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TECHNOLOGY GROUP

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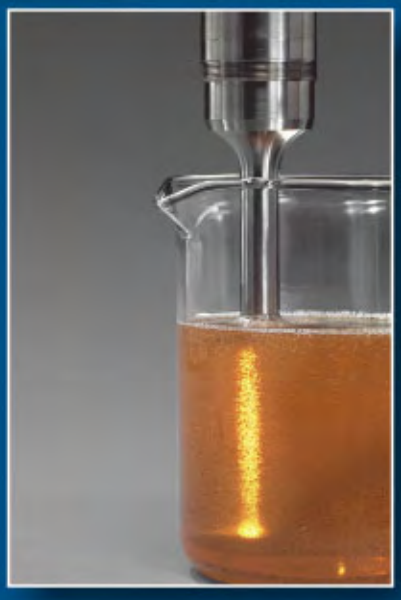
Find the *Sonics Vibra-Cell VCX-500* at our website: ***Click HERE***

SONICS®

SONICS & MATERIALS, INC.









Vibra-Cell™

High Intensity Ultrasonic Liquid Processors

sonics.com

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Introducing the VCX 500 and VCX 750

Simply stated... the VCX 500 and VCX 750 set the standard as the most technologically advanced and reliable ultrasonic processors in the industry.

POWERFUL

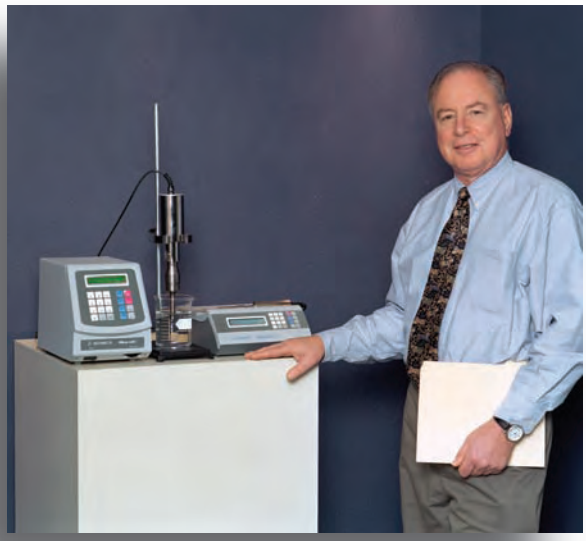
PRECISE

USER FRIENDLY



- Exclusive energy (Joules) monitor and controller
- Digital wattmeter
- Integrated temperature controller
- Optotune™ automatic tuning
- Microprocessor controlled
- Sealed converter
- Intuitive usability
- Smallest footprint in the industry
- 3-year transferrable warranty for parts **and** labor
- Designed and manufactured in the USA
- Used in more laboratories worldwide than any other ultrasonic processors

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Dear Colleague

At Sonics, we believe that technological innovation and collaboration are the cornerstones on which to build a better product. We are research driven, and continually refine and broaden our product line by aggressively investing in R&D and working closely with laboratory and production personnel around the globe. The instruments displayed in this catalog are the product of that synergy.

Our readiness to go the extra mile, and to treat our customers and employees with respect and integrity, has earned our company an enviable reputation in the field of ultrasonics. We look forward to strengthening these relationships in the years to come, as we work together to develop new and exciting ultrasonic solutions.

On behalf of all of us at Sonics, I would like to take this opportunity to thank each and every one of our customers for the confidence you have placed in us. You have contributed to our growth, and we sincerely appreciate your loyalty and continued patronage.

Robert Soloff – President

MORE PRODUCTS

MORE OPTIONS

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This catalog displays our products in terms of increasing power and processing capabilities, and includes, in addition to our core line of ultrasonic equipment, a new generation of ultrasonic processors specifically designed to meet the diverse and evolving needs of our research and industrial customers.

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COMPANY PHILOSOPHY

For forty years, we have provided the scientific and industrial community with the most innovative and reliable line of ultrasonic processors in the industry.

Dedication to excellence, and attentiveness to the needs of our customers, has resulted in long-term relationships and continuous growth. And even though we are now in a position of leadership, our goal has remained steadfast: to earn your trust by conducting business in a straightforward manner, and offering the highest quality products at a fair price.

3-YEAR WARRANTY – UNLIKE ANY OTHER

The Vibra-Cell™ three-year warranty reflects our commitment to safeguard your investment. Should your instrument need servicing within that period, we will repair it without charge for both parts **and** labor. Sonics' warranty outperforms all others in commitment, and stands as tangible evidence of the Vibra-Cell's™ long-term reliability.

PREDICTABLE PERFORMANCE

Making sure that your ultrasonic processor will stand the test of time is a responsibility we take very seriously. To this end, we control the quality of our equipment by manufacturing many of our components in house. Our attention to details has contributed to a high degree of reliability, and over the years, the rate of return for units to be repaired has consistently been less than ¼ of 1%. Should a need ever exist for repair, unlike our competitors, we will service your instrument regardless of the date of purchase.

The Vibra-Cell's™ inherent dependability is the result of strict adherence to ISO 9001 and our exacting quality control standards. During the manufacturing process, all parts are subjected to three levels of inspection: incoming, in process and final. In addition, every unit must pass four functional tests before leaving our manufacturing facility.

ISO 9001 CERTIFIED | ☑RoHS COMPLIANT | CE COMPLIANT

PERSONALIZED WORLDWIDE ASSISTANCE

For prompt support at the local level, Sonics has in place trained personnel located in most countries around the world.

For application-specific information, advice on which product to use, guidance prior to and during any phase of processing, or maintenance-related questions, please contact one of our Technical Support Specialists at our headquarters, or one of our authorized Vibra-Cell™ Distributors. Our Support Specialists regularly participate in multidisciplinary seminars and their experience with ultrasonic applications spans a broad spectrum of disciplines and functionalities. They will provide you with a level of expertise and personalized service that is simply unmatched in the industry.

The Vibra-Cell™ is distributed in over 30 countries around the world. For the name of your local Distributor, please contact our corporate headquarters.

ABOUT ULTRASONICS

The ultrasonic power supply (generator) converts 50/60 Hz voltage to high frequency electrical energy. This alternating voltage is applied to disc-shaped ceramic piezoelectric crystals within the converter, causing them to expand and contract with each change of polarity. These longitudinal vibrations are amplified by the probe (horn) and transmitted into the liquid as alternating high and low pressure ultrasonic waves. The pressure fluctuations pull the liquid molecules apart creating millions of micro-bubbles (cavities), which expand during the low pressure phases, and implode violently during the high pressure phases. As the bubbles collapse, millions of shock waves, micro streams, eddies and extremes in pressures and temperatures are generated at the implosion sites. Although this phenomenon, known as cavitation, lasts but a few microseconds, and the amount of energy released by each individual bubble is minimal, the cumulative amount of energy generated is extremely high. This process is self-stimulating because the imploding bubbles create new sites for bubbles to form. The high shear energy delivered is at maximum near the tip of the probe, and decreases as the distance away from the tip increases.

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Compared to mechanical homogenizers, ultrasonic probes are practically self-cleaning, and by virtue of their design, account for negligible sample losses.

When used with environmentally safe aqueous cleaning solutions, the Vibra-Cell™ becomes a powerful cleaning tool, capable of removing the most tenacious contaminants from normally inaccessible locations. Unlike ultrasonic baths, which dissipate the vibrational energy over a large area, the Vibra-Cell™ probe focuses the energy to create a concentrated, high intensity cleaning zone.

It should be noted that using a power supply of a higher power rating will not transmit more energy into the sample. Rather, it is the resistance to the movement of the probe that will determine how much power will be delivered. Negligible power is required to keep a probe vibrating in air. As the probe is immersed in a liquid and the resistance to its movement increases, a feedback network senses the change in power requirements, and causes the electrical power drawn from the power supply to increase automatically and proportionally in order to keep the amplitude at the probe tip constant. The higher the viscosity and greater resistance to the movement of the probe, the greater the amount of power that will be delivered to the probe.

HIGH PERFORMANCE ULTRASONICS

The Vibra-Cell™ incorporates significant innovations to give you complete freedom to focus on what's important. Feedback from the probe is continuously evaluated, and the frequency and power automatically adjusted to ensure optimum performance. All units are 100% microprocessor-controlled, and unlike conventional ultrasonic processors, are not only capable of displaying the amount of power in watts, but can also display the amount of energy in joules (watts x seconds).

Additionally, the VCX 500 and VCX 750 provide a new level of capability by simultaneously monitoring and **controlling** both the temperature of the sample and the amount of energy that is being delivered. This innovation, available exclusively with the Vibra-Cell™, delivers unprecedented accuracy and reproducibility, and virtually eliminates any opportunities for human errors and operator-to-operator variability. In contrast to other ultrasonic processors, the Vibra-Cell™ is the only one that can control to one Joule the amount of energy that is being delivered into the sample.

In order for a sample to be processed effectively, it is essential that the amplitude at the probe tip remains constant. Compared to others, our Optotune™ amplitude control is unmatched in the industry. It's the only one to incorporate novel digital circuitry that ensures rock-solid stability, regardless of variations in density, viscosity, volume or temperature. Unlike other systems, the vibrations at the probe tip will not decrease as the resistance to the movement of the probe increases. With the Vibra-Cell™ critical protocols can be qualified and duplicated with confidence, knowing that the amplitude delivered will always be identical to the one specified.

All models are remote actuation compatible, and for greater reliability incorporate overload protection circuitry to shut down the ultrasonics in the event of out-of-spec processing. The converters are designed for heavy-duty operation, and are sealed for protection against potentially harmful contaminants.

