## Serial number: HT...................

**Article: Harsonic for the HULL of Recreational boats** (to glue on the inside of the hull)
- **HullPower**: 1 transducer dia 110mm (110V-220V)
- **HullBat**: 1 transducer dia 110mm (12V / 24V)
- **HullSmart**: 1 transducer dia 110mm (110V-220V) and (12V/24V)
- **HullPower**: 2 transducers dia 110mm (110V-220V)
- **HullBat**: 2 transducers dia 110mm (12V/24V)
- **HullSmart**: 2 transducers dia 110mm (110V-220V) and (12V/24V)

**Article: Harsonic for the HULL of Recreational wooden boats** (to put on the outside)
- **HullPowerEx**: 1 transducer (110V-220V)
- **HullBatEx**: 1 transducer (12V or 24V)
- **HullSmartEx**: 1 transducer (110V-220V and 12V or 24V)

**Article: Harsonic for the PROPELLERS / Z-DRIVE / RUDDER of Recreational Boats**
- **PropPower**: 1 transducer 180mm x 130mm x 80mm can be connected to 2 prop. (110V-220V)
- **PropBat**: 1 transducer 180mm x 130mm x 80mm can be connected to 2 prop. (12V/24V)
- **PropSmart**: 1 transducer 180mm x 130mm x 80mm for 2 prop. (110V-220V) & (12V/24V)
- **PropPower**: 2 transducers 180mm x 130mm x 80mm can be connected to 4 prop. (110V-220V)
- **PropBat**: 2 transducers 180mm x 130mm x 80mm can be connected to 4 prop (12V/24V)
- **PropSmart**: 2 transducers 180mm x 130mm x 80mm for 4 prop (110V-220V) & (12V/24V)

**Article: Harsonic COMBINATION for Recreational Boat-Hull and Propellers of Boats**
- **Hull-PropSmart**: TD110mm (Hull) + TD 180mm x 130mm x 80mm (Propeller) (110V-220V)&(12V/24V)

**Article: Harsonic for TANKS on Boats**
- **TaPower**: 1 transducer dia 63mm (110V-220V)
- **TaBat**: 1 transducer dia 63mm (12V / 24V)
1 TaSmart : 1 transducer dia 63mm (110V-220V) & (12V/24V)
2 TaPower : 2 transducers dia 63mm (110V-220V)
2 TaBat : 2 transducers dia 63mm (12V / 24V)
2 TaSmart : 2 transducers dia 63mm (110V-220V) & (12V/24V)

Article : Harsonic for BOXCOOLERS
2 BoxPower : 2 transducers dia 75mm for Boxcoolers (110V-220V)
1 TuAGRI50/63/75/90 : 1 transducer for pvc pipes

Articl
2 TuAGRI50/63/75/90 : 2 transducers dia 75mm for Boxcoolers (110V-220V)

2 TXCOOL : 1 transducer dia 50mm + 1 transducer dia 75mm (110V-220V)

Article : Harsonic for INDUSTRIAL TANKS with little contamination (only biofilm)
1 IND50/50 : 1 transducer dia 50mm with grip small (110V-220V)
2 IND50/50 : 2 transducers dia 50mm with grip small (110V-220V)

Article : Harsonic for INDUSTRIAL MEDIUM PIPES from 30mm up to 110mm with little contamination (only biofilm)
1 IND50gripM : 1 transducer dia 50mm with grip medium (110V-220V)
2 IND50gripM : 2 transducers dia 50mm with grip medium (110V-220V)

Article : Harsonic for INDUSTRIAL BIG PIPES > 110mm with little contamination (only biofilm)
1 IND50 : 1 transducer dia 50mm to glue (110V-220V)
2 IND50 : 2 transducers dia 50mm to glue (110V-220V)

Article : Harsonic for COOLINGTOWERS
2 TXCOOL : 1 transducer dia 50mm + 1 transducer dia 75mm (110V-220V)

Article : Harsonic for AGRICULTURE
1 TuAGRI50/63/75/90/110 : pvc Y-piece + 1 transducer for pvc pipes
2 TuAGRI50/63/75/90/110 : pvc Y-piece + 2 transducers for pvc pipes
1 TaAGRI63 : 1 transducer 63mm for tanks <20m3
2 TaAGRI63 : 2 transducers 63mm for tanks <40m3
21.8. Make sure the cable DOES NOT lay on a metal floor. This reduces the emitted ultrasound. In case of metal floor, put an insulation under the cable.

21.9. Finally connect the power plug into the power outlet and check if the blue led is on. It might be possible that the light is off for a very short time, this is the time frame needed to start up the new frequency-cycle.

21.10 Make sure the power is ALWAYS on!! 24/7

21.11 Harsonic® has a open contact to connect to alarm systems (Optional, not included).

21.12. All devices are protected in case of wrong connection. In the event of false polarity connection, there will be an alarm and the transducer or the device will not be broken.

