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Printed in the United States of America.
Congratulations on your purchase of this Ultrasonic cleaner. Before operating this cleaner, please read this manual thoroughly to help promote an understanding of the cleaner's proper operation. Remember to save your invoice for warranty purposes!

### Environmental Conditions of Use
- Intended for indoor use.
- Maximum altitude 2000m.
- Temperature range 10°C to 40°C
- Relative humidity range 30% to 75%.
- Main supply voltage fluctuation allowable up to +/- 10% of the nominal voltage.

### Environmental Conditions for Transport and Storage
- Maximum altitude 2000m
- Temperature range -40°C to 70°C
- Maximum relative humidity 100%

### IEC 60601-1 Classifications
- Type of protection against electrical shock: Class I equipment, no applied parts.
- Equipment not suitable for use in the presence of flammable mixtures.

### What is Ultrasonic cleaning?
Ultrasonics by itself is just sound frequencies above what you can hear. Ultrasonic cleaning is performed through a process called cavitation. Cavitation generates millions of bubbles in the solution. These bubbles grow in size and eventually implode. When these bubbles collapse, the fluid surrounding the bubbles collapses with great force creating shock waves upwards of 20,000 pounds per square inch.
When the solution outside the bubble rushes towards the center of this cavity it generates high temperatures upwards of 20,000 degrees Fahrenheit. This is what causes the temperature of the solution to increase naturally while the unit is in operation.

The cavitation process is possible due to the use of transducers. A transducer is a thin ceramic disk, which when charged with an electrical alternating current, will create a sound outside of the normal hearing range of humans. It is this sound that we use to create ultrasonic action within the cleaner tank. As the transducer is electrically charged it will generate the ultrasonic wave in an upwards direction (ultrasonics go upwards, not outwards), creating an implosion of the sound waves, which creates the cleaning action.

Installing Your Ultrasonic Cleaner

Safety Precautions

Before using or installing your ultrasonic cleaner, it is important that you read the below safety precautions to ensure safe installation and usage of this ultrasonic unit. Failure to follow these precautions increases the risk of damage or personal injury.

- To avoid electrical shock, unplug your unit from the power source before filling your tank.
- Do not submerge this ultrasonic cleaner in water.
- Do not remove the grounding prong from supplied electrical plug.
- Do not place the ultrasonic cleaner on a circuit which may be overloaded.
- Do not place the ultrasonic cleaner on a circuit which presently supplies a relative large motor, autoclave/sterilizer, polishing motor, air compressor or vacuum motor.
- Do not use flammable fluids under any circumstances.
- Do not place fingers or hands in the tank while the ultrasonic power is on.
- Do not allow parts to rest on the tank bottom surface as they may cause erosion.
- Do not allow the solution level to drop below two inches from the bottom of the tank.
- Do not use any of the chemicals listed in Appendix A of this handbook in your ultrasonic cleaner.
- Only a certified service technician should disassemble the unit should it be needed.
- Do not handle the equipment when the tank is filled.
- This product incorporates fusing only in the ungrounded phase conductor. This product must not be used in countries other than the United States and Canada and must be used only in health care facilities on grounded systems where conditions of maintenance and supervision ensure that only qualified persons will service the electrical distribution system.
Information Regarding Potential EMC Interference And Advice For Avoidance

- Magnetic and Electrical fields are capable of interfering with the proper performance of this device. For this reason, make sure that all external devices operated in the vicinity comply with the relevant EMC requirements.
- Mains power quality should be that of a typical commercial or hospital environment.
- Power frequency magnetic fields should be at levels characteristic of a typical location in a commercial or hospital environment.
- If the above criteria cannot be verified, precaution shall be taken when using this equipment.

Symbol Definitions

ISO 3864, No. B.3.1
Caution: (refer to accompanying documents)

ISO 3864, No. B.3.6
Caution: Risk of electric shock

IEC 417, No. 5032
Alternating Current

Protective Earth Ground

Unpacking Your Ultrasonic Cleaner

1. Inspect the carton for any damages. If you find either external damage or internal damage contact your shipping carrier immediately before contacting your supplier.

