MISONIX

ULTRASONIC LIQUID PROCESSING EQUIPMENT

Method and Materials

Ultrasonic liquid processing is a highly valuable methodology in the laboratory. High intensity (20 kHz range) ultrasonic generation is sufficiently powerful to achieve useful liquid processing in a wide variety of applications. Everything from lysis of E. coli cells to spot cleaning of stubbornly dirty labware can be performed easily, quickly and reproducibly.

HOW ULTRASONIC LIQUID PROCESSING WORKS

The ***ultrasonic generator*** produces an electrical signal at a particular frequency.

The ***convertor/transducer*** transforms the electrical signal into mechanical vibration.

The mechanical vibration is transmitted and amplified down the length of the ***horn/probe.***

The ***tip of the horn/probe*** expands and contracts at the same frequency as the electrical signal through a prescribed amplitude (distance).

In liquid, the rapid (i.e., 20 kHz) vibration of the horn/probe tip causes ***cavitation,*** the formation and violent collapse of microscopic bubbles.

The collapse of the thousands of cavitation bubbles releases tremendous energy into the liquid in the form of ***shock waves.***

Objects and surfaces that are within or near the cavitation field are ***"processed"*** by the released energy.

The choices of a generator (and transducer) and horns/probes are matched to the volume, viscosity and other parameters of the particular application.

SOME SPECIFIC APPLICATIONS

- Lysis of bacterial, fungal, mammalian and other types of cells
- Mixing of compounds and solutions
- Improving solubility
- Generation of fine emulsions and suspensions
- Catalyzing difficult reactions
- Degassing of solutions
- Analyzing soil samples
- Cleaning

MISONIX EQUIPMENT

Our Ultrasonic Generators *(two models, one for larger and one for smaller volumes)* are highly sophisticated electronic devices that automatically adjust the power level to meet the level of resistance produced by the specific application.

Our Transducers utilize carefully selected piezo-electric crystals to transform the electrical signal to mechanical vibration.

Our Horns/Probes are crafted from high quality titanium or aluminum.

SONICATOR® 3000

MORE CONTROL THAN EVER BEFORE

The new Sonicator® 3000 integrates powerful ultrasonic processing capabilities with complete microprocessor control to optimize the sonication process. It is the first ultrasonic processor to offer programmability, auto tuning, temperature monitoring and the ability to control an external cooling device.

Our new microprocessor package makes operating the Sonicator® 3000 simple. The display screens literally walk you through the set-up and sonication process. It is completely programmable with up to 9 microprocessor-controlled programs. The unit provides for either continuous processing or on/off pulsing with adjustable "pulse on" and "pulse off" times ranging from 0.5 seconds to 1 hour and a total processing time of up to 100 hours.

The Sonicator® 3000 auto-tune circuit tracks frequency within the convertor/horn assembly. The advanced electronics automatically sense and set the exact frequency for optimum performance of the horn that is attached to the transducer. Whether you just switched the unit on or you have changed probes, tuning is no longer necessary.

Over-heating a sample is no longer a worry now that the Sonicator® 3000 has the capability of temperature control. The sample is monitored by a temperature probe and when the pre-set temperature of your sample is exceeded, an external cooling device can be triggered ensuring your sample remains within your desired temperature range.

NEW FEATURES

- Microprocessor Controlled
- Auto Tuning
- Temperature Monitoring and Control

BENEFITS

- Fully programmable
- Change probes without ever needing to re-tune the device
- Prevent over-heating of samples

For additional technical specifications please refer to insert sheets (inside back cover pocket).

A WIDE VARIETY OF Horns AND Accessories
TO MEET A WIDE VARIETY OF APPLICATIONS

FLOCELL™

Flocells™ are used for the continuous processing of large volumes of sample material. The liquid is pumped into the Flocell™ through a carefully designed opening so that all of the sample passes through the cavitation field and receives maximum, uniform sonication. The annulus and orifice sizes are variable to accommodate differing viscosity and flow rate. Flocells™ are available that can process material at rates of 40 liters per minute. Materials of construction vary with applications.

CUP HORNS

Cup Horns are high intensity ultrasonic water baths that allow samples to be processed in completely closed containers (such as test tubes or vials). The ultrasonic probe never comes in contact with the sample so that sample loss, escape and/or cross contamination can not occur. Large Cup Horns allow for the simultaneous sonication of clusters of tubes or vials providing for uniformity of processing. Cup Horns are ideal for sterile or pathogenic sample processing. Three different sizes are available.

HORNS/PROBES

We offer a wide variety of Horns and Probes to adapt the Sonicator® to your particular application. Probe choice is determined by the volume to be processed and the intensity desired. As tip diameter increases, intensity/amplitude decreases. Volumes less than 10ml require the use of a Microtip probe. Horns are available as solid, tapped (with replaceable titanium tips) or sapphire (with sapphire coated replaceable tips).

SONICATOR® 3000

MICROPLATE HORN

Process an entire microplate at one time with the Microplate Horn. Place the microplate within the reservoir and in minutes all wells of the microplate have been processed. The Microplate Horn delivers consistent sonication through each well of the microplate and allows you to reproduce your results from plate to plate. A Deep Well Microplate Horn is also available for use with Microtubes.

