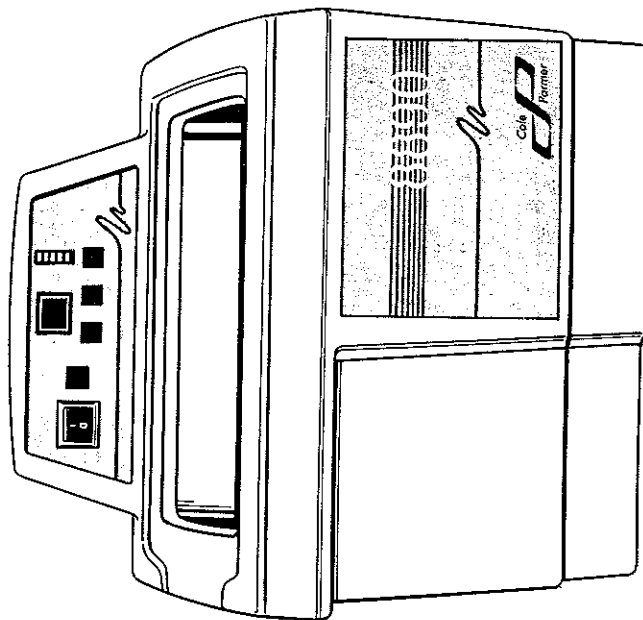


Operating Instructions

Cole-Parmer® 8890-, 8891-, 8892-,
8893-, 8894-Series

Ultrasonic Cleaners



Printed in the U.S.A. 0393

Cole-Parmer Instrument Company

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Thank you for purchasing our ultrasonic cleaners. See our General catalog for more items for your laboratory.

Warranty

The Cole-Parmer Instrument Company warrants this product to be free from significant deviations in material and workmanship for two years from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse within the two year period, please return-freight prepaid-and correction will be made without charge. Cole-Parmer alone will determine if the product problem is due to deviations or customer misuse. Out-of-warranty products will be repaired on a charge basis.



WARNING

- * Don't place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
- * Don't allow the solution to drop below the operating level line (one inch from the top) with the cleaner on.
- * Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- * Don't ever use mineral acids or bleaches. These could damage the tank.

Failure to comply with these warnings will void your warranty.

Return of Items

Authorization must be obtained from our Customer Satisfaction Department before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

NOTE: The Cole-Parmer Instrument Company reserves the right to make improvements in design, construction and appearance of our products without notice.

⚠ Warnings – do's and don'ts ⚠

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

To avoid electrical shock:

- Do unplug from power source before filling or emptying the tank.
- Do 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.
- Don't operate the cleaner without proper grounding.
- Don't remove the grounding prong on the line cord plug.
- Don't disassemble your cleaner — high voltage inside the cleaner is dangerous.
- Don't immerse the cleaner in water.

To prevent personal and/or property damage:

- Do operate the cleaner with a vented cover or no cover.
- Do use water-based solutions.
- Don't 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.
- Don't ever use mineral acids or bleaches. These could damage the tank.
- Don't touch the stainless steel tank or cleaning solution – they may be hot.
- Don't allow fluid temperature to exceed 70°C (160°F).
- Don't 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.

⚠ Warnings – do's and don'ts ⚠

To prevent damage to the cleaner:

- Do change your solution regularly.
- **Don't** cover vents on the cover.
- **Don't** operate the cleaner dry.
- **Don't** 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.
- **Don't** allow the solution to drop below the operating level line (one inch from the top) with heat or ultrasonics on. Failure to comply may cause transducer and/or heater damage and will void your warranty.

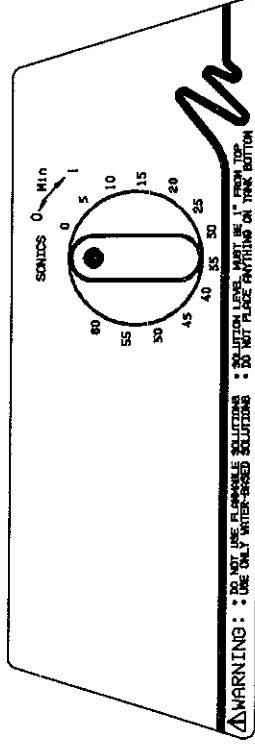
Installing your cleaner

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.

If your cleaner does not operate correctly, first refer to the troubleshooting section for possible causes. Please call Cole-Parmer for additional information.