2. Carefully check the packing and the picking list for correct items enclosed. If there is a discrepancy found, immediately contact your supplier.

3. Fill out warranty card located on the back cover of this manual and record serial number located on the rear of the unit and mail it to the manufacturer.
Installing Your Ultrasonic Cleaner

1. Select Location for Ultrasonic Cleaner

Counter-Top Model

a. The counter-top model may be positioned on a table or a counter top and should be positioned within reach of a standard (GFI) grounded electrical outlet. The label located on the back of the cleaner will identify proper power requirements.

b. Those units supplied with a drain assembly should be positioned near a sink to allow for easy drainage.

Recessed Model

a. The recessed model ultrasonic cleaner is designed to be surface mounted into a cabinet top. A rectangular hole must be cut in the cabinet top.

b. Further installation details for this model is contained in a “Cutout Template” drawing supplied separately with these units.

c. The unit should be positioned near a GFI electrical outlet as well as a sink for proper drainage. The label located on the back of the cleaner will identify proper power requirements.
Operating Your Ultrasonic Cleaner

Add Cleaning Fluid

1. Make sure that the stainless steel drain screen is installed in the tank drain hole inside the tank. Debris in the solution can destroy the seals in the drain valve and cause them to leak!

2. Make sure the drain valve is closed. Closed is when the quick disconnects are APART.

3. Add the required quantity of ultrasonic cleaning solution into the tank. Select the proper quantity from the table located in Appendix B. (Note: For a list of harmful chemicals see Appendix A.) Add ordinary tap water to fill the tank to the operating level between 1-1.5 inches from the tank top.

Note:

Solution should cover items to be cleaned so they are submerged at least 1/2 inch below the surface of the solution. It is important to change your solution regularly for consistent performance of your unit.

Degassing

To condition the freshly prepared fluid, set the timer to 15 minutes and allow it to operate without adding material to be cleaned. This process is known as a degas phase. After the initial degassing has been completed, subsequent startup only requires 1-2 minutes to complete the degassing. Degassing is required to eliminate air bubbles in the solution for maximum efficacy.

Cleaning

A. Basket Method

1. Place parts to be cleaned in the accessory basket.

2. Insert accessory basket into the ultrasonic cleaner containing the proper amount of ultrasonic solution.

B. Beaker/Pan Method

1. Fill ultrasonic tank 2/3 full with recommended solution water mixture.

2. Fill beaker or pan with ultrasonic cleaning solution to a level 1/2 inch above items to be cleaned.

3. Insert beaker or pan using proper mounting equipment
   a. Pans will have handles
   b. Beakers require positioning cover with Velcro straps so that the beaker does not come into contact with the bottom of the stainless steel tank.
Start-Up

1. Set timer to the desired time (0-60 minutes).
   a. Your cleaner will automatically turn itself off at the completion of the timed period.

Mode of Operation

The timer provided allows the unit to run at short-time intervals of 60 minutes. While the unit will shut off after 60 minutes, a rest period is not required between 60 minute intervals.
The Tank

Ultrasonic cleaner tanks are constructed from corrosion resistant stainless steel. (See Appendix A for limitations on fluids which can be used in this tank). All tanks, except 1.0 and 1.9 liter sizes, are provided with drains and drain valves.

System of Transducers

A transducer system is used in the ultrasonic cleaner to change the electrical energy developed by the ultrasonic generator into mechanical energy. Energy is then transferred from the transducers, bonded to the bottom of the tank, into the fluid in the ultrasonic cleaner tank.
Ultrasonic Generator

The ultrasonic generator is required to provide the proper stimulation to the transducer system previously discussed. This stimulation is electrical energy which fluctuates approximately 45,000 times per second during the periods of operation. The electrical signals are developed by the components located on the printed circuit board which is located inside the cabinet mounted to the bottom is shown in the table below.

The generators are factory tuned and may be used on all units having the same Model number interchangeably without retuning.