22/ Information on LCD screen

- The LCD screen shows all power interruptions. PF = POWER FAILURES
- The counting of Power Failures if connected to 220V/110V starts after 4 hours without incoming power.
- The counting of Power Failures if connected to battery starts after 10 hours, without incoming power.
- Once you plug in your device and unplug it again, there is a clock activated that will start counting the power interruption. This clock will register how long the device has been unplugged. In case the device has been without power for longer than 10 or 24 hours, there will be a registration on a Power Failure. So it is important if you unplug your device to plug it back in within the 10 or 24 hours to avoid Power Failures on your LCD screen (PF...). In case of batteries, when the battery is recharged, the device will be activated again automatically.

=> Harsonic For Boats: Every claim concerning fouling will be unacceptable in case the power has been interrupted for more than 200 hours or in case of tropical waters >25°C, longer than 150 hours. These power interruptions are showed at the LCD screen of the device. The guarantee on spare parts and fabrication will remain.

=> All other Harsonic applications: Every claim concerning fouling, scaling or other problems will be unacceptable in case the power has been interrupted for more than 24 hours.

LCD is blinking! => check power supply!
In case of low power the LCD screen will flash slowly to attend the owner that there is not sufficient power.
2/Purpose
Prevent biofilm

Water that is circulated, even in tap water, often contains pollutants that can cause a series of problems such as fouling, limestone formation, corrosion and biological growth.

Bacteria and other pathogenic micro-organisms are present everywhere in the environment. They can often be found in cooling tower water or other process water. When cooling towers contain an open recirculation system, micro-organisms can be spread from air to water and from water to air.

Micro-organisms & bacteria can rapidly multiply when a substrate is present. The perfect substrate for micro-organisms is BIOFILM. As a result of biofilm formation, micro-organisms can attach themselves to surface layers. This biofilm layer allows micro-organisms to no longer be flushed away. Biofilms protect micro-organisms from toxic disinfectants.

The intention is that the biofilm (slimy layer on the walls) and the use of chemicals will be reduced. The easiest way to control is to check the inside, before and after installation.

If the tank or pipes were not cleaned before, you will notice dirt and rust coming out so it is important to flush a lot in the beginning.

In case there is a lot of scaling on the inside, there has to be done a chemical cleaning first. Harsonic® devices are developed to work preventively or to reduce the existing biofilm but not hard scaling.

3/How does it work?
By means of ultrasound and the HS technique, developed by Harsonic®, we send constantly vibrations. The transducer converts electrical energy into mechanical energy and is programmed to send out different frequencies and power. These ultra-sounds are 100% safe for animals or human beings. Because of the vibrations and the HS technique, the biofilm (which is the feeding base for micro-organisms) will disappear.

To get the best results there are 5 conditions:
1. the device needs permanent power 24/7: network or battery or both
2. Harsonic® works preventively so we need to start from a clean situation
3. In case of surfaces with paints, remove paints or coatings up to the steel or naked surface.
4. For boat hulls remove soft primers or soft antifouling.
5. In case you connect the device to battery, you need to install a Harsonic® PBM (Power Battery Master) system! This is standard on a battery device.

4/ Technical information
Connection of standard blackboxes:
AC/DC Adapter * Input 100-240Vac * 50/60Hz * 1.8A MAX 12V 7A * Level V * Cable 1.5m *
EU plug
Certificate: UL/cUL * FCC * GS * TUV * CE * Rohs

21.5 in case of industrial Connection boxes with different black boxes inside with Era transformators

Plug and play system for max. 2 transducers:
To connect the transducers, plug in at TX1, TX2, TX3, TX4...

=> Picture = PVC housing 341x291x128 mm for black box and Era transformator and fuse

Plug and play system for max. 4 transducers:
To connect the transducers, plug in at TX1, TX2, TX3, TX4...

=> Picture = PVC housing 341x291x128 mm for black box and PVC housing 291x241x28 mm for Era transformators and fuse

Plug and play system for max. 20 transducers:
To connect the transducers, plug in at TX1, TX2, TX3, TX4, TX20...

Picture = High quality reinforced Polyester distribution box, size 740x530x300 mm for a connection of 8 transducers

21.6. Don't use other cables with other connections, this might disturb the ultrasound vibrations. The cable of the transducer cannot be lengthened yourself otherwise you will lose your guarantee.

21.7. Spare transducer-cable should NO be remain winded. Leave the transducer-cable un-winded in order to avoid negative influence on the sound waves. Cables should be secured up and protected from physical damage and...
20.11 For connection of the transducers to electronic box please follow instructions in art.21

21. Installation of Control box and Connection of transducers to Control Box

Important remark: once you plug in your device and unplug it again, there is a clock activated that will start counting the power interruption. This clock will register how long the device has been unplugged. In case the device has been without power for longer than 24 hours, there will be a registration on a Power Failure. So it is important if you unplug your device to plug it back in within the 24 hours to avoid Power Failures on your LCD screen (PF...). The counting of Power Failures if connected to battery starts after 10 hours without incoming power.

