

DURAsonic

Ultrasonic Cleaners

User Manual



Warranty

Ultrasonic Cleaners, when used in accordance with manufacturer's instructions and under normal use, are guaranteed for **one year parts and labor and an additional year of parts only**. Within the period guaranteed, manufacturer will repair or replace free of charge, at its sole discretion, all parts that are defective because of material or workmanship, not including costs for removing or installing parts. Liability, whether based on warranty, negligence or other cause, arising out of and/or incidental to sale, use or operation of the transducer elements, or any part thereof, shall not in any case exceed the cost of repair or replacement of the defective equipment, and such repair or replacement shall be the exclusive remedy of the purchaser, and in no case will we be responsible for any and/or all consequential or incidental damages including without limitation, and/or all consequential damages arising out of commercial losses.

CAUTION





-  Do not place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
-  Do not allow the solution to drop more than 1"1/2 inch below the top of the tank.
-  Do not ever use alcohol, gasoline, or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
-  Do not use mineral acids. These could damage the tank.

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Safety Precautions



Before using your Ultrasonic Cleaner, please read and thoroughly understand these safety precautions. Failure to follow them may result in serious personal injury or property damage.

To avoid electrical shock:

- Unplug from power source before filling or emptying the tank.
- Keep the control panel and the area around the cleaner clean and dry -- wipe up solution which spills over the tank brim. Water and high voltage can cause electrical shock.
- Do not operate the cleaner without proper grounding.
- Do not remove the grounding prong on the line cord plug.
- Do not disassemble your cleaner -- high voltage inside the cleaner is dangerous.
- Do not immerse the cleaner in water.

To prevent personal and/or property damage:

- Operate the cleaner with a vented cover or no cover.
- Use water-based solutions.
- Do not ever use alcohol, gasoline, or flammable solutions. Doing so could cause a fire or explosion and will void your warranty. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.
- Do not touch the stainless steel tank or cleaning solution -- they may be hot.
- Do not allow fluid temperature to exceed 70°C (160°F).
- Do not place your fingers or hands into the tank while the cleaner is operating. Doing so may cause discomfort and possible skin irritation. Avoid contact with solutions and provide adequate ventilation.
- Do not use solutions containing chlorine bleach.

To prevent damage to the cleaner:

- Change your solution regularly.
- Do not cover vents on the housing.
- Do not operate the cleaner dry.
- Do not place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items. Failure to comply may cause transducer damage and will void your warranty.
- Do not allow the solution to drop more than 1½ inch from top of tank with heat or ultrasonics on. Failure to comply may cause transducer and/or heater damage and will void your warranty. The fill line is 1" from top of the tank.

Introduction

DURAsonic Ultrasonic Cleaners

The ultrasonic cleaner includes nine models with sizes ranging from 2.5 liters thru 25 liters. Each model is constructed using durable industrial style 40 kHz transducers. These provide increased cleaning power along with built in sweep frequency to ensure uniform cleaning activity throughout the bath. The five larger sizes have built in drains. Each model has a digital timer and mechanical thermostat, with a power switch/fuse in the rear of the machine.



When you first fill your unit, or refill it with fresh solution, use warm water for the solution. Turn on the heater and turn on the ultrasonics (press the “on/off” touch screen button, and use the arrow buttons for timing purposes), add the cover, and the solution will heat quickly to temperature.

Accessories for Your Cleaner

Accessories include a cover and a mesh basket.

Unpacking Your Cleaner

Please check your cleaner and its carton carefully for any external or internal damage. **If you find damage, contact your shipping carrier immediately**, before contacting your distributor. Please retain your packaging for future use.

Installing Your Cleaner

Check the plate on the back of the cleaner for correct power requirements. Position your cleaner within easy reach of a standard grounded electrical outlet. Do not place the cleaner on a circuit which could become overloaded. Connect the Machine to GFI outlet.

If your cleaner does not operate correctly, first refer to the troubleshooting section for possible causes, or contact an authorized service center listed at the back of this manual, for additional information.