Filtering complies with worldwide regulations governing RF interference and leakage current. Unlike most other ultrasonic processors, the Vibra-Cell™ is conservatively rated, and is guaranteed to deliver published power output specifications. For maximum economy all ½" (13 mm), ¾" (19 mm) and 1" (25 mm) probes are available with replaceable tips; when cavitation erosion is advanced, it is only necessary to replace the tip, not the complete probe (see caution on page 8). And because bench space is at a premium, the Vibra-Cell™ was designed with the smallest footprint in its class.

In the lab and on the production line where processing capabilities and dependability must be delivered, the Vibra-Cell™ has no equal.

For Your Information . . . Power Ratings – Real or Exaggerated?

Unfortunately, there are no regulations governing ultrasonic processor power ratings.

One company may list its ultrasonic processor as being 100 watts, while another company, using the more stringent RMS rating standard will list that same unit as being only 60 watts.

With ultrasonic processing, the higher the wattage and the larger the probe diameter, the greater the volume that can be processed. Because power rating determinations vary widely with manufacturers, it is recommended that probe selection be carefully reviewed in order to ensure that the implied processing capabilities of the unit under consideration are valid. For example, a 100 watt unit should be able to drive a ½" (13 mm) probe, and **effectively** process up to 100 milliliters. If a ½" (13 mm) probe is not available with a "100 watt" unit, a method other than the RMS standard was used to determine its power rating, and its actual processing capabilities will be less than 100 ml.

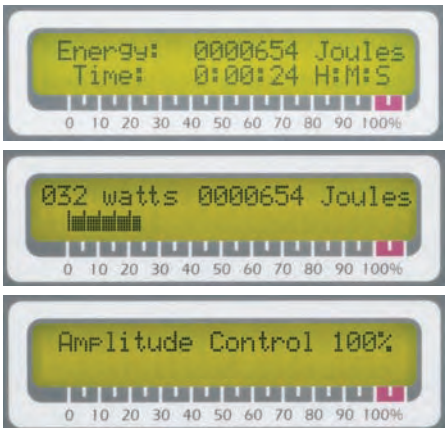
Note: The maximum volume that can effectively be processed with a ⅛" (3 mm) probe is 15 ml.

At Sonics we use the RMS power rating standard and publish both the wattage **and** legitimate processing capabilities, for we think that giving one without the other would be both meaningless and intentionally misleading.

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130 Watt Ultrasonic Processor with Thumb Actuated Pulser – 150 microliters to 150 milliliters

Real time display . . .



3 mm probe**



VCX 130 PB – VCX 130 FSJ

□ Energy monitor □ Digital wattmeter □ Automatic tuning □ Automatic amplitude compensation
□ Microprocessor based □ Thumb actuated pulser* □ Elapsed time indicator □ Variable power output control

SPECIFICATIONS

POWER SUPPLY	Net power output: 130 Watts. Frequency: 20 kHz Dimensions: (H x W x D) 4½" x 9¾" x 12½" (115 x 250 x 320 mm) Weight: 6.5 lbs. (3 kg) Can be run continuously or in a pulsing mode.*
CONVERTER	Piezoelectric lead zirconate titanate crystals (PZT) Part No. CV 188 with pulsing button. Compatible with VCX 130 PB* Part No. CV 18 without pulsing button. Compatible with VCX 130 FSJ Diameter: 1¼" (32 mm) Length: 5¾" (146 mm) Weight: ¾ lb. (340 g) Cable length CV 18: 5‘ (1.5 m) Cable length CV 188: 6' (1.8 m)
STANDARD PROBE	Tip diameter: ⅛" (3 mm). Processing capability: 250 µl to 10 ml.** Length: 5⁷⁄₁₆" (138 mm). Titanium alloy Ti-6Al-4V. Autoclavable. Part No. 630-0422
ELECTRICAL REQUIREMENTS	Unless otherwise requested, units are shipped wired for 117 volts, 50/60 Hz. For export, please specify desired voltage option.

ORDERING INFORMATION

	Part No.
130 Watt ultrasonic processor with pulsing button	VCX 130 PB*
130 Watt ultrasonic processor with footswitch jack	VCX 130 FSJ

Shipped complete and ready for operation with a ⅛" (3 mm) probe,** tool kit, and instruction manual.

OPTIONAL ACCESSORIES

For optional accessories, please refer to pages 5 and 6.

* Part No. VCX 130 PB does not have a footswitch jack. Part No. VCX 130 FSJ has a footswitch jack but the converter does not incorporate a pulsing button.
** For other volumes, please refer to probe and microtip listings on page 5. A different probe can be substituted for the standard probe.

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130 Watt Ultrasonic Processor with Timer and Pulser – 150 microliters to 150 milliliters

Real time display . . .



6 mm probe*



VCX 130

□ Energy monitor □ Digital wattmeter □ Automatic tuning □ Automatic amplitude compensation
□ Microprocessor based – programmable □ Ten hour timer □ 1-59 second independent ON/OFF pulser
□ Elapsed time indicator □ Variable power output control

SPECIFICATIONS

POWER SUPPLY	Net power output: 130 Watts. Frequency: 20 kHz Dimensions: (H x W x D) 4½" x 9¾" x 12½" (115 x 250 x 320 mm) Weight: 7 lbs. (3 kg.) Timer: Variable from 1 second to 10 hours Pulser: On and Off cycle are independently controllable from 1 second to 59 seconds Remote actuation compatible. Footswitch jack
CONVERTER	Part No. CV 18. Piezoelectric lead zirconate titanate crystals (PZT) Part No. CV 187. Same as CV 18 but with fittings for air cooling. Diameter: 1¼" (32 mm) Length: 5¾" (146 mm) Weight: ¾ lb. (340 g) Cable length: 5′ (1.5 m)
STANDARD PROBE	Tip diameter: ¼" (6 mm). Processing capability: 10 ml to 50 ml.* Length: 4½" (113 mm). Titanium alloy Ti-6Al-4V. Autoclavable. Part No. 630-0435
ELECTRICAL REQUIREMENTS	Unless otherwise requested, units are shipped wired for 117 volts, 50/60 Hz. For export, please specify desired voltage option.

ORDERING INFORMATION

	Part No.
130 Watt ultrasonic processor	VCX 130

Shipped complete and ready for operation with a ¼" (6 mm) probe,* tool kit, and instruction manual.

OPTIONAL ACCESSORIES

For optional accessories, please refer to pages 5 and 6.

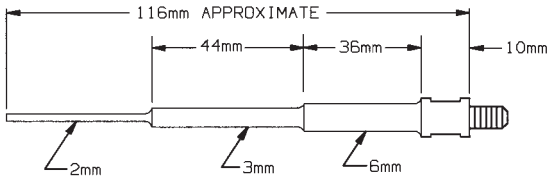
* For other volumes, please refer to probe and microtip listings on page 5. A different probe can be substituted for the standard probe.

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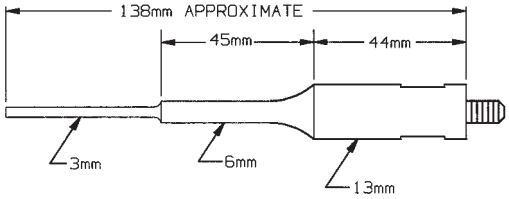
STEPPED MICROTIPS AND PROBES

Microtips and probes amplify and radiate the ultrasonic energy into the sample. Smaller diameter tips produce greater intensity of cavitation, but the energy released is restricted to a narrower, more concentrated field. Conversely, larger diameter tips produce lower intensity, but the energy is released over a greater area permitting larger volume to be processed. Connecting stud ¼ - 20. Microtips and probes are fabricated from titanium alloy Ti-6Al-4V and are autoclavable.

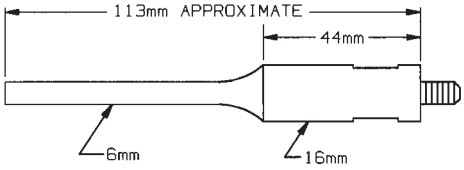
5/64" (2 mm) stepped microtip
Part No. 630-0423



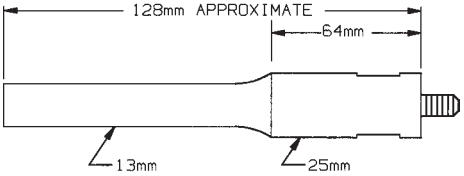
⅛" (3 mm) stepped microtip
Part No. 630-0422



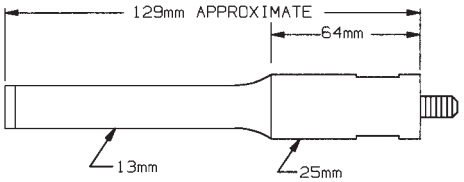
¼" (6 mm) probe
Part No. 630-0435



½" (13 mm) probe
Part No. 630-0561



½" (13 mm) probe with replaceable tip*
Part No. 630-0560



	STEPPED MICROTIPS AND PROBES			
PART NO.	630-0423	630-0422	630-0435	630-0561 630-0560
TIP DIAMETER	5/64" (2 mm)	⅛" (3 mm)	¼" (6 mm)	½" (13 mm)
INTENSITY	Ultra high	Very high	High	Medium
VOLUME (batch)	150 µl-5 ml	250 µl-10 ml	10-50 ml	50-150 ml
AMPLITUDE* micrometers (microns)	207	182	123	75
inches	.0081	.0071	.0048	.0030

*With the amplitude control set at 100%.
Note: With the amplitude control set at 100% the amplitude at the converter tip is 20 micrometers (.0008 inch).