21.1. Please always check if the voltage matches with the plug type and with your electricity network before installation. Please contact your Harsonic® supplier immediately if this is not the case.

21.2. The electronic box should be attached on a dry location to a wall, with the connections facing downwards. Your Harsonic® supplier can provide you with custom made attachment pieces that fit in the corners of the black-boxes. (not necessary for industrial housing-boxes)

21.3. Don’t install it in direct sunlight. Avoid areas which can become very hot and away from any external events.

21.4. For separate black-boxes:
- Check if your device is suitable for battery or network or both (= smart-version)
- Only network: plug in the female plug of the wall-adapter in the power-connection (see drawing)
- Only battery: plug in the female plug in the battery-connection (see drawing)
- Smart-version: FIRST the battery connection and SECONDLY the network connection !!! (device will recognize the incoming battery power 12V or 24V)

In some cases the cable is already connected waterproof in the box. In this case, you don’t need to plug in the transducers anymore.

Connection for female plug from adapter 220V/110V (wall adapters transform the 220V/110V to 12v)

Connection for Power Battery Master (battery)

Consumption: 6W per Transducer
TD Cable-length: 5m or 11m
Electronic Black Box: 18cm x 12cm x 9 cm
Polyester Housing for standard blackboxes and Erea transformers + fuse:
Industrial Box IP66 * temp -35°C/90°C * auto extinguible à 960°C * IEC 62208 UL * reinforced polyester * window IK08 * for heavy industry * industrial transformer of 6.3 Amp
PVC Housing for standard blackboxes and Erea transformers + fuse:
IP66 * NEMA 4-4X * Polyurethane gasket * Double Electrical insulation, Type II * Temp -25°C/60°C * glow wire resistance 65°C

Harsonic® is environmentally friendly and has the EMC certificate

5/ Safety instructions
- Check if the voltage of the electronic box matches with the plug type and your electricity network before installing (network or battery ?).
- check the article-number to see if the device is suitable for connection to battery and/or network.
- This equipment must be installed in accordance with the instructions in this handbook. Failure to do so could result in poor product performance, personal injury and/or damage.
- never put the electronic box under water
- before installing, please check whether there are no damages on your device. when you notice any damage on the transducer or the electronic box, unplug directly and contact your distributor.
- use the appropriate tools and safety gear when undertaking the installation
- ensure power is switched off prior to connecting or removing any cables to the control unit and transducer(s). Failure to do so can cause irreparable damage.
- make sure the installation is out of children’s reach
- install the electronic box and protect it from direct sunlight or rain or other heat-sources
- handle the transducer with care and protect it from shocks
- never open the electronic box or the transducer when it is connected to the power
- before maintaining or repairing something, always unplug the box

6/ Guarantee
Supplier’s Guarantee conditions 01.01.2015

Harsonic® items you purchase come with a manufacturer’s guarantee.

If you do find that you have a problem with the goods or services and you have a guarantee, read it carefully and check that:
- it covers your problem
- that the fault has been caused by something covered by the guarantee
- the timeframe has not expired
- it offers a reasonable solution
- you understand and are happy to pay any extra costs involved

Once you have done this, go or write to the business which sold you the item or provided the service. Explain what the problem is and show them that you have a valid guarantee or warranty. They should then provide you...
with options of how they can resolve the problem. These may include sending the item away for repair or providing you with a new one.

**Guarantee**

Trust in quality “Made by Harsonic®”

Offering our customers the highest quality at all times is a fundamental part of the Harsonic® company philosophy. We therefore offer consumers a voluntary five year manufacturer’s guarantee on our products.

The conditions and details can be found in the guarantee conditions below.

**Guarantee conditions**

**General**

Harsonic® shall assume this manufacturer’s guarantee towards consumers of Harsonic® products in addition to the legal guarantee to which the buyer is entitled in relation to the seller. It shall apply without prejudice to mandatory liability regulations, such as those in accordance with the Product Liability Act, in cases of willful intent and gross negligence, or resulting from loss of life, physical injury or damage to health by Harsonic® or its agents.

**Guarantee protection**

Harsonic® guarantees consumers that its products are free from material - , manufacturing - and design faults. The latest science and technology at the time of manufacture is decisive in this regard. The defect giving rise to the damage must already have been present in the product at this time. Claims for the reimbursement of consequential damage or on the grounds of product liability shall only be valid in accordance with mandatory legal regulations.

This guarantee shall be valid for five years from the purchase date and for a maximum of six years from the date of manufacture. The guarantee period shall not be extended due to the provision of services within the scope of this guarantee, especially not in the event of servicing or replacement. In such cases, the guarantee period shall also not start anew.