Equipment Specifications

Tank Capacity	Ultrasonic Frequency KHz	Unit Dimensions (L x W x H)	Tank Dimensions (L x W x H)	Weight	Power Supply	U.S. Power (Watts)	Warranty	Heat (w/ Temp Control)
2 Liter	40 KHz	8.5" x 7" x 12.5" (L x W x H)	6 x 5.25" x 6" (L x W x H)	7.25 lbs.	AC 100 ~ 120v, 50 / 60Hz	80 W	1yr prts/lbr + 1 yr parts.	Yes
3 Liter	40 KHz	12" x 7" x 10.5" (L x W x H)	9.25" x 5.25" x 4" (L x W x H)	8 lbs.	AC 100 ~ 120v, 50 / 60Hz	120 W	1yr prts/lbr + 1 yr parts.	Yes
4 Liter	40 KHz	14" x 7" x 10.5" (L x W x H)	11.75" x 6" x 4" (L x W x H)	10 lbs.	AC 100 ~ 120v, 50 / 60Hz	180 W	1yr prts/lbr + 1 yr parts.	Yes
6 Liter (1.5 Gallon)	40 KHz	14" x 7" x 12.5" (L x W x H)	12" x 6" x 6" (L x W x H)	12 lbs.	AC 100 ~ 120v, 50 / 60Hz	180 W	1yr prts/lbr + 1 yr parts.	Yes
8 liter (2.1 Gallon)	40 KHz	18"x11"x10.75" (LxWxH)	11.75"x9.5"x4" (L x W x H)	18 lbs.	AC 100 ~ 120v, 50 / 60Hz	660 W	1yr prts/lbr + 1 yr parts.	Yes

How Ultrasonics Work

Dirty items come clean in ultrasonic cleaning systems when millions of superheated bubbles scrub grime and oxidation away with stunning results. How? Through the process of de-cavitation.

Ultrasonic cleaning systems send high frequency sound waves ripping through an ultrasonic cleaning solution leaving superheated bubbles in the waves' wake. When these bubbles, called cavitations, collapse, called decavitation, the heat and energy of their implosions work with the specially formulated ultrasonic cleaning solution to remove dirt, oils, residue, and oxidation from the surface of the contaminated item.

Imagine the ability to get into the tiniest of nooks and crannies where dirt and grime hide, and then imagine scrubbing that surface ultra clean. With conventional cleaning – brushes, rags and elbow grease – this task seems impossible. But the cavitating

cleaning action of an ultrasonic cleaning system does just that – It goes where brush bristles can't.

What is Ultrasonic Cleaning Technology?

Ultrasonic cleaning technology is high frequency sound waves creating a phenomenon in a fluid called cavitating action, or cavitations. Cavitations, the superheated bursting of bubbles in a fluid, are what make ultrasonic cleaning work.

How Can Sound Waves and Ultrasonic Cavitations Clean?

When a sound wave travels through fluid, it stretches and compresses the fluid to transmit sound. When the sound wave's amplitude increases to a threshold level, when the fluid cannot hold the "stretch" of the sound wave, the sound wave energy literally tears the water apart and vacuum bubbles are formed.

Each vacuum bubble grows in size until it can grow no more – equilibrium is reached between the bubble and the fluid – at equilibrium, the bubble is compressed by the surrounding fluid pressure until it collapses. At collapse, a tiny liquid jet is created in the bubble's place.

Each liquid jet creates estimated temperatures and pressures of over five thousand degrees Celsius and ten thousand PSI when the collapse occurs. The extreme pressure and temperature of the jet provides the phenomenon responsible for the effective ultrasonic cleaning action. This action occurs millions of times, over and over, while the sound waves are traveling through the fluid.

Ultrasonic Cleaning Cleans Every Nook and Cranny

When the item being cleaned is submerged in the ultrasonic tank's fluid, the millions of jets created by ultrasonic energy are capable of reaching into fine depressions and intricate details. Every surface area is exposed to the ultrasonic cleaning action; cracks, crevices and hard to reach corners of every nook and cranny get cleaned by the ultrasonic cavitating action. Ultrasonic sweep cleaning technology enhances the system's ability to clean.

Ultrasonic Cleaning Power and Frequency

Ultrasonic system power is rated in how much energy, in watts, is generated in the ultrasonic tank. Higher power systems generally mean shorter part immersion times in the fluid.