EIGHT-ELEMENT PROBE



The high throughput eight-element probe meets the needs of repetitive tasks by processing identically 8 samples simultaneously. Consists of an aluminum coupler and eight ⅛" (3 mm) mini microtips. Processing capabilities: 250 µl-2ml.
Spacing between tips: 11/32" (9 mm).
Mini microtip length: 11/16" (17 mm).
Part No. 630-0602

REPLACEABLE TIP**



The replaceable tip for probe Part No. 630-0560 is fabricated from titanium alloy Ti-6Al-4V and is autoclavable.
Diameter: ½" (13 mm). Thread: ¼ - 20
Part No. 630-0406

CONTINUOUS FLOW CELL



The continuous flow cell screws into the converter in place of the probe. Recommended only for the treatment of low viscosity samples which do not require prolonged exposure to ultrasonics. Designed primarily for dispersing and homogenizing at rates up to 15 liters/hour. The vessel is fabricated from glass. The probe and processing chamber are fabricated from titanium alloy Ti-6Al-4V and are autoclavable. Ease of disassembly facilitates cleaning.
Volume of liquid with probe in place: 35 ml.
Connecting stud: ¼ - 20
For low pressure applications only.
Part No. 630-0566

NOTE: All probes and replaceable tips are fabricated from high grade titanium alloy Ti-6Al-4V and are autoclavable.
Because ultrasonic probes are tuned to resonance, their length may vary slightly due to variations in the titanium's modulus of elasticity.

*Do not use this probe with replaceable tip when processing samples containing organic solvents or low surface tension liquids. Use solid probe Part No. 630-0561 instead. See caution on page 8.

**Supplied individually or in sets of five.

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ROSETT COOLING CELL

The Rosett cooling cell enables uniform treatment at low temperatures. The cell is placed in a cooling bath. The ultrasonic energy forces the sample to circulate repeatedly under the probe and throughout the cooling arms.
30 ml Rosett cooling cell.
Part No. 830-00003





10 ml

GLASS COOLING CELLS

10 ml cooling cell with water jacket.
Part No. 830-00009

100 ml cooling cell with water jacket.
Part No. 830-00010
(see page 16 for photo)

MICRO CUP HORNS

The micro cup horns can process small samples in isolation without probe intrusion, precluding any possibilities of cross-contamination or airborne pollution. Especially useful when working with infectious materials. Typical applications include: cell disruption, protein extraction, liposome preparation, protein shearing and releasing cellular components including DNA and RNA.

The water-filled micro cup horn screws into the inverted converter in place of a probe. The test tube containing the sample is placed inside the cup horn. The vibrations produced in the cup induce cavitation inside the tube. Inlet and outlet port enable water to be circulated within the cup, inhibiting heat build-up during extended operation. Ease of disassembly facilitates cleaning, and in contrast to polycarbonate cup horns with removable plastic fittings, is 100% leakproof. Supplied with splash shield.



Note: Because the intensity of cavitation within the test tube is substantially less than with direct probe contact, to obtain comparable results when using the cup horn, multiply the processing time by 4.
Probe: Titanium alloy Ti-6Al-4V. Connecting stud: ¼ - 20
Inside diameter 1" (25 mm). Probe diameter 25/32" (20 mm): Part No. 630-0447
Inside diameter 1½" (38 mm). Probe diameter 25/32" (20 mm): Part No. 630-0608

*Bottom inlet port accommodates 0.4" (10 mm) inside diameter tubing. Upper outlet port accommodates 0.5" (13 mm) inside diameter tubing.

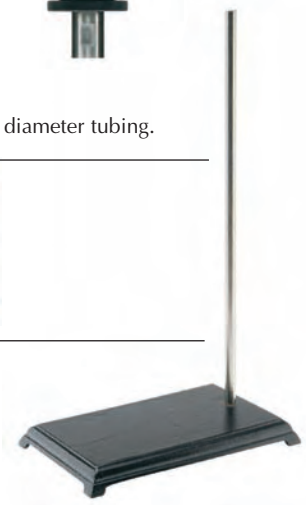
CONVERTER CLAMP

Securely supports 1¼" (32 mm) diameter converter on support stand with ½" (13 mm) diameter support rod. Chemical-resistant reinforced plastic.
Part No. 830-00118



SUPPORT STAND

Black enameled 5½" x 9" (140 x 229 mm) cast-iron base and ½" (13 mm) diameter, 24" (610 mm) long zinc-plated rod.
Part No. 830-00109



FOOTSWITCH

For hands-free operation. Compatible with VCX 130 and VCX 130 FSJ only. 10′ (3 m) cable with plug.
Part No. 830-00004



SOUND ABATING ENCLOSURE

Even though ultrasonic vibrations are above the human audible range, ultrasonic processing produces a high pitched noise in the form of harmonics, which emanate from the vessel walls and the fluid surface. The sound abating enclosure permits extended processing without discomfort by reducing the sound by 35 db. The probe/converter assembly is supported by the converter clamp, and the converter cable is fed through the ¾" (19 mm) opening at the top. Side access ports accommodate the tubing delivering the coolant and the sample to the processing vessel while the door is closed. The unit is faced on the exterior with white laminate, and lined on the interior with white waterproof polyethylene noise abating material. The access door permits observation during treatment and protects the operator against accidental splashing. Support rod and converter clamp are included.
Outside dimensions: (H x W x D) 20" x 12" x 12" (510 x 300 x 300 mm).
Part No. 630-0451



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500 and 750 Watt Ultrasonic Processor – 250 microliters to 1 liter*

Real time display . . .





VC 505 – VC 750

- **Energy Monitor**
  Digitally displays the actual amount of energy in Joules (watts x seconds) that is being delivered to the probe.
- **Wattmeter**
  Digitally displays the actual amount of power in watts that is being delivered to the probe.
- **Automatic Tuning and Frequency Control**
  Eliminates the need for constant adjustment of the power supply.
- **Microprocessor Based and Programmable**
  Digital accuracy assures adherence to the most exacting protocol.
- **Automatic Amplitude Compensation**
  Ensures uniform probe amplitude regardless of the varying loading conditions encountered during the processing cycle.
- **On Demand Real Time Display**
  Provides a window on the process. No more assumptions. No more approximations. Pressing a button enables all set and run parameters to be continuously displayed on the screen, providing operating mode confirmation without process interruption.
- **Variable Power Output Control**
  Allows the ultrasonic vibrations at the probe tip to be set to any desired amplitude. Selected output level is clearly displayed on the screen.
- **Ten Hour Process Timer**
  Controls the processing time from 1 second to 10 hours.
- **Elapsed Time Indicator**
  Monitors both the elapsed time and the duration of processing.
- **Independent On/Off Pulser**
  Enables safe treatment of temperature-sensitive samples at high intensity, and provides mixing by repeatedly allowing the sample to settle back under the probe after each burst. Both on and off cycles are independently controllable from 1 second to 59 seconds.
- **User Friendly**
  Menu driven fill-in-the-blank prompts provide intuitive guidance through all functions.
- **Smallest Footprint In Its Class**
  Ultra-compact design eases emplacement and optimizes bench space. Only 7½" x 13½" (190 x 340 mm).

*For larger volumes use continuous flow cell Part No. 630-0495 or VCX 1500. Laboratory stand and converter clamp are not included.

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SPECIFICATIONS

POWER SUPPLY	Net power output: VC 505 - 500 Watts. VC 750 - 750 Watts. Frequency: 20 kHz Remote actuation compatible. Dimensions: (H x W x D) 9¼" x 7½" x 13½" (235 x 190 x 340 mm) Weight: 15 lbs. (6.8 kg).
SEALED CONVERTER	Part No. CV 334. Piezoelectric lead zirconate titanate crystals (PZT) Diameter: 2½" (63.5 mm) Length: 7¼" (183 mm) Weight: 2 lbs. (900 g) Cable length: 6' (1.8 m)
STANDARD PROBE	Tip diameter: ½" (13 mm) with threaded end and replaceable tip Part No. 630-0220 or solid probe with non-replaceable tip Part No. 630-0219. Please specify.* Processing capability: 10 ml to 250 ml.** Length: 5⅜" (136 mm) Weight: ¾ lb (340 g) Titanium alloy Ti-6Al-4V
ELECTRICAL REQUIREMENTS	Unless otherwise requested, units are shipped wired for 117 volts, 50/60 Hz. For export, please specify desired voltage option.

ORDERING INFORMATION

	Part No.
500 Watt ultrasonic processor	VC 505
750 Watt ultrasonic processor	VC 750

Unless otherwise requested, shipped complete and ready for operation with a ½" (13 mm) probe with replaceable tip,* tool kit and instruction manual

OPTIONAL ACCESSORIES

For optional accessories, please refer to pages 11 through 16.

*Do not use a probe with replaceable tip when processing samples containing organic solvents or low surface tension liquids. See caution below. Use solid probe Part No. 630-0219 instead. Unless otherwise requested, the probe supplied will have a replaceable tip.

**For other volumes please refer to probe and microtip listings on pages 11 through 13. A different probe can be substituted for the standard probe.

CAUTION

All probes, including those with replaceable tips, are tuned to resonate at 20 kHz. If the replaceable tip is removed or isolated from the rest of the probe, that element will no longer resonate at 20 kHz and the power supply will go into an overload condition and shut down or fail. Organic solvents (e.g. methylene chloride) and low surface tension liquids will penetrate the interface between the probe and the replaceable tip, thus carrying the particulates into the threaded section and isolating the tip from the probe. When processing samples containing organic solvents or low surface tension liquids, ALWAYS use a solid probe or as an alternate a full wave 10" (254 mm) probe or an extender. NEVER use a probe with a replaceable tip.