**Written notification of defects**

The buyer shall be entitled to assert the rights from this guarantee by providing Harsonic® or the distributor from whom the buyer purchased the product, with a written notification of defect within the guarantee period. The buyer must also provide notification of the defect within 2 weeks of its detection. The buyer shall be obliged to prove that the guarantee has not expired (for example, by presenting the purchase receipt).

Harsonic® shall also be entitled to determine the start of the guarantee period on the basis of the data of manufacture.

**Investigation of claims**

The amount of a claim can never be higher than the amount invoiced by Harsonic® or its distributor. Harsonic® nor its distributor can be held responsible for direct and/or indirect damage, included consequence damage, lack of profit, missed savings and damage by company stagnation on the side.

The Harsonic® product is developed to avoid fouling or scaling and can only be installed after total cleaning. The buyer must be able to prove that the installation was done after a chemical cleaning or another cleaning (with high pressure) where all fouling and biofilm was been removed. The proof of the cleaning with dated pictures is obliged to have a valid guarantee-claim on the result.

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**Transmissmion powder for ponds**

Harsonic developed a unique powder with a concentration of minerals, which improves the ultrasound transmission in water.

**Quantity:** when you install the Harsonic® device, use 25ml per 1,000 litres to activate the transmission of the sound in the water.

**After the installation, every 3 months, use 25ml per 1,000 litres**

**How to check if the device is working?**

At first it might seem that the algae have grown instead of dying. This is because the cohesion of the algae has been reduced. The cells are further away from each other. When the algae come to the surface it is important to remove as much as possible before they will form a blanket on the surface and this blanket will reduce the ultrasound reflections.

If you are not sure that the algae are dead or not, you can do the "bottle-test".

You take an empty plastic bottle and you fill it at 30cm under water with water and algae. Leave it resting during 24-48 hours but don’t close the bottle. If the water remains green and unclear, the algae are not dead. If the algae have sunk to the bottom or are at the surface of the bottle the algae are dead and the device works.

Please notice that the ultrasound device only kills algae. This does not mean that the pond or lake will become completely clear!! Dead algae have to be removed manually or by filters.

**20/installation instructions for Harsonic® for SPA**

- => transducer 63mm
- => 5m cable

20.1 Clean the spa until all biofouling, biofilm, scaling, etc., is completely removed.
20.2 Take dated pictures to prove that cleaning has been done properly. In case of doubt, contact your Harsonic® supplier to check if cleaning is ok.
20.3 The transducer needs to be glued or fixed on the outside and under the waterline! For correct installation location, please inform with your Harsonic® supplier.
20.4 Before installation: remove all insulation and/or paint or coatings till you reach the polyester. It is really important that there is no soft material whatsoever that can block or reduce the transmission. In some cases there is a liner on the inside, in this case contact your Harsonic® supplier.
20.5 Remove dust and degrease. Also degrease transducer.
20.6 Use ONLY the glue from the package and mix this very well!!
20.7 Put the mixture on the transducer and glue it on the location you prepared.
20.9 In case you have a transducer with a grip, fix this firmly around the tube. It is crucial.
20.10 Make sure the transducer is completely fixed WITHOUT ANY AIR.

The glue has to become hard and dry. Wait 24 hours before connecting to the power network.

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There are 2 different ways to install the transducer: with a float or with a stainless steel bar.

**19.1. Determine the optimal location of the transducer**

=> put the float in a corner as close to the wall as possible, or bend the bar over the side

**19.2. You should compare the transducer with "eyes", everything he can "see" will be treated. Make sure there are no obstacles in front of the transducer (e.g. fountains, plants, statues or air bubbles ...)

19.3. when you install the transducer on the bar, ensure that the transducer-front sticks out +/- 5 cm further than the bar so the transmissions can pass also to the bottom without being blocked by the bar

19.4. ensure the transducer is installed in the same way as the water low and/or most frequent wind direction

19.5. ensure there are no corners outside the reach of the transducer

19.6. ensure that the transducer is always completely below water surface!!

19.7. ensure a horizontal position of the transducer

19.8. the float should be secured by means of a pole/spear or rope to make sure that it can't change direction. The float ensures that the transducer always remains in a position of about 15 cm horizontally below water surface. In this way the sound waves will be reflected when they touch the water surface.

19.9. in case the pond/storage tank has a special shape or corners that can’t be reached with 1 transducer, you need to install more transducers

19.10. if you install more than 1 transducer, ensure that they are not facing each other:

19.11. **For connection of the transducers to electronic box please follow instructions in art.21.**

To operate effectively, the device must be operating continuously, 24 / 7

The speed in which the algae are killed will depend on the concentration of algae and the type of algae that have to be treated. There are more than 30,000 sort of algae that can live in salt or sweet water. Algae grow faster when the PH is between 5 and 7 and when there are a lot of nitrates. Some biological filters (especially those with lava-stones) are real algae-factories. The amount of time that passes until you begin to see results will thus vary from a few days to a few weeks. It is VERY important to remove dead algae. Some algae will come to the surface and block the ultrasound waves as they form a kind of algae-blanket. After heavy rains new algae blooms may occur.