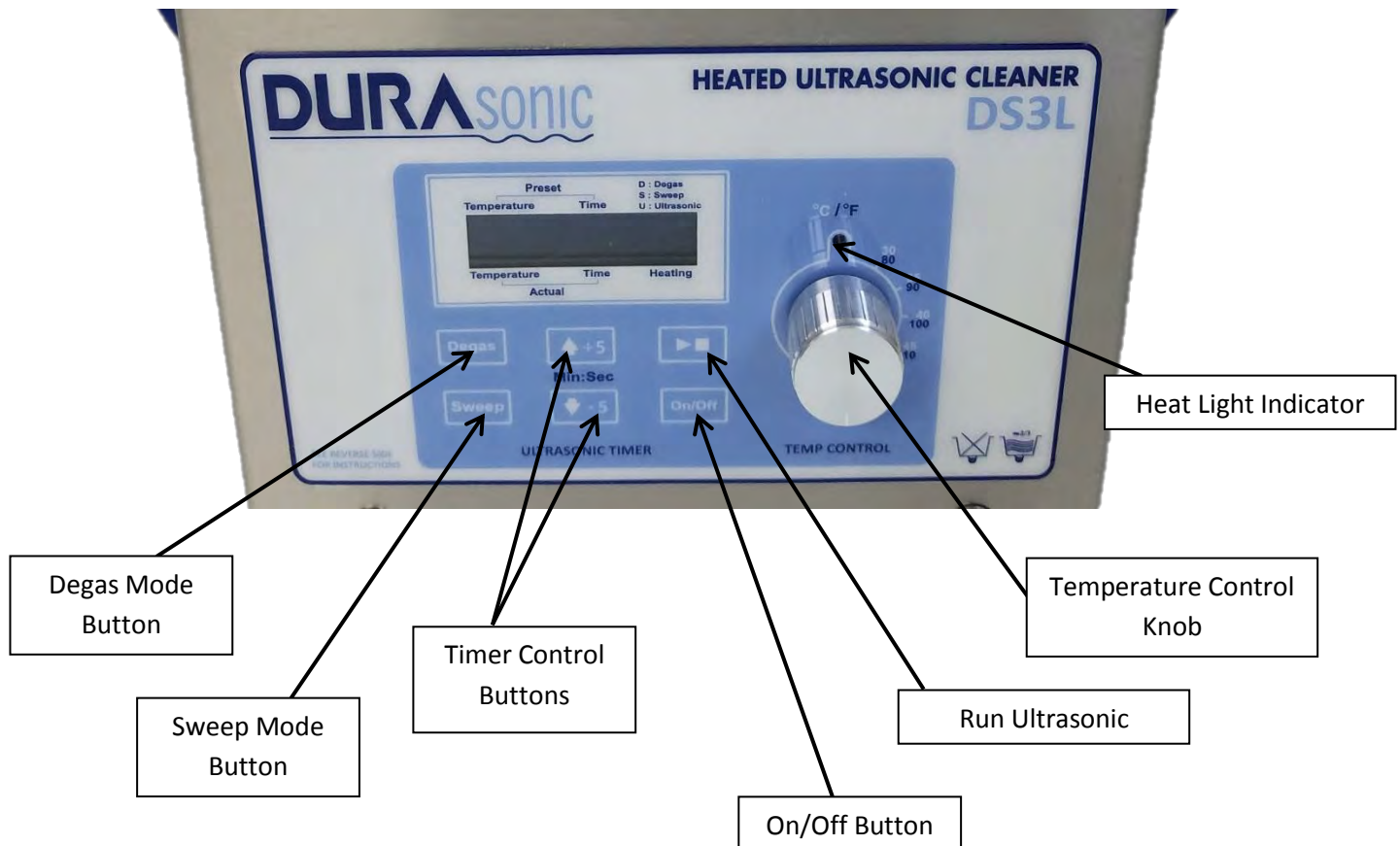
The ideal cleaning frequency is determined by the size of dirt being cleaned. Simply speaking, higher frequencies are more capable it is of removing smaller particles, lower frequencies are better suited for large dirt particles. Many SharperTek® ultrasonic systems can be configured with multi-frequency technology, giving you the benefit of multiple cleaning frequencies in a single design package.

Operating Your Cleaner



If this is the first time you are using the cleaner, please read this whole section before operating your cleaner! Please be advised that the touch pad panel on the front of the unit is energy-seeking, and touch-sensitive. It may not work properly if you push it like a regular button. It is looking for your energy, so try to use the flat part of your fingertip, and it should respond to the lightest touch.