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500 and 750 Watt Ultrasonic Processors – VCX Series – 250 microliters to 1 liter*

Real time display . . .





VCX 500 – VCX 750

□ Exclusive Energy Setpoint
The energy setpoint continuously monitors the amount of energy in Joules (watts x seconds), that is being delivered to the probe, and terminates the ultrasonics when the desired amount of energy has been dispensed.

□ Wattmeter
Digitally displays the actual amount of power in watts that is being delivered to the probe.

□ Automatic Tuning and Frequency Control
Eliminates the need for constant adjustment of the power supply.

□ Integrated Temperature Controller
Precludes harmful overheating of the sample and guarantees process integrity by terminating the ultrasonics when the sample temperature reaches a predetermined limit. Allows process control and monitoring from 1°C to 100°C.

□ Consistent Reproducibility
Time saving memory stores up to ten procedures to facilitate protocol duplication, automate repetitive tasks, and eliminate technician-to-technician method variability.

□ Microprocessor Based – Programmable
Digital accuracy and repeatability assures adherence to the most exacting protocol.

□ Automatic Amplitude Compensation
Ensures uniform probe amplitude regardless of the varying loading conditions encountered during the processing cycle.

□ On Demand Real Time Display
Provides a window on the process. No more assumptions. No more approximations. Pressing a button enables all set and run parameters to be continuously displayed on the screen, providing operating mode confirmation without process interruption.

□ Variable Power Output Control
Allows the ultrasonic vibrations at the probe tip to be set to any desired amplitude. Selected output level is clearly displayed on the screen.

□ Ten Hour Process Timer
Controls the processing time from 1 second to 10 hours.

□ Elapsed Time Indicator
Monitors both the elapsed time and the duration of processing.

□ Independent On/Off Pulser
Enables safe treatment of temperature-sensitive samples at high intensity, and provides mixing by repeatedly allowing the sample to settle back under the probe after each burst. Both on and off cycles are independently controllable from 1 second to 59 seconds.

□ User Friendly
Menu driven fill-in-the-blank prompts provide intuitive guidance through all functions.

□ Smallest Footprint In Its Class
Ultra-compact design eases emplacement and optimizes bench space. Only 7½" x 13½" (190 x 340 mm).

*For larger volumes use continuous flow cell Part No. 630-0495 or VCX 1500. Laboratory stand, converter clamp and temperature probe are not included.

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SPECIFICATIONS

POWER SUPPLY	Net power output: VCX 500 - 500 Watts. VCX 750 - 750 Watts. Frequency: 20 kHz Remote actuation compatible Dimensions (H x W x D) 9¼" x 7½" x 13½" (235 x 190 x 340 mm) Weight: 15 lbs. (6.8 kg)
SEALED CONVERTER	Part No. CV 334. Piezoelectric lead zirconate titanate crystals (PZT) Diameter: 2½" (63.5 mm) Length: 7¼" (183 mm) Weight: 2 lb. (900 g) Cable length: 6' (1.8 m)
STANDARD PROBE	Tip diameter: ½" (13 mm) with threaded end and replaceable tip Part No. 630-0220 or solid probe with non-replaceable tip Part No. 630-0219. Please specify.* Processing capability: 10 ml to 250 ml.** Length: 5⅜" (136 mm) Weight: ¾ lb. (340 g) Titanium alloy Ti-6Al-4V
TEMPERATURE PROBE (Optional)	Allows sample temperature to be monitored up to 100°C. Stainless steel. Part No. 830-00060
ELECTRICAL REQUIREMENTS	Unless otherwise requested, units are shipped wired for 117 volts, 50/60 Hz. For export, please specify desired voltage option.

ORDERING INFORMATION

	Part No.
500 Watt ultrasonic processor	VCX 500
750 Watt ultrasonic processor	VCX 750

Unless otherwise requested, shipped complete and ready for operation with a ½" (13 mm) probe with replaceable tip,* tool kit, and instruction manual.

OPTIONAL ACCESSORIES

For optional accessories, please refer to pages 11 through 16.

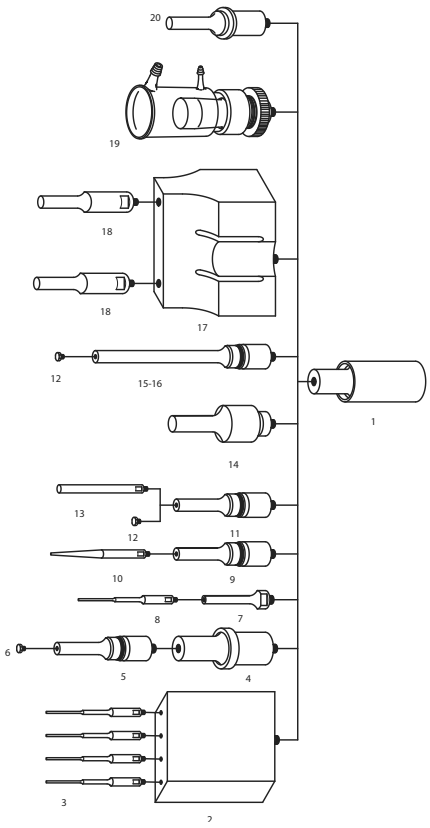
* Do not use a probe with replaceable tip when processing samples containing organic solvents or low surface tension liquids. See caution on page 8. Use solid probe Part No. 630-0219 instead. Unless otherwise requested, the probe supplied will have a replaceable tip.

** For other volumes please refer to probe and microtip listings on pages 11 through 13. A different probe can be substituted for the standard probe.

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The accessories and attachments described in this section are compatible with most 20 kHz ultrasonic processors. Please specify make, model, and connecting stud size (½" - 20 or ⅜" - 24) when ordering.

NO.	DESCRIPTION	PART NO.
1*	Converter Part No. CV 334	CV00334
2	Multi-element coupler	See page 14
3	⅛" (3 mm) stepped microtip	See page 14
4	Booster	BHNVC21
5	½" (13 mm) solid probe	630-0219
	½" (13 mm) probe with threaded end and replaceable tip	630-0220
	¾" (19 mm) solid probe	630-0208
	¾" (19 mm) probe with threaded and replaceable tip	630-0207
	1" (25 mm) solid probe	630-0209
	1" (25 mm) probe with threaded and replaceable tip	630-0210
6	½" (13 mm) replaceable tip	630-0406
	¾" (19 mm) replaceable tip	630-0407
	1" (25 mm) replaceable tip	630-0408
7	Coupler	630-0421
8	5/64" (2 mm) stepped microtip	630-0423
	⅛" (3 mm) stepped microtip	630-0422
	¼" (6 mm) probe	630-0435
9	½" (13 mm) probe with threaded end and replaceable tip	630-0220
10	⅛" (3 mm) tapered microtip	630-0418
	3/16" (5 mm) tapered microtip	630-0419
	¼" (6 mm) tapered microtip	630-0420
11	Probe – solid or with threaded end and replaceable tip – same as 5	
12	Replaceable tip – same as 6	
13	½" (13 mm) half wave extender 5" (127 mm) long	630-0410
	¾" (19 mm) half wave extender 5" (127 mm) long	630-0409
	1" (25 mm) half wave extender 5" (127 mm) long	630-0444
	¾" (19 mm) full wave extender 10" (254 mm) long	630-0518
	1" (25 mm) full wave extender 10" (254 mm) long	630-0519
14	¾" (19 mm) solid high gain probe	630-0306
	1" (25 mm) solid high gain probe	630-0310
15-16	½" (13 mm) full wave probe solid 10" (254 mm) long	630-0217
	½" (13 mm) full wave probe 10" (254 mm) long with threaded and replaceable tip	630-0218
17	Aluminum coupler*	630-0562
18	¾" (19 mm) solid probe	630-0208
19	1½" (38 mm) inside diameter cup horn	630-0503
	2¾" (70 mm) inside diameter cup horn	630-0431
	3" (76 mm) inside diameter cup horn	630-0496
20	½" (13 mm) solid probe with flange at the nodal point	630-0603



* Supplied with standard equipment unless otherwise specified.

Caution: Do not use a tapered microtip with a coupler. Do not use a stepped microtip without a coupler. Observe microtip amplitude limits. Do not use a probe with threaded end and replaceable tip when processing samples containing organic solvents or low surface tension liquids. Use a solid probe instead. See caution on page 8.

PROBES

Probes (sometimes referred to as horns) are one-half wavelength long tools that act as mechanical transformers to increase the amplitude of vibration generated by the converter. They consist of two sections each having different cross-sectional areas. When driven at its resonant frequency, the probe expands and contracts longitudinally about its center. However, no longitudinal motion occurs at the threaded nodal point (area of no activity), allowing accessories to be connected to the probe at that point. The greater the mass ratio between the upper section and the lower section, the greater the amplification factor. Probes with smaller tip diameters produce greater intensity of cavitation, but the energy released is restricted to a narrower, more concentrated field. Conversely, probes with larger tip diameters produce less intensity, but the energy is released over a greater area. The larger the tip diameter, the larger the volume that can be processed, but at lower intensity. High gain probes produce higher intensity than standard probes of the same diameter, and are usually recommended for processing difficult applications. Probes are fabricated from high grade titanium alloy Ti-6Al-4V because of its high tensile strength, good acoustical properties at ultrasonic frequencies, high resistance to corrosion, low toxicity, and excellent resistance to cavitation erosion. They are autoclavable, and available with threaded ends to accept replaceable tips, microtips and extenders.