The generators are rated at 80-125 watts of average power, depending on the specific model, at 45,000 Hz. The power levels typical of each model are:

<table>
<thead>
<tr>
<th>Model</th>
<th>Wattage</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.9C</td>
<td>80 watts Avg.</td>
</tr>
<tr>
<td>T3.3C</td>
<td>100 watts Avg.</td>
</tr>
<tr>
<td>T4.4C</td>
<td>125 watts Avg.</td>
</tr>
<tr>
<td>T5.7C</td>
<td>150 watts Avg.</td>
</tr>
<tr>
<td>T9.0C</td>
<td>200 watts Avg.</td>
</tr>
<tr>
<td>T10.4C</td>
<td>200 watts Avg.</td>
</tr>
<tr>
<td>T10.4C/SPEC</td>
<td>250 watts Avg.</td>
</tr>
<tr>
<td>T13.7C</td>
<td>300 watts Avg.</td>
</tr>
<tr>
<td>T19.9C</td>
<td>300 watts Avg.</td>
</tr>
</tbody>
</table>

Cabinet

Health-sonic cabinets are constructed from steel and powder coated with a chemical resistant epoxy paint. The tank is supported by the edge of the cabinet. The interface between these components is especially prepared with rubber spacers to reduce vibrations being transmitted into the cabinet walls. This reduces the sound levels emanating from these surfaces and reflects them back into the tank where they can provide useful work.
Foil Test

The foil test is relatively easy to conduct and will provide a permanent record for future comparative evaluation of the cleaner’s performance. The following aluminum foil procedure is recommended.

1. Obtain a roll of standard light weight household aluminum foil. Unroll a piece of foil measuring approximately the diagonal dimension of the tank. Use scissors to cut the foil-Do not tear foil to separate it.

2. Prepare solution using the recommended dilution of ultrasonic cleaning solution and normal tap water (cold). Fill the ultrasonic tank to one inch of the brim.

3. Run the ultrasonic cleaner for 5 minutes.

4. Place foil sample into the tank. Position it vertically into the tank. The foil should extend the diagonal length of the tank. The foil should extend downward to the tank bottom, but not touch the bottom.

5. Hold the foil as steady as possible for 20 seconds.

6. Remove foil sample. Allow foil to air dry, being careful not to wrinkle the foil.

7. The first time you perform the test, immediately after the initial purchase or after a servicing has been performed, the following observations and actions should be made:

   a. The foil surfaces, actually submerged into the solution, should be uniformly peppered, that is worked with the tiny pebbling effect, over the entire surface.

   b. Areas greater than 1 inch square having no pebbling indicate that there is a possible problem in this unit. The unit should be immediately retested, using new foil, to substantiate the failure. The unit, along with its latest foil record, should be returned to your service center for service, if both foil samples agree.

   c. If the foil sample shows even pebbling, then it should be retained in your cleaner file for the future comparative purposes.

8. In subsequent testing you should compare the new foil with the previous foil retained in step 8 above. The foil records form a characteristic picture of your particular ultrasonic cleaner. If these foil records differ materially, contact your service center.
The ultrasonic cleaner is a relatively easy device to keep in good condition. Because the unit uses, in most cases, water based fluid in the tank, care must always be exercised to keep the fluid contained within the tank. The following important points should be observed.

Water Spills

Spills are avoidable during operations and are usually caused by:

- Too much liquid in the tank causing overflow when parts are added.
- Slopping liquid out on the exterior surface when dumping fluid from tank.

The simple solution when a spill occurs is to immediately wipe up all spills, not only on the cleaner surfaces, but also on the table surface and the cleaner bottom.

Tank

As with other appliances the cleaning tank should always be clean. This not only helps retain the highest degree of cleanliness achievable but allows the ultrasonic action to reach its strongest level. Caked debris or sludge must never be allowed to accumulate in the tank bottom. Contaminants greatly impede the passage of the ultrasonic action.