Operating the mechanical timer cleaner

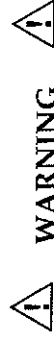
NOTE: If this is the first time you are using the cleaner, please read *Optimizing Your Cleaner* on pp. 16-18 before operating your cleaner.



Explanation of controls

Control	Function
TIMER	Activates ultrasonics and sets time (60 mins. max.)

Before you start cleaning



WARNING

- Don't place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
- Don't allow the solution to drop below the operating level line (one inch from the top) with the cleaner on.
- Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Don't ever use mineral acids or bleaches. These could damage the tank.

Operating the mechanical timer cleaner

Before you start cleaning

Step	Action
1	Select your cleaning solution.
2	Allowing for the volume of the parts you will be cleaning and cleaning solution, fill the tank with warm tap water to the operating level line (one inch from the top).
3	Add cleaning solution to the tank water.
4	Plug the cleaner into a grounded 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 TIMER to 5 – 10 and let the cleaner run to allow the solution to "degas." NOTE: Refer to page 20 for further details on degassing.

Operating the mechanical timer cleaner

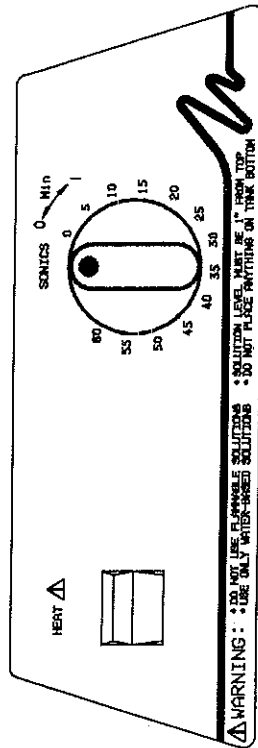
Cleaning items

NOTE: To stop ultrasonics at any time, turn the TIMER to zero.

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, perforated tray, or beakers in a positioning cover.
3	If using beakers or a solid tray, add cleaning solution to beakers or tray to cover the items.
4	Slowly lower the tray or beakers into the tank. Do not allow items to contact the tank bottom. Do not stir the solution.
5	When items are clean, slowly remove them from the cleaner.
6	Rinse the clean items with clean water and dry them, if necessary.

Operating the mechanical timer and heater cleaner

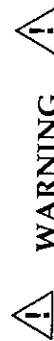
NOTE: If this is the first time you are using the cleaner, please read *Optimizing Your Cleaner* on pp. 16-18 before operating your cleaner.



Explanation of controls

Control	Function
HEAT	Activates heat to 60°C maximum. NOTE: Refer to page 17 for further temperature information.
TIMER	Activates ultrasonics and sets time (60 mins. max.)

Before you start cleaning



- Don't place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
- Don't allow the solution to drop below the operating level line (one inch from the top) with the cleaner on.
- Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Don't ever use mineral acids or bleaches. These could damage the tank.

Operating the mechanical timer and heater cleaner

Before you start cleaning

Step	Action
1	Select your cleaning solution.
2	Allowing for the volume of the parts you will be cleaning and the cleaning solution, fill the tank with warm tap water to the operating level line (one inch from the top).
3	Add cleaning solution to the tank water.
4	Plug the cleaner into a grounded 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." NOTE: Refer to page 20 for information on degassing.

Operating the mechanical timer and heater cleaner

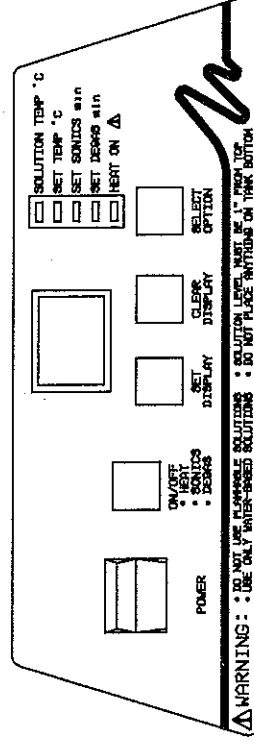
Cleaning items

NOTE: To stop ultrasonics at any time, turn the **TIMER** to zero.

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, perforated tray, or beakers in a positioning cover.
3	If using beakers or a solid tray, add cleaning solution to beakers or tray to cover the items.
4	Slowly lower the tray or beakers into the tank. Do not allow items to contact the tank bottom. Do not stir the solution.
5	When items are clean, slowly remove them from the cleaner.
6	Rinse the clean items with clean water and dry them, if necessary.