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PROBES*

PART NO.	630-0220**	630-0219	630-0207**	630-0208	630-0210**	630-0209
TIP DIAMETER	½" (13 mm)	½" (13 mm)	¾" (19 mm)	¾" (19 mm)	1" (25 mm)	1" (25 mm)
TYPE	Threaded End	Solid	Threaded End	Solid	Threaded end	Solid
INTENSITY	High	High	Medium	Medium	Low	Low
VOLUME (batch)	10-250 ml	10-250 ml	25-500 ml	25-500 ml	50-1000 ml	50-1000 ml
AMPLITUDE*** micrometers (microns)	124	124	61	61	35	35
inches	.0049	.0049	.0024	.0024	.0014	.0014
LENGTH†	5½" (139 mm)	5½" (139 mm)	5" (127 mm)	5" (127 mm)	4 13/16" (122 mm)	4 13/16" (122 mm)

* Connecting stud ½ - 20. Available with ⅜ - 24 stud to enable connection to a 20 kHz converter manufactured by another company.
** Do not use a probe with a replaceable tip when processing samples containing organic solvents or low surface tension liquids. Use a solid probe instead. See caution on page 8.
*** With the amplitude control set at 100%.
† Because ultrasonic probes are tuned to resonance, their length may vary slightly due to variations in the titanium's modulus of elasticity.
Note: With the amplitude control set at 100% the amplitude at the converter tip is 15 micrometers (.0006 inch).



HIGH GAIN PROBES*

PART NO.	630-0306**	630-0310**
TIP DIAMETER	¾" (19 mm)	1" (25 mm)
TYPE	Solid	Solid
INTENSITY	High	Medium
VOLUME (batch)	25-500 ml	50-1000 ml
AMPLITUDE*** micrometers (microns)	89	71
inches	.0035	.0028
LENGTH†	5 13/32" (137 mm)	5 3/16" (133 mm)



* Connecting stud ½ - 20. Available with ⅜ - 24 stud to enable connection to a 20 kHz converter manufactured by another company.
** Do not use with a booster.
*** With the amplitude control set at 100%.
† Because ultrasonic probes are tuned to resonance, their length may vary slightly due to variations in the titanium's modulus of elasticity.
Note: With the amplitude control set at 100% the amplitude at the converter tip is 15 micrometers (.0006 inch).

DUAL PROBE

The dual probe assembly enables a single ultrasonic processor to process two (25-500 ml) samples simultaneously. The assembly consists of an aluminum coupler Part No. 630-0562 and two ¾" (19 mm) solid probes Part No. 630-0208*. Power delivered to each probe is identical, and is half the total power delivered by the power supply. Center to center dimension between the probes is 4½" (114 mm). Connecting stud ½ - 20.** Part No. 630-0525

When used with a 750 watt ultrasonic processor, the dual probe is the only one in the industry capable of delivering up to 375 watts per probe, meeting all EPA requirements specified in SW-846 method 3550.



BOOSTERS

Boosters are used to process difficult applications. When connected between the converter and the probe, the booster (also called amplitude transformer) acts as a mechanical amplifier that increases the amplitude of vibration at the probe tip. Do not use with a microtip, extender, dual probe, or high gain probe. Increases amplitude by 100%. Connecting stud ½ - 20.**
Part No. BHNVC21.



*Two ½" (13 mm) solid probes can be substituted for the two ¾" (19 mm) solid probes. Probes can also be supplied with threaded end and replaceable tip, however these probes should not be used when processing samples containing organic solvents or low surface tension liquids. See caution on page 8.
** Available with ⅜ - 24 connecting stud to enable connection to a 20 kHz converter manufactured by another company.

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MICROTIPS

Two types of microtips are available to enable processing small samples at very high intensity – a tapered microtip and a stepped microtip.

The tapered microtip screws into the ½" (13 mm) threaded end probe in place of the replaceable tip.

The stepped microtip/probe assembly consists of two parts, and screws into the converter in place of the probe. Capable of reaching into narrower vessels than the tapered microtip, the stepped microtip assembly can process volumes as small as 150 µl. Microtips are fabricated from titanium alloy Ti-6Al-4V and are autoclavable.

CAUTION: *In order not to exceed the tensile limit of the titanium, do not operate the equipment beyond the maximum amplitude limits listed below when using a microtip. Ignoring this caution will cause the microtip to fracture.*



TAPERED MICROTIP
(see page 11)

STEPPED MICROTIP ASSEMBLY



COUPLER

STEPPED MICROTIP
(see page 11)

MICROTIPS

	TAPERED MICROTIP*			STEPPED MICROTIP/PROBE ASSEMBLY**			
PART NO.	630-0418	630-0419	630-0420	COUPLER*** 630-0421	STEPPED MICROTIP 630-0423	STEPPED MICROTIP 630-0422	PROBE 630-0435
TIP DIAMETER	⅛" (3 mm)	3/16" (5 mm)	¼" (6 mm)		5/64" (2 mm)	⅛" (3 mm)	¼" (6 mm)
INTENSITY	Ultra high	Very high	High		Ultra high	Very high	High
VOLUME (batch)	1-10 ml	3-20 ml	5-50 ml		150µl -5 ml	250µl -10 ml	10 ml - 50 ml
MAXIMUM AMPLITUDE	40%	65%	75%		40%	40%	40%
micrometers† (microns)	228	203	203		250	210	150
inches†	.0090	.0080	.0080		.0098	.0083	.0059
LENGTH#	6 5/16" (159 mm)	6" (155 mm)	5⅝" (142 mm)	3⅝" (9.2 mm)	4½" (116 mm)	5 13/32" (136 mm)	4 7/16" (113 mm)

* Screws into a ½" (13 mm) threaded end probe Part No. 630-0220 in place of the replaceable tip. Connecting stud ¼ - 20.
** Consists of coupler and stepped microtip. Screws into the converter instead of the ½" (13 mm) probe.
*** Connecting stud ½ - 20.
† At maximum amplitude.
# Because microtips are tuned to resonance, their length may vary slightly due to variation in the titanium's modulus of elasticity.

EXTENDERS

Extenders screw into threaded end probes of identical diameter in place of the replaceable tip. Recommended when working with tall narrow vessels such as Erlenmeyer flasks. Extenders are fabricated from titanium alloy Ti-6Al-4V and are autoclavable. Also available on special order with threaded ends to accept replaceable tips.* Connecting stud ¼ - 20.

½" (13 mm) half wave extender - 5" (127 mm) long. Part No. 630-0410.
¾" (19 mm) half wave extender - 5" (127 mm) long. Part No. 630-0409.
1" (25 mm) half wave extender - 5" (127 mm) long. Part No. 630-0444.
½" (13 mm) full wave extender - 10" (254 mm) long. Part No. 630-0517.
¾" (19 mm) full wave extender - 10" (254 mm) long. Part No. 630-0518.
1" (25 mm) full wave extender - 10" (254 mm) long. Part No. 630-0519.



*Do not use an extender with replaceable tip when processing samples containing organic solvents or low surface tension liquids. Use a solid extender instead. See caution on page 8.

Note: Because extenders are tuned to resonance, their length may vary slightly due to variations in the titanium's modulus of elasticity. Longer extenders are available upon request.

REPLACEABLE TIPS

Replaceable tips are fabricated from titanium alloy Ti-6Al-4V and are autoclavable.



REPLACEABLE TIPS

	½" (13 mm)	¾" (19 mm)	1" (25 mm)
PART NO.	630-0406	630-0407	630-0408
CONNECTING STUD	¼-20	3/8-24	½-20

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MULTI-ELEMENT PROBES

The high throughput multi-element probes meet the needs of repetitive tasks by processing identically numerous deepwells simultaneously. They screw into the converter in place of the standard ½" (13 mm) probe, and can be used either manually or with automated systems. The energy delivered by each tip is uniform within 2%. With the four, eight, and twenty four-element probes, the spacing between the tips is 22/32" (18 mm) and the length of the special microtips is 5 7/16" (139 mm). With the ninety-six element probe, spacing between the tips is 11/32" (9 mm) and the length of the mini microtips is 11/16" (17 mm). Multi-element probes are fabricated from titanium alloy Ti-6Al-4V and are autoclavable.

Note: Custom formatted multi-element probes are available upon request.

MULTI-ELEMENT PROBES*

PART NO.	DESCRIPTION	ULTRASONIC PROCESSOR
630-0559 630-0598	Four-element probe Consists of an aluminum coupler and four ⅛" (3 mm) special microtips. Replacement microtip (250 µl – 10 ml) for four-element probe	500 watt or 750 watt
630-0586 630-0598	Eight-element probe Consists of an aluminum coupler and eight ⅛" (3 mm) special microtips. Replacement microtip (250 µl – 10 ml) for eight-element probe	500 watt or 750 watt
630-0579 630-0598	Twenty-four-element probe Consists of an aluminum coupler and twenty-four ⅛" (3 mm) special microtips. Replacement mini microtip (250 µl – 10 ml) for twenty-four-element probe	750 watt
630-0611 630-0599	Ninety-six-element probe Consists of an aluminum coupler and ninety-six 11/16" (17 mm) mini microtips. Replacement mini microtip (150 µl – 2 ml) for ninety-six-element probe	750 watt

**Connecting stud ½ - 20.



HEAVY DUTY MULTI-ELEMENT PROBE SUPPORT ASSEMBLY

Supports the converter and multi-element probe with minimum deflection.
Recommended when working with twenty-four and ninety-six element probes.
Base: 10" x 10" (254 x 254 mm).
Height: 24" (610 mm).
Part No. 830-00320



SOUND ABATING ENCLOSURE

Even though ultrasonic vibrations are above the human audible range, ultrasonic processing produces a high pitched noise in the form of harmonics which emanate from the vessel walls and the fluid surface. The sound abating enclosure permits extended processing without discomfort by reducing the sound by 35db. The probe/converter assembly is supported by the converter clamp, and the converter cable is fed through the ¾" (19 mm) opening at the top. Side access ports accommodate the tubing delivering the coolant and the sample to the processing vessel while the door is closed. The unit is faced on the exterior with white laminate, and on the interior with white waterproof polyethylene noise abating material. The access door permits observation during treatment and protects the operator against accidental splashing. Support rod and light duty converter clamp are included.
Outside dimensions (H x W x D): 30" x 14" x 14" (762 x 355 x 355 mm).
Part No. 630-0427



LABORATORY JACK

Provides adjustable elevation from 2½" (64 mm) to 10" (254 mm).
Top plate: 6" x 5" (152 x 127 mm).
Part No. 830-00113



NON-SLIP LABORATORY MAT

Holds beakers and microplates securely in place, and reduces noise by absorbing vibrations normally transmitted to the laboratory jack.
4" x 7" (100 x 175 mm).
Part No. 830-00119



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HIGH INTENSITY CUP HORNS

Cup horns can process samples in isolation without probe intrusion, precluding any possibilities of cross-contamination or airborne pollution. Especially useful when working with infectious materials.