- Periodically the tank inner surfaces should be cleaned with a scouring substance, such as AJAX, COMET, etc.
- Use the white scouring pad supplied with each cleaning unit.
- Do not use any coarse abrasives as deep scratches may be left in stainless steel surfaces.

Note:

Watermarks and slight erosion appearing on new tank surfaces are NORMAL! This occurs because all units are factory operated using fluid for a minimum of 3 hours before shipping. Once operated, these marks can not be totally removed. However, this in no way departs from the new unit condition.

Painted Surfaces

The painted surfaces of your cleaner should be kept clean for good aesthetics as well as for long rust-free life. If a scratch or if the paint is removed the surface should be touched up immediately to prevent rust build-up which tends to undermine the good surrounding paint and in time will destroy the steel.

- Clean the painted surfaces using a good quality cleaner-wax combination periodically.
- In between the times wipe the surface with a 40:1 mixture of Health-Sonics Ultrasonic Cleaner Solution as often as required. All spills should be wiped up immediately.
Transducers

Normally these devices are not seen by operating personnel, however, they may be damaged inadvertently unless adequate precautions are exercised.

- Do not drop parts on bottom of tank (use basket).
- Maintain fluid level between 1 1/2" from tank top.
- Do not allow moisture to enter cleaner’s interior.
  (Never place cleaner on a wet surface.)

Note:

Our warranty provisions may be voided if any of these above conditions have occurred.

Trouble Shooting

The purpose of this section is to provide your repair persons with sufficient technical information to allow a field repair. In order to determine and localize the issue, follow the Trouble Analysis Chart below.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Trouble</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Timer “On” – No light or ultrasonic action observed.</td>
<td>Unit not connected to power source.</td>
<td>Connect unit to proper power receptacle.</td>
</tr>
<tr>
<td></td>
<td>Power Source voltage not present at wall socket.</td>
<td>Locate building master circuit breaker &amp; reset if necessary.</td>
</tr>
<tr>
<td></td>
<td>Unit’s fuse defective.</td>
<td>Replace fuse with proper type and same value.</td>
</tr>
<tr>
<td>2. Timer “ON” Lite “ON” but no ultrasonic action.</td>
<td>Defective generator.</td>
<td>Refer to the generator unit replacement procedure.</td>
</tr>
<tr>
<td>3. Weak ultrasonic action.</td>
<td>Fluid not degassed.</td>
<td>Allow an additional degas period (5-20 minutes) as required.</td>
</tr>
<tr>
<td></td>
<td>No, or insufficient wetting agent in solution.</td>
<td>Add appropriate amount of the Health-Sonics Multi-purpose Ultrasonic cleaner.</td>
</tr>
<tr>
<td></td>
<td>Defective generator.</td>
<td>Contact a certified field technician.</td>
</tr>
<tr>
<td></td>
<td>Defective transducer.</td>
<td>Return unit to factory or authorized service representative for transducer placement.</td>
</tr>
<tr>
<td>5. Ultrasonic action present with timer on but no light.</td>
<td>Defective lamp.</td>
<td>Replace lamp assembly as required.</td>
</tr>
</tbody>
</table>
Chemicals Harmful to Your Tank

The following chemicals, but not limited to those listed, are known to cause varying degrees of deterioration in the corrosion resistance of the stainless steel tank. The chemical activities of these materials are also increased by the “ultrasonic cavitation” forces and by the higher operating temperatures. To maintain your warranty provisions, these chemicals must not be used directly or in dilution in the ultrasonic tank. If there is any question as to the use of any fluid contact your supplier:

- Acetophenone
- Aluminum Chloride
- Aluminum Fluoride
- Aluminum Sulfate
- Ammonium Bifluoride
- Ammonium Chloride
- Ammonium Hydroxide
- Amyl Chloride
- Antimony Trichloride
- Agua Regia
- Bromine
- Calcium Bisulfate
- Calcium Bisulfite
- Calcium Hypochlorite
- Chloracetic Acid
- Chloric Acid
- Chlorine, Anhydrous
- Chromic Acid
- Copper Chloride
- Copper Fluoborate
- Ethyl Chloride
- Ferric Chloride