Operating the digital timer and heater cleaner

NOTE: If this is the first time you are using the cleaner, please read *Optimizing Your Cleaner* on pp. 16-18 before operating your cleaner.



Explanation of controls

Control	Function
POWER	Press to activate/deactivate power to the cleaner.
ON/OFF	After you press SELECT OPTION and set the LED Display for the selected option, press to activate HEAT (SET TEMP) , Degas (DEGAS TIME) and/or Sonics (SET TIME) .
LED Display	Indicates the tank temperature, set temperature, ultrasonics time or degas time setting, depending on your SELECT OPTION choice.
SET/CLEAR DISPLAY	Used in conjunction with SELECT OPTION to set or clear the LED display. Press CLEAR DISPLAY to clear the LED display to 00. Press SET DISPLAY to reach your selection.
SELECT OPTION	When pressed, toggles through the Function Indicators. This allows you to check or set the tank temperature and set ultrasonic cleaning or degas time.

Operating the digital timer and heater cleaner

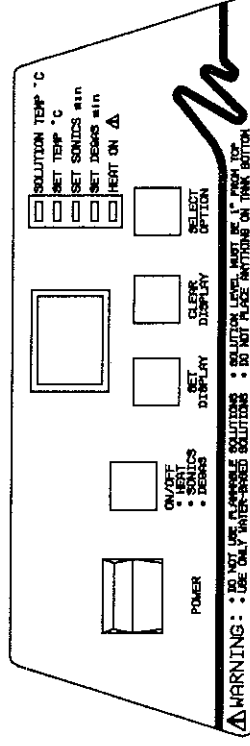
Control	Function
Function Indicators	Lights indicate the option selected by pressing SELECT OPTION. TANK TEMP: Displays current tank temp. (10 – 75°C, ± 4°C). SET TEMP: Set tank temperature (01 – 69°C). SET TIME: Set ultrasonic time (01 – 99 mins., 60 mins. default). DEGAS TIME: Set degas time (01 – 99 mins., 5 mins. default). HEAT ON: Indicates heat is activated and has been set (SET TEMP).

Before you start cleaning

Step	Action
1	Select your cleaning solution.
2	Allowing for the volume of the parts you will be cleaning and for the cleaning solution, fill the tank to the operating level line (one inch from the top) with warm tap water.
3	Add a cleaning agent to the tank water.
4	Plug the cleaner into a grounded outlet.
5	Turn the POWER switch ON. The cleaner will run through a three-second self-test. Wait until the LED Display shows 05 and the DEGAS TIME Function Indicator lights.

Operating the digital timer and heater cleaner

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, move to *Setting Operating Parameters*.



Degassing

Step	Action
1	Degas for 5 – 10 minutes. If necessary, use SET/CLEAR DISPLAY to alter this setting. Default degas time is 5 minutes. NOTE: Refer to page 18 for information on degassing.
2	Press ON/OFF once to start the degas process.
3	After completing the degas time, you are ready to set operating parameters.

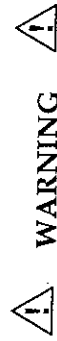
Operating the digital timer and heater cleaner

Setting operating parameters

Step	Parameter	Action
1	SET TIME	The cleaner is now in Set Time mode with a default time of 60 mins. If necessary, use SET/CLEAR DISPLAY to alter this setting. Press ON/OFF once to activate timed ultrasonics.
2	SET TEMP.	To set the tank temperature, press SELECT OPTION until the SET TEMP LED lights. Then press SET DISPLAY to alter the setting until the LED display indicates the tank temperature you wish to maintain. Press ON/OFF once to activate heat. The heat indicator lights.
3	MONITOR TEMP.	To monitor the solution temperature, press SELECT OPTION until the TANK TEMP LED lights. The LED display will indicate the actual temperature of the solution.

Operating the digital timer and heater cleaner

Cleaning items



WARNING

- Don't place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
- Don't allow the solution to drop below the operating level with the cleaner on.
- Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Don't ever use mineral acids or bleaches. These could damage the tank.

NOTE: Select Set Time then press ON/OFF once to stop ultrasonics at any time.

Step	Action
1	Place the items into a basket, perforated tray, or beakers in a positioning cover.
2	If using beakers or a solid tray, add cleaning solution to beakers or tray to cover the items.
3	Slowly lower the tray or beakers into the tank.
4	Press ON/OFF once to activate ultrasonics. Do not stir.
5	When the items are clean, press ON/OFF once to deactivate ultrasonics, then slowly remove the items from the cleaner.
6	Rinse clean items with clean water and dry, if necessary.