Typical applications include: cell disruption, liposome preparation, protein shearing, and releasing cellular components including DNA and RNA.



The water-filled cup horn is screwed into the inverted converter in place of the probe. The test tube(s) containing the sample(s) is(are) placed inside the cup horn. The vibrations produced in the cup induce cavitation inside the tube(s). Inlet and outlet port enable water to be circulated within the cup, inhibiting heat build-up during extended operation. Ease of disassembly facilitates cleaning, and in contrast to polycarbonate cup horns with removable plastic fittings, these cup horns are 100% leakproof. The probe is fabricated from titanium alloy Ti-6Al-4V and is autoclavable. Supplied with floating microtube holder Part No. 830-00238 to enable 8 samples to be processed simultaneously, and splash shield. (Microtube holder is not available with Part No. 630-0503.)

Note: Because the intensity of cavitation within the test tube(s) is substantially less than with direct probe contact to obtain comparable results when using the cup horn, multiply the processing time by 4. Connecting a booster Part No. BHNVC21 between the cup horn and the converter, will double the intensity of cavitation within the cup.*

HIGH INTENSITY CUP HORNS**

PART NO.	CUP COMPOSITION	OVERALL HEIGHT	OUTSIDE DIAMETER	INSIDE DIAMETER	PROBE DIAMETER
630-0503	Glass	5" (127 mm)	2" (51 mm)	1½" (38 mm)	1¼" (32 mm)
630-0431		6" (152 mm)	3" (76 mm)	2¾" (70 mm)	2" (51 mm)
630-0496		6½" (165 mm)	3 11/32" (85 mm)	3" (76 mm)	2½" (64 mm)

*When using a booster, always increase the power supply amplitude gradually to inhibit stalling.
**Connecting stud ½ - 20. Available on special order with ⅜ - 24 stud to enable connection to a 20 kHz converter manufactured by another company.
Upper outlet port accommodates 0.5" (13 mm) inside diameter tubing.
Bottom inlet port accommodates 0.4" (10 mm) inside diameter tubing.

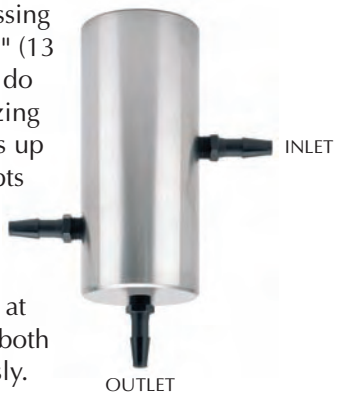
FLOATING MICROTUBE HOLDER

The plastic microtube holder conveniently suspends 8 microtubes inside the 2¾" (70 mm) and 3" (76 mm) cup horn. Holder floats and keeps tubes immersed at a constant depth regardless of the fluctuation in water level. Pressure plate holds tubes firmly in place and keeps tube caps closed. Autoclavable. Microtubes not included.
Part No. 830-00238



LOW VOLUME CONTINUOUS FLOW CELL

The stainless steel continuous flow cell enables closed system operation and ensures safe processing when working with infectious materials. The flow cell screws onto the threaded portion of the ½" (13 mm) probe at the nodal point. Recommended for the treatment of low viscosity samples, which do not require prolonged exposure to ultrasonics. Designed primarily for dispersing and homogenizing one or two dissimilar materials simultaneously at rates up to 20 liters/hour. Suitable for pressures up to 40 psi (276 kPa/3 bar). Volume of liquid in chamber with probe in place: 65 ml. Fitting accepts 5/16" (8 mm) ID tubing. Stainless steel. Autoclavable.
Part No. 630-0495



Note: For most applications the sample should be fed through the lower side port and collected at the bottom port. However it is recommended that for cell disruption, the flow be reversed. Use both the upper side port and the lower side port when processing two different samples simultaneously.

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SEALED ATMOSPHERE TREATMENT CHAMBER



The stainless steel sealed atmosphere treatment chamber screws onto the threaded portion of the ½" (13 mm) probe at the nodal point. This accessory enables safe batch treatment of toxic, pathogenic, and biohazardous materials at high intensity. Ports located above the sample level permits purging with an inert gas, or capturing released gases. An integral cooling jacket, through which a suitable cooling liquid can be circulated, inhibits heat build up during extended operation. 50 ml capacity. Suitable for pressures up to 40 psi (276 kPa/3 bar). Autoclavable.
Part No. 830-00086

ROSETT GLASS COOLING CELLS



The Rosett cooling cell enables uniform treatment at low temperatures. The cell is placed in an ice bath. The ultrasonic energy forces the sample to circulate repeatedly under the probe and throughout the cooling arms.

30 ml Rosett cooling cell.
Part No. 830-00003

300 ml Rosett cooling cell.
Part No. 830-00001

GLASS COOLING CELLS

10 ml cooling cell with water jacket.
Part No. 830-00009

100 ml cooling cell with water jacket.
Part No. 830-00010



10 ml 100 ml

CONVERTER CLAMPS



The light duty converter clamp securely supports 2½" (64 mm) diameter converters onto stands with ½" (13 mm) diameter support rod. Chemical-resistant reinforced plastic.
Part No. 830-00116

Heavy duty converter clamp. Same as above but fabricated of aluminum. Recommended for industrial applications.
Part No. 830-00105

Note: To support multi-element probes, use the heavy duty multi-element support assembly Part No. 830-00320. See page 14 for details.

SUPPORT STAND

Black enameled cast-iron base and zinc-plated rod.
Base: 5½" x 9" (140 x 229 mm).
Rod: ½" (13 mm) diameter, 24" (610 mm) long.
Part No. 830-00109

FOOTSWITCH



For hands-free operation
10' (3 m) cable with plug.
Part No. 830-00004

ADAPTING STUD



⅜-24 to ½-20
Enables a 20 kHz probe not manufactured by Sonics to be connected to our converter.
The ⅜-24 connecting stud is removed from the probe and replaced with the adapting stud.
Part No. 631-0101

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VCX 1500

- Same functions as VCX 750
- Up to 20 liters on a batch basis

SPECIFICATIONS

POWER SUPPLY	Net power output: 1500 Watts. Frequency: 20 kHz Dimensions (H x W x D): 11" x 15" x 18¼" (279.4 x 380 x 463.5 mm) Weight: 21 lbs. (9.5 kg)
AIR COOLED CONVERTER	Part No. CV 294. Piezoelectric lead zirconate titanate crystals (PZT) Diameter: 3" (76.2 mm) Length: 6¼" (158.7 mm) Weight: 2 lbs. (900 g) Cable length: 10' (3 m)
BOOSTER	Part No. BHNVC31 – Increases amplitude by 150%
STANDARD PROBE	Part No. 630-0609 Tip diameter: 1" (25 mm). Solid Length: 10" (254 mm) Weight: 1.5 lbs. (680 g) Titanium alloy: Ti-6Al-4V. Autoclavable Processing capabilities: 4 liter*
ELECTRICAL REQUIREMENTS	220 volts, 50/60 Hz.

ORDERING INFORMATION

	Part No.
1500 Watt ultrasonic processor	VCX 1500
Sound abating enclosure with solid door for VCX 1500	630-0474**
(H x W x D) 36" x 16" x 16" (914 x 406 x 406 mm)	
Support stand	830-00109
Converter clamp for VCX 1500	830-00120
Optional temperature probe	830-00060

* Up to 20 liters when used with a 1" (25 mm) solid 20" (508 mm) long probe Part No. 630-0580, and a customer-supplied mechanical mixer or stirrer.
** The sound abating enclosure will accommodate the VCX 1500 converter, booster and 1" (25 mm) probe Part No. 630-0209, 630-0210 and 630-0310. It will not accommodate the 1" (25 mm) solid 20" (508 mm) long probe Part No. 630-0580 because of its length.

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VC 750 HV



HIGH VOLUME CONTINUOUS FLOW CELL



VCX 1500 HV

When used in conjunction with the VC 750 ultrasonic processor and booster Part No. BHNVC21, the flow cell throughput rate is typically 50 liters/hour. When used in conjunction with the VCX 1500 ultrasonic processor and booster Part No. BHNVC31, the flow cell throughput rate is typically 100 liters/hour – variables being viscosity and desired degree of processing. The flow cell is recommended for the treatment of low viscosity samples which do not require extended exposure to ultrasonics. Designed primarily for dispersing and homogenizing. For optimum performance, when working on a flow through basis, premixing the sample with a mechanical mixer or stirrer is recommended. The flow cell is easily disassembled for inspection and cleaning, and is water jacketed to enable the sample to be cooled/heated while it is being processed. All wetted parts are autoclavable.