Even after the water is cleared from algae, the Harsonic® device will be of use, as algae tend to come back if left untreated. Therefore, the device should remain in order, to continue to keep the water mostly clear and free of algae.

Finally, check regularly whether the transducer and the float are still in the optimal position and clean the front of the transducer once a month with vinegar.

The LCD screen of the Harsonic® devices, will show if there have been power failures.

In case of an invalid claim, all expenses will be charged at the buyer.

**In case the claim of the buyer is valid, Harsonic® or his distributor will return the deposit amount.**

In case of a valid claim, Harsonic® or his distributor has the right to choose to replace the product or to give a compensation with a maximum of the invoiced amount following these percentages:

- Year 1: 100% of the invoiced price
- Year 2: 80% of the invoiced price
- Year 3: 50% of the invoiced price
- Year 4: 25% of the invoiced price
- Year 5: 15% of the invoiced price

The guarantee shall not cover:

- Wear to the device parts such as seals, XLR-electrical connector, led light,
- Breakage of breakable components such as glass or bulbs;
- The exhaustion of consumable materials such as batteries, adapters and others;
- Slight deviations of the Harsonic® products from the target quality that do not affect the usability of the product;
- Damage caused by aggressive environmental influences such as salt, chemicals or detergents or caused by operating and handling errors;
- Product defects caused by the installation, transportation or test operation of the purchased item;
- Damage caused by the faulty Harsonic® product;
- Products for trials and similar.

The guarantee shall not be valid in the event of:

- Non-compliance with the installation, maintenance and usage instructions appended or provided.
- Products that have not been or are not used in line with their intended purpose; The name of the product or to give a compensation with a maximum of the invoiced amount (with a minimum of 750€).
- Damage caused by force majeure or natural disasters, especially but not limited to water, lightning, fires or frost damage.
- Any expedition costs will be carried by the buyer.
- The LCD screen of the Harsonic® devices, will show if there have been power interruptions.

Conditions and exclusions

This guarantee shall only be valid if installation and maintenance have been duly conducted in accordance with the operating instructions and generally accepted engineering practices (e.g. by a master craftsman or authorized specialist). The operating instructions have been compiled with and the Harsonic® products have been used in line with the technical and maintenance instructions provided by Harsonic®.

Installation, usage and maintenance instructions are provided with all products.
These Power Interruptions are important in case of claims for fouling. Depending on the product specifications below:

- **Harsonic For Boats**: Every claim concerning fouling will be unacceptable in case the power has been interrupted for more than 200 hours or in case of tropical waters >25°C, longer than 150 hours. The guarantee on spare parts and fabrication will remain.

- **All other Harsonic applications**: Every claim concerning fouling, scaling or other problems will be unacceptable in case the power has been interrupted for more than 24 hours.

**Place of fulfillment, place of jurisdiction and applicable laws**

This guarantee shall be subject to Belgian law under the exclusion of the UN Convention on Contracts for the International Sale of Goods (CISG) of 11 April 1980. The place of fulfillment for the obligations and the place of jurisdiction under this guarantee shall be Antwerp, Belgium.

Manufacturer Harteel bvba (Harsonic) - Belgium - info@harsonic.com

### 7/Maintenance

The Harsonic® system does not require any maintenance (except for all transducers that hang in the water such as those for Open Waterstorage – see installation instructions Open Waterstorage and Harsonic for the hull (exterior), but we recommend that transducers are measured once a year. Contact your distributor for this to be assured that a Harsonic® authorized specialist does the control, he has a Harsonic® measurement device.

Check now and then if the transducers still make good contact and if they have not become loose. Check frequently the LCD screen if you have an application device with a LCD screen. It is really important that there is no air in between the transducer bottom and the surface where it is fixed on. Also check cabling is secured and not damaged.

### 8/ Installation instructions for the transducers for the HULL of Recreational boats

**A)** to glue the transducers at the inside of the hull

- transducer(s) 110mm
- cable 5m (for 1 transducer) or 5m & 11m (for 2 transducers)

Positioning of the transducer(s) is absolutely critical because incorrect positioning can make the system less effective. Take into account that one transducer covers a radius of 7m15 (=40m²). To be sure of the correct position, consult your Harsonic distributor. He can measure on the spot if the location is fine.

18.6. Notice that there are no obstacles in front of the transducer (on the inside of the tank) which can block the waves. Some tanks have insulation through which the ultrasound waves can’t pass. Please check this before installation.

**PLEASE DO NOT FORGET TO CLEAN THE FILTERS OR TO FLUSH THE TUBES IN THE BEGINNING BECAUSE ALL THE DIRT WILL COME OFF.**

18.7. The transducer has to be installed in between the tubes. This means you have to interrupt the tubes. The transducer is glued into a high pressure Y-piece. Make sure to use the correct connection pieces to the pipelines.