Operating Your DS2L, DS3L, DS4L and DS6L Cleaners



DEGAS MODE / SWEEP TECHNOLOGY


The Degas mode will expel all of the gasses and/or air out of the water in the tank, for better cavitation for the ultrasonic power. The Sweep mode will move the cavitation around in the tank in a more uniform fashion making the ultrasonic cavitation more efficient. Once you utilize these buttons on the machine, you will see the U turn to a D

for degas, and an S for Sweep. Use degas once your machine is fully heated, and then use the sweep mode when you are cleaning for the best possible results!


Explanation of Controls

Control	Function
HEAT	Activates heat to 55 C Maximum.
TIMER	Activates ultrasonics and sets time.
	Turn Knob to desired heat. Turn clockwise to hold position for continuous heat operation.

Before You Start Cleaning



CAUTION!



- Do not place parts or containers directly on the bottom of the cleaning tanks; use a tray or wire to suspend items.
- Do not allow the solution to drop more 1 ½” from top of tank.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

Failure to comply with these cautions will void your warranty.

Step	Action
1	Select your cleaning solution (refer for solution effects on metals)
2	Allowing for the volume of the parts you will be cleaning and operation level line (one inch from the top)
3	Add cleaning solution to the tank of water
4	Plug the cleaner into a ground outlet

NOTE:

If this is the first time you are running the cleaner, or if you have changed cleaning solution, you must degas the solution. If not, skip to “**Cleaning Items**”.

Degassing

Step	Action
1	Turn the HEAT ON
2	Turn the TIMER to 5-10 and let the cleaner run to allow the solution to “degas”.

Cleaning Items

NOTE: To stop ultrasonics at any time, press red off button.

Step	Action
1	Set the TIMER for the amount of time you wish the items to be cleaned.
2	Place the items into a basket.
3	Slowly lower the basket into the tank. Do not allow items to contact the tank bottom.
4	When items are clean and time is up, slowly remove them from the cleaner.
5	Rinse the clean items with clean water and dry them, if necessary.

Operating Your Cleaner

Control	Function
On button	Green touch button located on the left lower half of panel. Press to activate power to cleaner.
Off button	Red touch button located on the middle lower half of panel. Press to deactivate power to cleaner.
Timer control buttons	The two blue touch buttons located in between the on/off buttons. Use to select the amount of time you want the machine to run. Up arrow increases time by 5 minutes and down arrow decreases time by 5 minutes. Note: machine will power off when timer is finished.
Digital Timer Display	Displays select time for cleaning.
Temperature Knob	Located on the right side of panel. Used to set cleaner at desired temperature (In Celsius). The temperature ranges from 0° Celsius to 70° Celsius.
Heat Light Indicator	Red “Heat Light Indicator” turns on indicating that the heat on cleaner is active.

Draining Your Cleaner



Warning



Do not immerse the cleaner in water.
Unplug the cleaner from the power source.

2L, 3L, 4L, and 6L models do not have a drain. To empty, use the side of the rim to pour the used solution into a waste disposal unit, rinse the tank thoroughly and refill with new solution.

Optimizing Your Cleaner

Cleaning - check the tank for contamination whenever you change solution. If necessary, remove contaminants with a nonabrasive cloth and water.

Emptying - always unplug the cleaner before emptying the tank. Empty the solution into a waste disposal unit.

Filling - always unplug the line cord before filling the tank. Fill the cleaner to the operating level (one inch from the top with beaker/tray in place), using warm tap water.

Low solution level - will cause the cleaner to fail. When you remove heavy or bulky loads from the cleaner, the solution level may drop below the operating level. If so, be sure to replace lost solution and degas, if necessary, depending on the amount used.

Overload - do not rest any items on the tank bottom. Weight on the tank bottom dampens sound energy and will cause damage to the transducer. Instead, use a tray and/or beaker positioning cover to support all items. Allow at least one inch between the tank bottom and the beaker or receptacle for adequate cavitation.

Covers - allow the cleaner to heat up faster, to a higher temperature, and avoid excessive liquid evaporation.

Heater - the heater may cause some discoloration of the tank wall. This is normal and will not affect the performance of the unit.

Solution - the fastest method to heat your cleaner is to fill with warm solution, use heat, ultrasonics (which also adds heat), and a cover.

Solution activity - the amount of visible activity is not necessarily related to optimum cavitation for cleaning.

Degassing - fresh solutions contain many dissolved gases (usually air), which reduce effective ultrasonic action. Although solutions will naturally degas over time. Solutions that have been sitting unused for 24 hours or longer have reabsorbed some gases.

Heat - increases the chemical activity of cleaning solutions.