SPECIFICATIONS

POWER SUPPLY	VC 750 or VCX 1500
CONVERTER	For VC 750 – Part No. CV 334. Piezoelectric lead zirconate titanate crystals (PZT) For VCX 1500 HV – Part No. CV 294. Piezoelectric lead zirconate titanate crystals (PZT)
BOOSTER	For VC 750 HV – Part No. BHNVC21. Increases amplitude by 100% For VCX 1500 HV – Part No. BHNVC31. Increases amplitude by 150%
HIGH VOLUME CONTINUOUS FLOW CELL	Weight: 11 lbs. (5 kg) Height: 17" (425 mm) Width: 16" (400 mm) Housing: 316 stainless steel. Quick opening clamp Probe – Solid – 630-0609: Titanium alloy Ti-6Al-4V Operating pressure: Up to 50 psi (345 kPa/3.45 bar) Volume of liquid in chamber with probe in place: 400 ml. Tubing required: ¼" (6 mm) inside diameter Part No. 630-0583

ORDERING INFORMATION

	Part No.
750 Watt high volume ultrasonic liquid processing system	VC 750 HV
Replacement solid probe for high volume continuous flow cell	630-0609
Sound abating enclosure for high volume continuous flow cell (H x W x D) 36" x 16" x 16" (914 x 406 x 406 mm)	630-0474
1500 Watt high volume ultrasonic liquid processing system	VCX 1500 HV
Replacement solid probe for high volume continuous flow cell	630-0609
Sound abating enclosure for high volume continuous flow cell (H x W x D) 36" x 16" x 16" (914 x 406 x 406 mm)	630-0474

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The chemical effects of ultrasound are diverse and include dramatic improvements in both stoichiometric and catalytic reactions. In some cases, ultrasonic irradiation can increase reactivities by nearly a million-fold. It does so through the process of acoustic cavitation; the formation, growth and implosive collapse of bubbles in a liquid.

During cavitational collapse, intense heating of the bubbles occurs. The localized hot spots have temperatures in the range of 5000°C, pressures approaching 500 atmospheres, lifetimes of a few microseconds, and heating and cooling rates greater than 109 K/s.*

Applications for chemical reactions exist in both homogeneous liquids and in liquid-solid systems. Of special synthetic use is the ability of ultrasound to create clean, highly reactive surfaces on metals. Ultrasound has also been found to be beneficial for the initiation or enhancement of catalytic reactions, in both homogeneous and heterogeneous cases.

RECOMMENDED ULTRASONIC PROCESSOR

VC 505, VC 750, VCX 500, or VCX 750. Please see pages 7 and 9 for detailed description.

SONOCHEMICAL REACTION VESSELS

The Suslick reaction vessel consists of a glass chamber and a stainless steel fitting. Three side ports accept septum for syringe charging or retrieval. The fitting screws onto a standard solid ½" (13 mm) probe Part No. 630-0219, or threaded end ½" (13 mm) probe** Part No. 630-0220 at the nodal point. The glass chamber slides into the adapter and is held in place by an internal O-ring. With the other reaction vessels, the adapter Part No. 830-00014 screws onto special probe Part No. 630-0217 or 630-0218** at the nodal point. The glass chamber is held in place by the action of a threaded nylon bushing compressing an O-ring. Moving the glass chamber up or down on the adapter allows the portion of the probe protruding out of the adapter to be immersed at the optimum depth into the sample.

4-10 ml Suslick reaction vessel. Glass chamber height: 3¼" (82 mm). Part No. 830-00007.

4-10 ml reaction vessel.*** Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4⅞" (123 mm). Part No. 830-00011.

10-50 ml reaction vessel.*** Bottom well capacity: 10 ml. Main body capacity: 50 ml. Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4¾" (120 mm). Part No. 830-00012.

40-250 ml reaction vessel.*** Three 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 6⅜" (162 mm). Part No. 830-00013.

SPECIAL PROBES

½" (13 mm) special 10" (254 mm) long full wave solid probe. Recommended when processing samples containing organic solvents or low surface tension liquids. Used with the adapter below. Titanium alloy Ti-Al-4V. Autoclavable
Part No. 630-0217.

½" (13 mm) special 10" (254 mm) long full wave probe with threaded end, and replaceable tip.** Used with the adapter below. Titanium alloy Ti-6Al-4V. Autoclavable Part No. 630-0218.

ADAPTER

5" (127 mm long). Stainless steel. Internally threaded. Screws onto a full wave 10" (254 mm) long ½" (13 mm) probe at the nodal point. Part No. 830-00014.

* From an article by Dr. Kenneth Suslick, Professor of Chemistry and Beckman Institute Professor, University of Illinois Urbana/Champaign

** Do not use a probe with replaceable tip when processing samples containing organic solvents or low surface tension liquids. See caution on page 8.

*** Must be used with the adapter Part No. 830-00014 and special probes listed above.



Suslick Vessel
830-00007



3-10 ml Vessel
830-00011



10-50 ml Vessel
830-00012



40-250 ml Vessel
830-00013



Adapter
830-00014

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Low and Medium Atomization Rate – 20 kHz and 40 kHz

- From microliters to liters – continuous or intermittent
- Dispenses material with virtually no overspray
- Pressureless atomization – low velocity mist
- Low cost atomizing probe replacement
- Minimal atmospheric contamination
- Virtually uncloggable





VC 5020 AT / VC 5040 AT

TYPICAL APPLICATIONS

- Coating non-woven fabric, paper, etc.
- Laboratory spray drying
- Injecting moisture into a gas stream
- Applying minute amount of oil, fragrance or flavor onto a product
- Injecting small volume of reagents into a reactor

GENERAL DESCRIPTION

Unlike conventional atomizing nozzles that rely on pressure and high-velocity motion to shear a fluid into small drops, the ultrasonic atomizer uses only ultrasonic vibrational energy to generate a gentle, low-velocity spray. Overspray is practically eliminated, resulting in substantial material savings and reduction in airborn pollution. The liquid can be dispensed to the atomizing probe (nozzle) by either gravity or a small low-pressure metering pump, and atomized continuously or intermittently. The rate at which the liquid is atomized depends, within limits, solely on the volume that is being delivered onto the atomizing surface, and the frequency. Typically, the higher the frequency, the lower the processing capability. The amount of material atomized can be as little as 2 µl/sec. Because the droplets typically drift downward at low velocity under the influence of gravity, the probe should be mounted with the tip facing downward, and air turbulence kept to a minimum. A wide variety of coatings, chemicals, lubricants, and particulate suspensions can readily be atomized. However, factors such as viscosity, miscibility, and solid content deserve consideration. For optimum atomization, the viscosity should be under 50 cps and the solid concentration kept below 30%. Although lower frequencies are capable of atomizing higher viscosity liquids, because the atomization process depends on setting a liquid film into motion, typically the higher the viscosity – the lower the flow rate, and the more difficult the application. The atomization of liquids containing long-chained polymer molecules is problematic, even in diluted form, due to the highly cohesive nature of the material. In many cases, mixtures with particulates can be atomized, because the solids are simply carried along in the drops. The low transport velocity of the liquid through the probe permits even abrasive slurries to be processed with negligible erosion of the passageway. Compared with conventional pressurized nozzles, the feed channel running through the probe and exit orifice are relatively large, and practically uncloggable. Drop size is primarily a function of frequency, and the higher the frequency, the smaller the drop diameter. With water, the median drop size at 20 kHz is 90 microns, and 50 microns at 40 kHz.

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HOW DOES IT WORK?

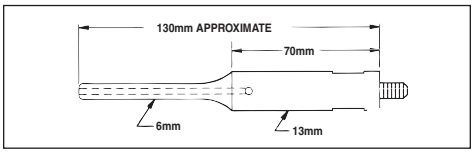
The ultrasonic power supply converts 50/60 Hz to high frequency electrical energy. This electrical energy is transmitted to the piezoelectric transducer within the converter, where it is changed to mechanical vibrations. The ultrasonic vibrations are intensified by the probe and focused at the tip where the atomization takes place. The liquid travels through the probe, and spreads out as a thin film on the atomizing surface. The oscillating tip disintegrates the liquid into micro-droplets, and ejects them to form a gentle, low velocity spray.

SPECIFICATIONS

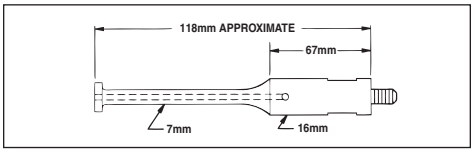
POWER SUPPLY	Net power output: 50 Watts. Frequency: 20 kHz (Part No. VC 5020 AT). 40 kHz (Part No. VC 5040 AT) Dimensions: (H x W x D): 4½" x 9¾" x 12½" (115 x 250 x 320 mm) Weight: 3 lbs. (1.4 kg)
CONVERTER	Piezoelectric lead zirconate titanate crystals (PZT) 20 kHz - Part No. CV 18. Compatible with VC 5020 AT 40 kHz - Part No. CV 24.* Compatible with VC 5040 AT Diameter: 1¼" (32 mm) Length: CV 18 - 5¾" (146 mm). CV 24 - 4¾" (121 mm) Weight: ¾ lb. (340 g) Cable length: 5' (1.5 m)
STANDARD ATOMIZING PROBE**	Orifice 3/32" (2.3 mm). Threaded port #10-32 UNF thread. Titanium alloy Ti-6Al-4V. Autoclavable. Tubing required: 5/32" (4 mm) inside diameter. 20 kHz: 630-0437 40 kHz: 630-0499
MEDIAN DROP SIZE	20 kHz: 90 microns. 40 kHz: 50 microns
ELECTRICAL REQUIREMENTS	Unless otherwise requested, units are shipped wired for 117 volts, 50/60 Hz. For export please specify desired voltage options.