- Ferrous Chloride
- Ferrous Sulfate
- Fluoboric Acid
- Fluorine
- Hydrobromic Acid
- Hydrochloric Acid
- Hydrocyanic Acid
- Hydrofluoric Acid
- Hydrofluosilicic Acid
- Iodoform
- Mercuric Chloride
- Muriatic Acid
- Phenols
- Phosphoric (crude)
- Sodium Hypochlorite
- Potassium Chloride
- Stannic Chloride
- Stannous Chloride
- Sulfur Chloride
- Sulfuric Acid
- Zinc Chloride
### Ultrasonic Solution Required

<table>
<thead>
<tr>
<th>Ultrasonic Cleaner Model</th>
<th>Solution required 40:1 ratio*</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.9C</td>
<td>1.0 ounces</td>
</tr>
<tr>
<td>T3.3C</td>
<td>1.75 ounces</td>
</tr>
<tr>
<td>T4.4C</td>
<td>2.0 ounces</td>
</tr>
<tr>
<td>T5.7C</td>
<td>3.0 ounces</td>
</tr>
<tr>
<td>T9.0C</td>
<td>4.5 ounces</td>
</tr>
<tr>
<td>T10.4C</td>
<td>5.0 ounces</td>
</tr>
<tr>
<td>T10.4C/S</td>
<td>6.5 ounces</td>
</tr>
<tr>
<td>T13.7C</td>
<td>7.0 ounces</td>
</tr>
<tr>
<td>T 19.9C</td>
<td>11.0 ounces</td>
</tr>
</tbody>
</table>

*Note: 32 ounces = 1 quart

*HealthSonics recommends using HealthSonics Multi-Purpose Ultrasonic Cleaning Solution.

### Unit Fuse Values

#### 120v units:

<table>
<thead>
<tr>
<th>Ultrasonic Cleaner Model</th>
<th>Fuse Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.9C</td>
<td>1A IR35A</td>
</tr>
<tr>
<td>T3.3C</td>
<td>2A IR100A</td>
</tr>
<tr>
<td>T4.4C</td>
<td>2A IR100A</td>
</tr>
<tr>
<td>T5.7C</td>
<td>2A IR100A</td>
</tr>
<tr>
<td>T9.0C</td>
<td>2A IR100A</td>
</tr>
<tr>
<td>T10.4C</td>
<td>2A IR100A</td>
</tr>
<tr>
<td>T10.4C/S</td>
<td>3A IR100A</td>
</tr>
<tr>
<td>T13.7C</td>
<td>3A IR100A</td>
</tr>
<tr>
<td>T 19.9C</td>
<td>5A IR200A</td>
</tr>
</tbody>
</table>

#### 250VAC units:

<table>
<thead>
<tr>
<th>Ultrasonic Cleaner Model</th>
<th>Fuse Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.9C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T3.3C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T4.4C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T5.7C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T9.0C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T10.4C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T10.4S</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T13.7C</td>
<td>IR10,000A</td>
</tr>
<tr>
<td>T 19.9C</td>
<td>IR10,000A</td>
</tr>
</tbody>
</table>

### Health-Sonics Warranty

Health-Sonics guarantees its products to be free from defects in material and workmanship when used with Health-Sonics approved chemicals for a period of 2 years on electrical circuitry and 5 years on the tank, transducers and cabinet. All transportation charges paid and the unit or parts are found defective because of defects or workmanship, the unit (parts) will be repaired, replaced, or credited as determined by Health-Sonics. No claims for damages, taxes, duties or expenses of any other nature will be allowed. To protect our service personnel a $25.00 clean-up charge will be imposed on dirty units returned for service.

### Instructions for Obtaining Warranty Repairs

Package the ultrasonic unit securely to prevent damage in transit. It is not necessary to return accessories (covers, baskets, etc.). Please call our customer service department at (800) 342-3096 to obtain a repair request number and for instructions on sending the unit in for repair. Be sure to include a valid copy of the original purchase invoice with the unit.