Surface tension - can be reduced by adding solution to the bath. Reduced surface tension will increase cavitation intensity and enhance cleaning.

Solvents - never use solvents. Vapors of flammable solutions will collect under the cleaner, where ignition is possible from electrical components.

Renewal- replace cleaning solutions often to increase ultrasonic cleaning activity. Solutions, as with most chemicals, will become depleted over time. Solutions can become contaminated with suspended soil particles which coat the tank bottom, inhibiting ultrasonic activity.

Application Hints



Never clean novelty or inexpensive jewelry in the cleaner. The combination of heat and vibration may loosen a cement-held setting.

Never clean gemstones such as emerald, amethyst, pearl, opal, coral, turquoise, peridot or lapis lazuli in the cleaner.

First time cleaning - first experiment with one piece, then proceed with the remainder. Solution level- Be sure to maintain solution level within 1 ½" of top of the tank. Surface activity can vary with liquid level.

Load size - It is faster and more efficient to run several small loads rather than a few big loads.

Placing items - Never allow items to sit on the bottom of the tank. Always place them in a tray or beaker or suspend in the solution.

Rinsing items - After cleaning, use a clean water bath to rinse away chemicals adhering to items.

Lubricating items - When necessary, re-lubricate items immediately after cleaning.

Drying items - Air drying at room temperature works for some items. Place parts requiring faster drying time under hot air blowers or in ovens.

Cleaning Methods

There are two methods of cleaning - direct and indirect. Each has advantages and disadvantages. When in doubt, run test samples using both methods to decide which one produces the best results for you.

Direct method

- Items in perforated insert tray
- Item suspended

How it works:

- Fill the tank with warm water and a cleaning solution.
- Place the items to be cleaned in a perforated tray and lower them into the tank. You can also suspend items on a wire and then immerse them in the solution.

The advantages of this method are the simplicity of operation and cleaning effectiveness.

Indirect method

- Items laid randomly in solid insert tray
- Items placed in beakers

How it works:

- Fill the tank with warm water and a cleaning solution.
- Pour your solution medium into one or more beakers or into a solid insert tray.
- Place the beakers in a beaker positioning cover or a solid insert tray to fit your cleaner. Beakers should not touch the tank's bottom.

The advantages of this method are:

- Removed soil stays in the beaker or tray so you can easily examine, filter or discard it.
- You can use one or more solutions at the same time.
 - Two completely different cleaning solutions.
 - One beaker or tray with a cleaning solution and one with a rinse solution.
- Cleaning solution in your tank needs to be changed less often.

Cleaning Solutions



CAUTION

⚠ Do not use alcohol, gasoline, bleach, mineral acids, solutions with a flash point, semi-aqueous or combustible liquids in ultrasonic tanks, or you will void the warranty. Only use non-flammable solutions and water-based solutions.

Solution Types

Water-based solutions are either slightly acidic or alkaline. They include detergents, soaps and industrial cleaners designed to remove specific soils.

Acidic water-based solutions: remove rust, tarnish or scale. They range from mild solutions that remove tarnish, to concentrated, and inhibited acidic solutions that remove investment plaster, milk-stone, zinc oxide and rust from steel and cast iron as well as smut and heat-treat scale from hardened steel.

Alkaline water-based solutions: include carbonates, silicates and caustics. These cause emulsifying action, which keeps soil from redepositing on the cleaned surface, and improves cleaning action in hard water.

Alkaline strength	Removes:
Mild	Light oils and greases, cutting oils and coolant compounds.
Mild to Strong	Heavy grease and oil, waxes, vegetable oils, inks, wax or fat-base buffing and polishing compounds, milk residues and carbohydrates.
Heavy-duty	Mill scale; heat-treat scale, corrosion or oxides.

Change the cleaning solution periodically. Cleaning solutions can become contaminated with suspended soil particles which coat the tank bottom. This coating dampens the ultrasonic action and reduces cleaning efficiency. Certain solutions will cavitate better than others. Contact your local distributor for further information.

Heat and cavitation: increase the chemical activity of cleaning solutions. Some materials may be damaged by this stronger chemical action. When in doubt, test run samples of items to be cleaned. Caustic solutions: used to remove rust from steels, metal alloy corrosion and a variety of tenacious soils.

Solution Amounts

Solution amounts may vary. The amount you use depends on the detergent and the type of soil to be removed. Follow instructions on the solution container and refer to the table below for the effects of solutions on metals.