18.8. Make sure the transducer is installed pointing to the same direction as the water flows.

18.9. **For connection of the transducers to electronic box please follow instructions in art.21.**

**PLEASE DO NOT FORGET TO CLEAN THE FILTERS OR TO FLUSH THE TUBES IN THE BEGINNING BECAUSE ALL THE DIRT WILL COME OFF.**

**Special remark**: in case there are valves installed which work by net-power, it can be possible that all dirt comes in the pipes when there is a power-interruption. In that case it is necessary that you flush the dirt out.

### 19/Installation instructions for Harsonic® for Open Waterstorage

- **minimum depth**: pond/lake/open storage tank has to be 80 cm
- **depth > 2m**: require extra transducers
- **special shapes**: require extra transducers

The ultrasound waves are issued by the transducer in a 180 degrees spread from the front of the machine. The device needs to be placed in such a manner that as much of the water surface as possible comes into direct contact with the sound waves. The strongest signals are those that come straight out of the transducer.
17.3. The big transducer dia 75mm has to be installed on the wall of the cooling tower BELOW the waterline!

17.4. Look for best location on the outside of the tank to install transducer.
17.5. Please check on the inside and the outside of the cooling tower if there are no soft coatings or liners (e.g. silicon based). Those have to be removed.
17.6. Remove all paint or rust with sandpaper or steel brush until you see the bare metal.
17.7. Remove dust and degrease. Also degrease transducer.
17.8. Use ONLY the glue delivered by Harsonic and mix this very well!!
17.9. Put the mixture on the transducer and install it on the outside-wall BELOW the waterline.
17.10. Make sure the transducer is completely fixed WITHOUT ANY AIR. The glue has to become hard and dry. Wait 24 hours before connecting the power.
17.11. For connection of the transducers to electronic box please follow instructions in art.21. Make sure the small transducer dia 50mm is connected in TX1 and the transducer of 75mm in TX2. Please consult your Harsonic Supplier to verify the installation.

18/Installation instructions for Harsonic® for Agriculture

=> The transducer has to be installed on the inner side of the hull where there is no extra reinforcement or air so on the external skin of the hull.
=> In case of sandwich construction, balsa cored construction or other fake floor, you should remove this completely!
=> Avoid installation of the transducers close to the surrounding structures bonded to the hull, such as bulkheads, stringers and supporting/strengthening areas for "P" brackets and sail drives. It is best to move further away from the centerline onto an area of original solid hull.
=> 1 transducer can treat a diameter of 7m15 (=40 square meter or 131 square feet) of hull.

18.1. Check if the voltage of the electronic box matches with the plug type and your electricity network before installing.
18.2. If you want to treat the drinking/irrigation water of plants/animals, it is the best to treat the tubes as well as the tank where the water is stored.
18.3. The tank where the water stands still or the high compression barrel where the water stays for a while has to be treated as well.

Tank
18.4. If the wall of the tank is flat, there should be no problem to glue the transducer perfectly. If the wall of the tank is round, it is best to make an adaption piece to fit the transducer in.
18.5. Inside the package you'll find a 2 component glue to attach the transducer. Make sure the transducer is completely fixed to the wall WITHOUT ANY AIR in between the wall and the transducer. Use plenty of 2 component glue and mix this very well!!

Sailingboat:
=> DON'T install on top of keel. Install behind keel
With a keel over the whole length, install left and right from keel

Motoryacht:
=> Install in bilge area or as low as possible

DON'T install on top of keel.

8.1 Clean the boat hull under high pressure! NOT BY DIVER. All biofilm (slime) has to be removed.
8.2 Take picture with date to prove boat has been cleaned.
8.3 Put a high conducted HARD coating on the hull.
8.4 Be aware that the primer is also hard, as well as other coatings. Soft paints like Betumen-based primers should be removed.
8.5 Search for location with single hull as low as possible in the ship (under the waterline). No locations with insulation or air-spaces. Mostly the spot where fish-finder or depth-meter is installed, is fine.
8.6 For sailing boats avoid installation on top of the keel.
8.7 Remove all paint with sandpaper or sander until you see outside hull. Remove all rust on a metal hull. On polyester ships, remove any coating such as gel-coat or other.

8.8 The surface to which the transducer is to be attached must be totally dry and free from grease and dust. Use acetone. Also degrease the aluminium plate of the transducer.

8.9 ONLY use the glue from the package and mix this very well (use rubber gloves)!!

8.10 Put the glue on the transducer and fix it on the hull. LET THE GLUE DRY FOR 24HOURS BEFORE YOU ACTIVATE. THE DEVICE PERMANENTLY. AFTER ONE HOUR THERE CAN BE A TEST TO SEE IF EVERYTHING IS OK.

8.11 Make sure the transducer is completely fixed WITHOUT ANY AIR IN BETWEEN HULL AND TRANSDUCER. The glue has to become hard and dry.