ATOMIZING PROBES

20 kHz

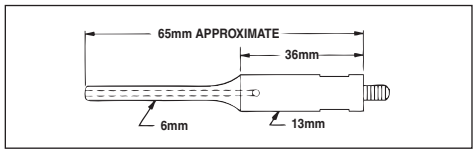


Standard tip half wave
Low atomization rate. Up to 60 ml./min.
Part No. 630-0437

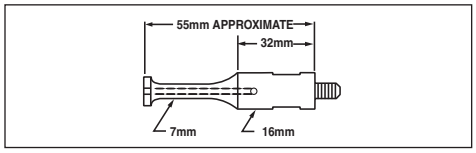


Flat tip half wave
Medium atomization rate. Up to 100 ml./min.
Part No. 630-0545

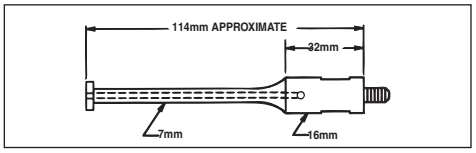
40 kHz



Standard tip half wave
Low atomization rate. Up to 30 ml./min.
Part No. 630-0499



Flat tip half wave
Medium atomization rate. Up to 50 ml./min.
Part No. 630-0552



Flat tip full wave
Medium atomization rate. Up to 50 ml./min.
Part No. 630-0547

Note: Because ultrasonic probes are tuned to resonance, their lengths may vary slightly due to variations in the titanium's modulus of elasticity.

ORDERING INFORMATION

	Part No.
50 Watt ultrasonic atomizer 20 kHz	VC 5020***
50 Watt ultrasonic atomizer 40 kHz	VC 5040***

* A shorter version of converter CV 24 (3½" (89 mm) long and 1¼" (32 mm) in diameter is available as Part No. CV 243 for use with automated system.
** A different atomizing probe can be substituted for the standard probe.
*** Shipped complete and ready for operation with an atomizing probe, tool kit, and instruction manual.
Please specify part numbers when ordering power supply, converter, and probe.
Example: VC 5020 AT power supply with CV 18 converter and 20 kHz atomizing probe Part No. 630-0437.

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ATOMIZERS FOR HIGH ATOMIZATION RATE

Two types of atomizing probes are available for processing volumes up to 20 liters per hour* – a dual inlet atomization probe and a wide dispersion atomizing probe. The dual inlet probe operates at 20 kHz. The wide dispersion probe operates at 20 kHz or 40 kHz.

With the dual inlet probe the mixed liquids flow through the probe and spread out as a thin film on the tip surface. The oscillations disintegrate the liquid into micro-droplets and eject them to produce a fine, low velocity spray. One port can be sealed when only one liquid has to be processed. Threaded ports #10-32 UNF thread. Required connecting tube ID 5⁄32" (4 mm).

With the wide dispersion atomizing probe, the liquid which is dispensed onto the probe surface via a small tube runs downward and spreads out as a thin film on the tip surface. The oscillations disintegrate the liquid into micro-droplets, and eject them to produce a fine, low velocity spray.

With both probes, atomization can be continuous or intermittent. The probes are fabricated of titanium alloy Ti-6Al-4V and are autoclavable.

*With water



DUAL INLET
ATOMIZING PROBE



WIDE DISPERSION
ATOMIZING PROBE

ATOMIZING PROBES FOR HIGH ATOMIZATION RATE

	20 kHz DUAL INLET ATOMIZING PROBE	WIDE DISPERSION ATOMIZING PROBES	
		20 kHz (H x W) 5 3⁄16" x 1" (132 x 25 mm)	40 kHz (H x W) 2 5⁄8" x 1" (67 x 25 mm)
PART NO.	630-0434	630-0590	630-0587
COMPATIBLE WITH	VCX 130 FSJ*	VC 5020 AT	VC 5040 AT
CONVERTER	CV 18	CV 18	CV 24
MAX. FLOW RATE**	20 l/hour	20 l/hour	10 l/hour
MEDIAN DROP SIZE	90 microns	90 microns	50 microns

*Without the standard ¼" (6 mm) probe
**With water

ULTRASONIC PROCESSORS FOR OEM APPLICATIONS

Sonics is structured to serve the OEM market, and over the years we have accumulated more experience working with OEM applications than all other ultrasonic companies combined. Our contributions have been numerous and applications diverse; from preparation of samples for particle size analysis and dispersion of nanomaterials to the dissolution of reagents for diagnostic investigations.

For most applications we have at our disposal a wide selection of proven products – from 50 watts to 1500 watts, designed specifically for the OEM market. They are readily available, and cost effective. In addition, we can provide application-specific variations of our core products to suit unique requirements.

Our engineers are among the most knowledgeable in the field of ultrasonics, and they have a breadth of experience that is unequalled in the industry. They have long ago recognized the benefits of working closely with our customers, and typically devote as much time in the field working collaboratively with them, as they do in the laboratory, designing and refining products. Their involvement with a variety of critical projects has compelled us to develop robust equipment that can withstand the rigors of industrial environment, establishing our company as the supplier of choice for demanding ultrasonic applications.

At Sonics we recognize that it is the complex and varying needs of our customers that set the agenda for innovative product development, and we undertake challenging projects with optimism and enthusiasm. So whether you have an existing application, or just want to explore how the inclusion of ultrasonics can enhance your process, and provide competitive advantages, please feel free to contact a member of our technical staff. We have a high regard for privacy, and your needs will be assessed confidentially, without obligation or preconceived solutions . . . just customized alternatives to address your particular requirements.

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FREQUENTLY ASKED QUESTIONS

What is ultrasonics?

Although sound is the sensation perceived by the sense of hearing, it's not always audible. Ultrasound literally means beyond sound; sound above the human audible spectrum. The frequency of a sound is the number of cycles of a sound wave in one second. Frequency is measured in units called hertz (Hz). Because the human ear is most sensitive to frequencies in the 1-5 kHz range with lower and upper limits of 20 Hz and 18 kHz respectively, ultrasonics refers to sound beyond the range of human audibility.

What are the differences between an ultrasonic processor and an ultrasonic bath?

The intensity within a bath is fixed, low, location dependent, and inconsistent, due to the fluctuation in the level and temperature of the water.

With an ultrasonic processor, processing is significantly faster and highly reproducible, due to the fact that the energy at the probe tip is high (at least 50 times higher than that produced in a bath), focused and adjustable.

20 kHz or 40 kHz?

40 kHz is commonly used for ultrasonic atomization because the droplet size at that frequency is half that generated at 20 kHz. However, the frequency of choice for most ultrasonic liquid processing applications is 20 kHz, because the amplitude at the probe tip and the resulting cavitation is twice that generated at 40 kHz.

With ultrasonic processing, are there any limitations?

Yes. Viscosity, temperature and liquid characteristics.

As the viscosity of the material increases, its ability to transmit vibrations decreases. Typically, the maximum viscosity at which a material can be processed effectively is 4000 cps. With standard systems, the practical upper limit on temperature without air cooling is approximately 100°C. Solid probes can safely be used with both aqueous solutions and low surface tension liquids (e.g. solvents), however, probes with replaceable tips should **never** be used with samples containing low surface tension liquids.

Which instrument should I use?

The 500 and 750 watt units are the most versatile because they can process both large and small volumes – on a batch basis, as little as 250 µl with a microtip, and as much as 1 liter with a 1" (25 mm) probe. Additionally, they can process up to 20 liters per hour on a flow-through basis when used with a continuous flow cell.

Since every instrument will perform equally well up to a certain volume, for samples up to 150 ml, the 130 watt models might warrant consideration.

The 1500 watt unit is the most powerful ultrasonic processor on the market, and the unit of choice for scale up and industrial applications.

Which probe is best suited for my application?

The larger the probe diameter, the larger the volume that can be processed, but at lesser intensity. See probe listings for recommendations; and for dependable performance, **always** use a solid probe when processing samples containing organic solvents or low surface tension liquids.

Can probes be manufactured to any length?

No. Probes are made to resonate at a specific frequency (half a wavelength or multiple thereof). 20 kHz probes are approximately 5" (127 mm) long and can be made longer in 5" (127 mm) increments. 40 kHz probes are approximately 2.5" (63 mm) long and can be made longer in 2.5" (63 mm) increments. Because ultrasonic probes are tuned to resonance, it is not uncommon for probes of identical frequency to have slightly different lengths due to variations in the titanium's modulus of elasticity.

Do all manufacturers rate the power output capabilities of their ultrasonic processors the same way?

Unfortunately not. Sonics' units are rated using the RMS standard – the amount of power, measured in watts, that a unit is capable of delivering continuously. Some of our competitors use less conservative methods, such as measuring the power for only a short period of time.

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Sonics' headquarters and manufacturing facility in Newtown, Connecticut, USA

All information and specifications in this catalog were reviewed for accuracy at the time of printing.
Because of our policy of continual improvement, we reserve the right to change our products at
any time without prior notice, in order to optimize performance and reliability.
For the latest information, please contact one of our Product Specialists.

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NEED ADDITIONAL INFORMATION?

For technical assistance, to request a quotation or inquire about delivery,
please call toll free 1-800-745-1105 or 203-270-4600
Monday through Friday between 8:30 am and 4:30 pm (Eastern Standard Time).



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