors.

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 r egimes
After - 12 months of normal operation after cleaning & fitting **Echo Tech** system

Transducer Location – BOX COOLERS

Most box coolers can be protected from biofouling by two or more Echo Tech 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 Echo Tech 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 sea chest to determine the location that offers the best coverage.

Above - Typical box cooler setup

Transducer Location – SEACHESTS

For Sea chests 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 sea chest walls. [Do not mount transducers on the horizontal top of the sea chest if there is any chance of an airgap, or if an air bleed valve is fitted].

Transducer Location – WATERJETS

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

Echo Tech 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 Echo Tech Pipe Adaptors can be used to mount transducer s 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.

Below - Diagram showing mounting locations for waterjets

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 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.

2. Key the metal surface and the mounting surface of the transducer with 80-grit sandpaper. (if using power tools, be careful 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. Apply a small amount of epoxy to the prepared bare metal surface and spread it with a flat-edged scraper.

5. 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 transducer.

6. Now apply epoxy to the base of the transducer.

7. Press the transducer firmly into place on the prepared metal surface.

8. Tape or clamp the transducer in place and allow the epoxy to fully cure, usually 12-24 hours.

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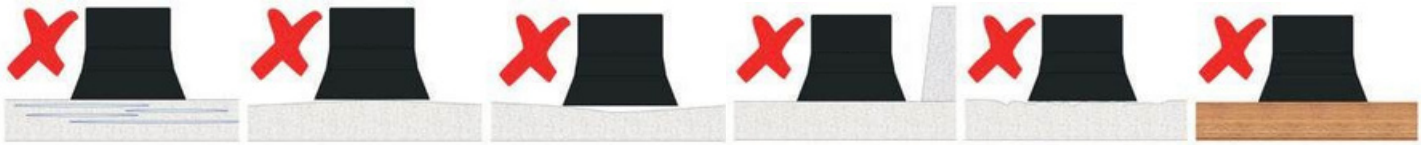
FITTING ECHO TECH - To GRP/ FRP Surfaces

The effectiveness of your system depends on correct installation. Below are the instruct ions for bonding the transducer to GRP (Glass Reinforced Plastic or Fiberglass and FRP (Fiber Reinforced Plastic, like Carbon- Fiber, or Kevlar

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.

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 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 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. Apply a small amount of epoxy to the prepared GRP surface and spread it with a flat-edged scraper.

6. 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 transducer.

7. Now apply epoxy to the base of the transducer.

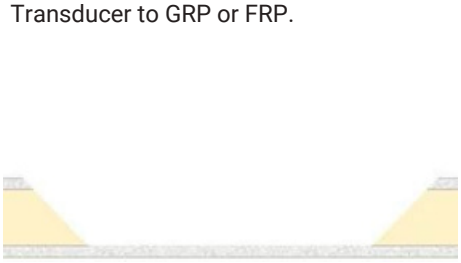
8. Press the transducer firmly into place on the prepared GRP surface.

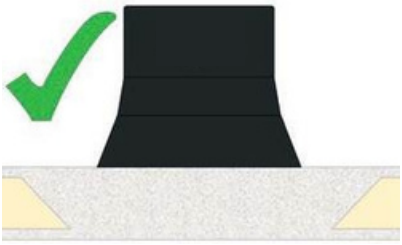
9. Tape or clamp the transducer in place and allow the epoxy to fully cure, usually 12-24 hours.

FITTING THE TRANSDUCERS - In ‘Foam Core’ or ‘Sandwich’ FRP GRP Constructions

DANGER – Consult a qualified marine technician with GRP/FRP expertise before fitting Echo Tech 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 layerof 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 to GRP or FRP.





FITTING PIPE ADAPTORS

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

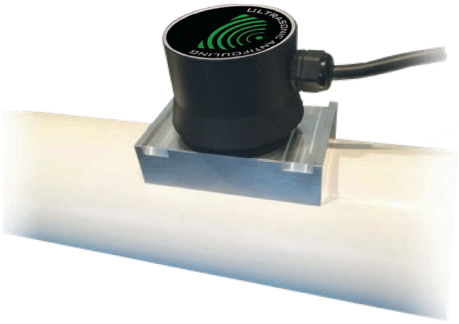
Take the correctly-sized Echo Tech Pipe Adaptor and find a suitable location Ensure you are at least 250mm from a pipe flange, valve-body or bulkhead.

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 adapter to the pipe.
Apply the epoxy to the concave surface of the pipe adapter, paying close attention to the middle of the curve. Ensure that there are no air bubbles in the epoxy.
Press the adapter onto the prepared portion of the pipe, ensuring that the epoxy spreads evenly.

Use heavy-duty zip ties or Jubilee clips to hold the pipe adapter securely in place while the resin cures.

Once the epoxy has set (12-24 hrs), apply epoxy to the transducer mounting surface and the flat surface of the pipe adapter.

Press the transducer firmly in place and tape or clamp into place while epoxy drys, usually 12-24 hours.



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