The result will be a clean hull but you may notice some growth along the waterline where the hull is intermittently exposed to air. The only thing you can do about this is brush this line occasionally.

Fouling on the hull up to 10% of the surface cannot be evaluated as failure.

8.12 For connection of the transducers to electronic box please follow instructions in art.21

8.13 For connection of the transducers to electronic box please follow instructions in art.21

B) to put the transducer in the water: ONLY FOR WOODEN SHIPS

=> transducer 75mm with floater or stainless steel bar

=> 10m cable

8B.1 Follow the instructions 8.1 till 8.4

8B.2 In case you have a system with a float: => Secure the float with 2 cables to make sure that the front points always in the right direction and can not change direction.!!

In case you don’t use the float: => Install the transducer to the wall +/- 80 cm under the waterline make sure that the front points always in the right direction and can’t change direction

=> If the transducer is in salt water CLEAN it with vinegar every month!!!!!!

8B.3 For connection of the transducers to electronic box please follow instructions in art 21

9/Installation instructions for the transducers PROPELLERS / Z-DRIVE / RUDDER of Recreational Boats

=> transducer box 180 mm x 130 mm x 80 mm

1 transducer box can treat 2 Propellers or 2 Z-drives or 2 Rudders

15/Installation instructions for for SMALL (15-30mm) & MEDIUM (30-110mm) PIPES with little contamination (only biofilm) Transducers have a GRIP!

please go to instructions of article 13.2 till 13.12

16/Installation instructions for for BIG (>110mm) PIPES with little contamination (only biofilm) transducers need to be glued

=> 1 or 2 transducers 50mm to be glued

please go to instructions of article 13.3 till 13.12

17/Installation instructions for Harsonic® for Coolingtowers

=> Transducer dia 75mm & Transducer dia 50mm

17.1 Clean the coolingtower until all biofouling, biofilm, scaling, etc... is completely removed.

17.2 The small transducer (dia 50mm) has to be installed on the metal pipe of the water inlet. In case the pipe is pvc , contact your Harsonic® supplier.

For metal pipes, the transducer is delivered with a grip. Clasp the grip around the metal pipe and make sure there is NO air between the metal pipe and the grip. Use the 2 component glue (delivered by Harsonic) in between the grip and the pipe to assure a full contact.

please go to instructions of article 13.2 till 13.12
13.1. For installation on the **hull of commercial shipping**, the transducers need to be installed on the inside of the hull, where there is no extra reinforcement or air so on the external skin of the hull. Avoid installation of the transducers close to the surrounding structures bonded to the hull, such as bulkheads, stringers and supporting/strengthening areas for "P" brackets and sail drives. It is best to move further away from the centerline onto an area of original solid hull. In case of sandwich construction, balsa cored construction or other false floor, or to receive an installation-plan, please contact your Harsonic® supplier. He will make the whole calculation for the number of transducers you need and he will inform you where to install all the transducers.

13.2. **installation on tanks, pipelines, heatexchangers, etc:** Look for a location on the outside of the tank / pipeline where the transducer can be installed best. The transducer needs to be glued or fixed on the outside! For correct installation location, please inform with your Harsonic® supplier.

13.3. **Before installation:** clean the tank / pipeline / heatexchanger / hull or any other object you want to treat, until all biofouling, biofilm, scaling, etc... is completely removed.

13.4. **Take dated pictures to prove the cleaning has been done properly.** In case of doubt, contact your Harsonic® supplier to check if cleaning is ok.

13.5. In all cases it is really important that there is no soft material whatsoever that can block or reduce the transmission. In some tanks there is a liner on the inside, in this case contact your Harsonic® supplier.

13.6. **Remove all paint with sandpaper or steel brush until you see polyester or steel.**

13.7. **Remove dust and degrease.** Also degrease transducer.

13.8. **Use ONLY the glue from the package and mix this very well!!**

13.9. **Put the mixture on the transducer and glue it on the location you prepared.**

13.10. **In case you have a transducer with a grip, fix this firmly around the tube.** It is crucial that there is no air in between the tube and the metal plate of the grip!!

To avoid air spaces, **fill up with glue from the package!!**

13.11. **Make sure the transducer is completely fixed WITHOUT ANY AIR.** The glue has to become hard and dry. Wait 24 hours before connecting to the power network. **For connection of the transducers to electronic box please follow instructions in art.24**

13.12. **PLEASE DO NOT FORGET TO CLEAN THE FILTERS OR TO FLUSH THE TANK / PIPES IN THE BEGINNING BECAUSE A LOT OF DIRT WILL COME OFF.**

14/Installation instructions for **INDUSTRIAL TANKS** with little contamination (only biofilm)

=> 1 or 2 transducers 75mm to be glued

**NOT INCLUDED:**

A./ FLEXIBLE INSULATED STAINLESS STEEL CABLE 6 mm to 10 mm:
- length maximum 5 meter
- (The required length can be bought in the local shop).