Optimizing the Cleaner

Temperature

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

Solution – a cleaner with mechanical timer and heater, **without a cover**, will stabilize at 49°-52°C (120°-125°F) approx. when ultrasonics and heat are running continuously. However, a cleaner with mechanical timer and heater but **with a cover** will stabilize at 60°-64°C/140°-150°F running continuously.

A cleaner with digital timer and heater will stabilize at approx. the same temperature, unless you set the temperature higher. Ultrasonics will add heat to the solution.

Setting the temperature – the cleaner will shut down at 75°C and the LED display will blink "75". Turn the cleaner off and allow it to cool down. For a faster cooldown, replace some of the warm solution with cold solution.

Optimizing the cleaner

Solution

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, using Degas mode speeds up the degassing process. 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.

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

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

Application hints



WARNING

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 at the tank's "operating level" line (one inch from the top).

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.

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

Lubricating items – When necessary, relubricate items immediately after cleaning.

Please call us if you have application questions.

Troubleshooting

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



WARNING

High voltage inside – dangerous shock hazard. DO NOT attempt to disassemble or repair the cleaner.

Problem	Cause	What to do
Cleaner will not start.	Cleaner not plugged in properly.	Plug into functioning electrical outlet.
	Mechanical Timer – Mechanical timer not ON.	Turn timer clockwise.
	Digital Timer – POWER switch not ON.	Press power switch ON.
	Digital Timer – Malfunctioning start button.	Call Cole-Parmer.
	Blown fuse.	Call Cole-Parmer.
Cleaner operates but does not heat solution.	Heater malfunctions.	Call nearest authorized service center.
	Mechanical Timer – HEAT not ON.	Turn HEAT ON.
	Digital Timer – HEAT not set properly.	See <i>Operating Your Digital Timer and Heater Cleaner</i> .
	Digital Timer – Malfunctioning membrane.	Call Cole-Parmer.

Continued on next page:

Troubleshooting



WARNING

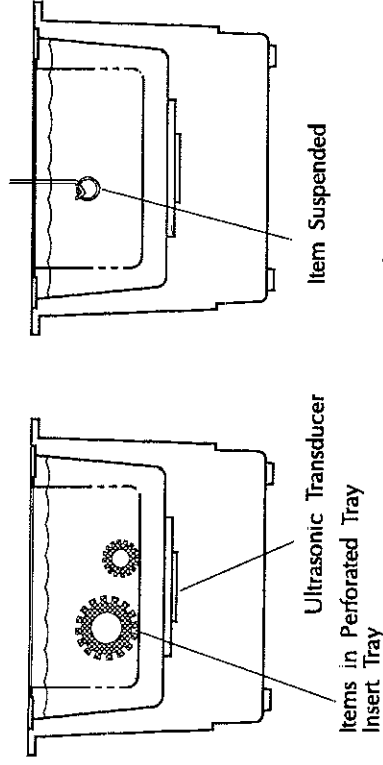
High voltage inside – dangerous shock hazard. DO NOT attempt to disassemble or repair the cleaner.

Problem	Cause	What to do
Cleaner operates but does not maintain set temperature.	Malfunctioning heater or sensor components.	Call Cole-Parmer.
Cleaner operates but display does not function.	Interrupted calibration sequence. Digital Timer – Malfunctioning timer board.	Press SET DISPLAY Call Cole-Parmer.
Cleaner stops operating and display blinks "75".	Overheat condition.	Turn cleaner off. Allow cleaner to cool, check solution level, then restart. Refer to <i>Optimizing Your Cleaner</i> .
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 operating level line (one inch from top) with load. Empty, then clean tank with warm water. Wipe with a nonabrasive cloth. Use warm tap water in the tank. Refer to page 25 for further information.

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



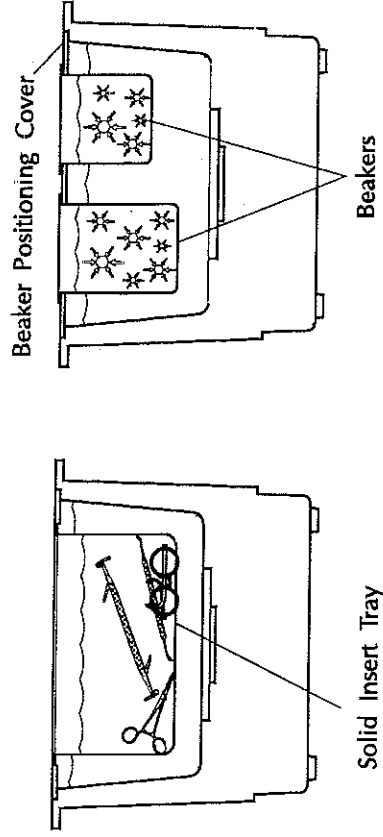
How it works:

- 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.