Chemicals Harmful to the DuraSonic™ Tank

The following chemicals will harm your ultrasonic tank and the action of ultrasonics and higher operating temperatures will increase their chemical activity. Do not use these or similar chemicals directly or in dilution in your ultrasonic tank or you will void your warranty.

Acetophenone	Ferric Chloride
Aluminum Chloride	Ferrous Chloride
Aluminum Fluoride	Ferris Sulfate
Aluminum Sulphate	Fluoboric Acid
Ammonium Bifluoride	Fluorine
Ammonium Chloride	Hydrobromic Acid
Ammonium Hydroxide	Hydrochloric Acid
Amyl Chloride	Hydrocyanic Acid
Antimony Trichloride	Hydrofluoric Acid
Aqua Regia	Hydrofluosilicic Acid
Bromine	Iodoform
Calcium Bisulfate	Mercuric Chloride
Calcium Bisulfite	Muriatic Acid
Calcium Hypochloride	Phosphoric (crude)
Chloracetic Acid	Sodium Hypochlorite
Chloric Acid	Potassium Chloride
Chlorine, Anhydrous	Stannic Chloride
Chromic Acid	Stannous Chloride
Copper Chloride	Sulfur chloride
Copper Fluoborate	Sulfuric Acid
Ethyl Chloride	Zinc Chloride

Solution Effects on Metals

Cleaning Agent	Steel	Brass	Alumi-num	Magne sum	Zinc	S. Steel	Tin
Optical (1)	None	none	none	none"	none"	none	none"
Jewelry (1)	None	none	none	none	none	none	none
Oxide (2) Remover SC31	Slight Etch	none	slight attack	attacks	attacks	none	none
Electronic cleaner	None	none	slight attack	none	none	none	none
General(1) Purpose SC20	none	none	slight attack	none	none	none	none
Metal (1) SC52	none	none	none	none	none	none	none
Rust (3) stripper	none	none	attacks	attacks	attacks	none	slight attack

(1) = Alkaline; (2) = ACidic; and (3) = Caustic.

 **Warning** 

*Free hydrogen may be released if solution comes in contact with reactive metals.

** no effect if solution temperature is less than 140°F.

Troubleshooting

If your cleaner does not operate satisfactorily, please check the tables below for possible causes before calling your authorized service center.

 Warning  <p>High voltage inside - dangerous shock hazard. DO NOT attempt to disassemble or repair the cleaner.</p>

Problem	Cause	What to do
Cleaner will not start.	Cleaner not plugged in properly <i>Rear power switch not in on position.</i> Lose terminal. Bad touch pad panel. <i>Digital timer - Start button malfunctioning.</i> Blown fuse.	Plug into functioning electrical outlet. Press power switch ON. Call nearest authorized service center. Replace with identical fuse or Call service center. nearest authorized
Cleaner operates but does not heat solution.	Heater malfunction <i>Mechanical Thermostat - HEAT not set to ideal</i> Lose terminal or bad heater.	Call nearest authorized service center. Turn heat ON.

 Warning  <p>High voltage inside - dangerous shock hazard. DO NOT attempt to disassemble or repair the cleaner.</p>

Problem	Cause	What to do
Cleaner operates but does not maintain set temperature.	Malfunctioning heater or sensor components.	Call nearest authorized service center.
Cleaner operates but display does not function.	Interrupted calibration sequence. Timer board malfunctions. Bad touchpad panel.	Press SET DISPLAY. Call nearest authorized service center.
Decreased ultrasonic activity.	Solution is not degassed. Solution is spent. Solution level is incorrect for load. Tank bottom is covered with soil particles. Using deionized water in the tank.	Make sure that tank was filled with warm tap water plus cleaning solution and has run 5-10 minutes. Change solution. Adjust solution to within 1 ½" from top of tank, filled with warm tap water. Empty, then clean tank with warm water. Wipe with a nonabrasive cloth. Deionized water does not cavitate as actively as soapy tap water.

Service Information

With normal use, your Ultrasonic Cleaner should not require servicing. However, if it fails to operate satisfactorily, first try to diagnose the problem by following the suggestions in the Troubleshooting Guide.



If you find that your cleaner needs repair, carefully pack and return it to Duraline Systems, Inc. If under warranty, remember to include proof of purchase.

Your cleaner will be shipped by ground service unless you specify otherwise.

Technical Support



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