B./ CABLE EYE 10MM TO CONNECT THE STAINLESS STEEL CABLE ON EACH END AND TO CONNECT ON THE STEEL BAR FROM THE TRANSDUCER BOX IN BETWEEN THE NUTS.
- => can be ordered as an option from Harsonic®
- => use stainless steel cable eyes, not copper

C./ NECESSARY MATERIAL TO CONNECT TO PROPELLER SHAFT
(= Sliding Contacts on the propeller shaft. Normally they are on board but if not, these can be bought in the local shop.)

9.1. **Clean propeller or Z-drive under high pressure!**

9.2. **Make propeller as smooth as possible with hard, high conducted coating.**

9.3. **Make sure all soft coatings, paints and anti-fouling are removed.**

9.4. **Take picture with date to prove propeller or Z drive was cleaned**

**Connection of propeller device = transducer box with threaded rod**

9.5. Put the stainless steel cable-eye around the metal piece of the transducer box (threaded rod) in between the nuts and connect the cable to the cable eye.

9.6. **Use a flexible, hard, insulated steel cable of 6 to 10 mm.** MAXIMUM CABLE LENGTH IS 5 METER.
- Fill up the cable eye with the 2 component glue of the package (mix this glue first very well) and put the cable inside the filled cable eye. **DO THIS ON BOTH END OF THE CABLE.**
- Press the cable connection until it is closed completely. This pressure should be done with a special tool to make sure the cable is in fully contact with the cable eye and without air.

9.7. **Make sure the cable-eye is very well in contact with the metal part of the transducer-box.**

There should not be air in between the cable-eye and the metal bar of the transducer box. In case there is an open space, fill it up with the 2 component glue from the package and mix this very well!!! The glue has to become hard and dry. Use glue on BOTH SIDES of the cable-eye to fill up all air-spaces. The glue avoids air-bubbles between the connection of the cable-eye and the nuts. Wait for 24 hours before connecting to the power!

Measure with the Harsonic detector to see if there is sufficient sound on the propeller in dry dock. This must be done by a Harsonic specialist.

**Propeller shaft:**

9.8. **Connect the steel-cable-eye to the arm which is fixed around the rotating shaft.** Sliding contacts at the propeller shaft are necessary.

**Z-drive**

9.8. with Zdrive connect to screws or bolts to let transmission go out. So connect the steel-cable-eye to one of the bolts, so that the vibrations can pass to the Z-drive.
9. In case you have 2 propeller-shafts, use 2 cables and connect the 2nd cable between the 2nd and the 3rd nut on the transducer bar. More than 2 propellers require extra transducers.

9.10 For connection of the transducers to electronic box please follow instructions in art. 21

10/Installation instructions for transducers of the COMBINATION for Recreational Boat-Hull and Propellers of Boats

For installation of transducer on the hull => please go to article 8
For installation of transducer on Propeller/Z-drive => please go to article 9
For connection of the transducers to electronic box please follow instructions in article 21

11/Installation instructions for the transducer for TANKS on Boats

They can be used on the outside of gasoil tanks or watertanks, 1 transducer till 20,000 liters

=> Transducer dia 63mm

11.1 Look for a location on the outside of the tank where the transducer can be installed best.
11.2 Remove all paint with sandpaper or sander until you see polyester or steel
11.3 Remove dust and degrease. Also degrease transducer.
11.4 ONLY use the glue from the package and mix this very well!!
11.5 Put the glue on the transducer and install it on the wall of the tank
11.6 Make sure the transducer is completely fixed WITHOUT ANY AIR.
11.7 The glue has to become hard and dry LET THE GLUE DRY FOR 24 HOURS BEFORE YOU ACTIVATE THE DEVICE PLEASE DO NOT FORGET TO CLEAN THE FILTERS IN THE BEGINNING BECAUSE A LOT OF DIRT WILL COME OFF.

12/Installation instructions for BOXCOOLERS

=> two transducers 75mm

12.1 Clean the boxcooler tubes and chest until everything is completely removed
12.2 Take dated pictures of the cleaned tubes and chest (together with the serial number of the cooler)
12.3 Remove all paint with sandpaper or steel brush until you see the steel chest.
12.4 Remove dust and degrease. Degrease the transducers.
12.5 ONLY use the 2-component glue from the package. Mix this very well and let it dry for 24 hours before connecting to the power
12.6 For connection of the transducers to electronic box please follow instructions in art. 21

first transducer on tubes in the middle

TX 1

second transducer on the outside chest

TX 2

In case there are several Boxcoolers in one big chest, you need to treat every unit separately. The top TX 1 (see picture) AND the chest TX 2 on one of the sides, pointing to the tubes of that boxcooler. (see picture).

13/Installation instructions for Harsonic Industry Heavy Duty => for Heatexchangers / Tanks / Pipes / Hull’s of Commercial vessels to prevent scale, fast scale, chalk, rust, biofouling, lime etc.

=> transducers 50mm or 75mm

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