Cleaning methods

Indirect method



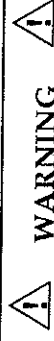
How it works:

- 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



WARNING

Do not use corrosive solutions, such as bleaches, strong acids or powerful caustics, 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, 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

Mild

Mild to strong

Heavy-duty

Removes:

Light oils and greases, cutting oils and coolant compounds.

Heavy grease and oil, waxes, vegetable oils, inks, wax or fat-base buffing and polishing compounds, milk residues and carbohydrates.

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 Cole-Parmer 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.

Cleaning solutions

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.

Solution effects on metals

Cleaning Agent	Steel	Brass	Aluminum	Magnesium	Zinc	S.S. Steel Copper	Tin
Buffing (1) compound	none	slight stain	none	none	attacks	none	none
Oxide (2) remover	slight etch	none	slight attack	attacks	attacks	none	none
General(1) purpose	none	none	slight etch *	none	none	none	none
Industrial strength(1)	none	none	slight etch *	none	none	none	none

* Slight etch on some aluminum alloys

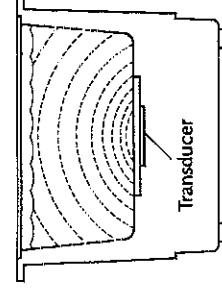
** WARNING: Free hydrogen may be released if solution comes in contact with reactive metals.

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

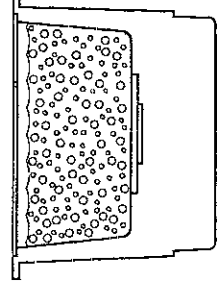
(1) = Alkaline; (2) = Acidic; and (3) = Caustic.

How ultrasonics works

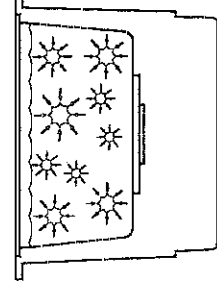
Ultrasonic sound is sound transmitted at frequencies generally beyond the range of human hearing. In your ultrasonic cleaner, ultrasonic sound (sonics) is used for cleaning materials and parts. This is how it works:



- As the sound waves from the **transducer** radiate through the solution in the tank, they cause alternating high and low pressures in the solution.



- During the **low pressure stage**, millions of microscopic bubbles form and grow. This process is called **CAVITATION**, meaning "formation of cavities."



- During the **high pressure stage**, the bubbles collapse, or "implode," releasing enormous amounts of energy. These implosions act like an army of tiny scrub brushes. They work in all directions, attacking every surface and invading all recesses and openings.

Equipment specifications

* NOTE: In the following table, MT describes the Mechanical Timer option; MTH describes the Mechanical Timer and Heater option; and DTH describes the Digital Timer and Heater option.

Solution Capacity	Frequency	Tank Size in/mm	Wt.	Input Power	Heater	Max. Draw Power Req. (Watts)
1/2 gal. 1.91 lit.	47 kHz	L: 5 1/2" (39mm) W: 6"/152mm H: 4"/101.6mm		80W	0 63 63	80-MT * 143-MTH 143-DTH
3/4 gal. 2.81 lit.	47 kHz	L: 9 1/2" (241.3mm) W: 5 1/2" (139mm) H: 4"/101.6mm		125W	0 109 109	125-MT 234-MTH 234-DTH
1 1/2 gal. 5.71 lit.	47 kHz	L: 11 1/2" (292.1mm) W: 6"/152mm H: 6"/152mm		130W	0 205 205	130-MT 335-MTH 335-DTH
2 1/2 gal. 9.51 lit.	47 kHz	L: 11 1/2" (292.1mm) W: 9 1/2" (241.3mm) H: 6"/152mm		185W	0 284 284	185-MT 469-MTH 469-DTH
5 1/2 gal. 20.81 lit.	43 kHz	L: 19 1/2" (95.3mm) W: 11 1/2" (292.1mm) H: 6"/152mm		320W	0 561 561	320-MT 881-MTH 881-DTH

Notes



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