DUAL HORN

Sonication is used by environmental testing labs to process soil and sediment samples according to EPA Method SW846-3550 in lieu of soxhlet extraction methods. Sonication takes minutes per sample versus 4-18 hours by soxhlet extraction. Sonication uses half the solvent and improves contaminant yields. The Dual Horn allows you to process two samples simultaneously, cutting already reduced testing times in half.

For additional technical specifications please refer to insert sheets (inside back cover pocket).

MICROSON™ XL2000

SMALL VOLUME ULTRASONIC PROCESSOR

The Microson™ is an economic alternative to the Sonicator® 3000 if your work is restricted to 100ml samples or smaller. Auto-tuning and dual mode operation help make the Microson™ an effective and practical tool for your research.

The improved load monitoring and frequency tracking ensure that the probe operates more efficiently to deliver consistent sonication intensity at any given amplitude setting. The user experiences shorter processing times and greater sample-to-sample consistency.

The Microson™ has two modes of operation, the probe can either sonicate continuously or be activated by the thumb pulsing switch for greater control. Several probes are available to suit your particular application including a Micro Cup Horn for the safe processing of hazardous or pathogenic samples inside sealed vials.

FEATURES

- Auto Tuning
- Thumb Pulse Switch
- Compact Design

BENEFITS

- No Need to Tune Probe Before Each Use
- Greater Control of Sonication
- Uses Minimal Table Space

For additional technical specifications please refer to insert sheets (inside back cover pocket).

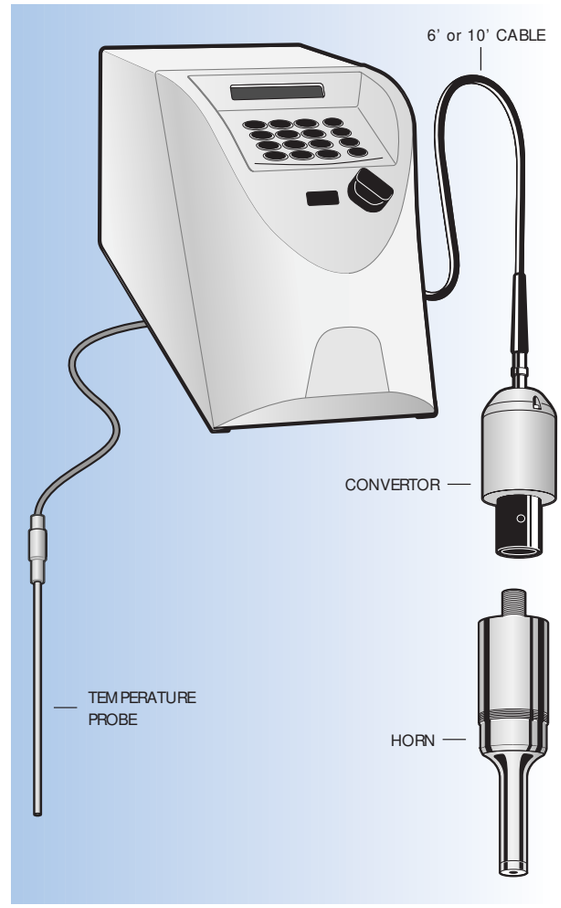
TECHNICAL DATA

SONICATOR® 3000

The Sonicator® 3000 offers a powerful generator with a 600-Watt output, a 20kHz convertor, temperature control, auto-tuning, 9 level microprocessor-controlled memory, external cooling device interface, digital display, wrench set and quick-disconnect cable.

Part # S3000 is the Sonicator 3000® package that includes one each of the following:

- Generator
- Convertor
- 1/2" Horn
- 6' Cable
- Wrench Set
- Temperature probe



SPECIFICATIONS

Generator	
Dimensions	8.5" wide x 19.0" deep x 10.5" high (21.6 cm x 48.3 cm x 26.7 cm)
Weight	17.6 lbs. (8.0 kg)
Maximum Power Output	600 Watt
Operating Frequency	20 kHz
Input	110VAC @ 10 Amps/220VAC @ 5 Amps
Total Processing Time	1 sec. to 100 hrs.
Adjustable Pulse On & Off Time	0.5 sec. to 1 hr.
Convertor	
Dimensions	2.5" diameter x 6.0" length (6.4 cm x 15.2 cm)
Weight	1.75 lbs. (0.79 kg)

To order call 1-800-645-9846

TECHNICAL DATA

MICROSON™

The Microson™ is an economic alternative to the Sonicator 3000® if your work is restricted to samples of 100ml or smaller. The unit features two modes of operation; continuous or thumb switch activated pulsing.

Part # XL2000 is the Microson™ package that includes one each of the following:

- Generator
- Convertor
- 1/8" Microprobe
- Cable
- Wrench Set

An optional foot switch and timer are available.

SPECIFICATIONS

Generator	
Dimensions	7.5" wide x 13.0" deep x 7.0" high (19.0 cm x 33.0 cm x 17.8 cm)
Weight	9.0 lbs. (4.1 kg)
Maximum Power Output	100 Watts
Operating Frequency	22.5 kHz
Input	117VAC @ 0.5 Amps/220VAC @ 0.25 Amps (50/60 Hz)
Convertor	
Dimensions	1.25" diameter x 6.6" long (3.2 cm x 15.2 cm)
Weight	9.0 oz. (0.17 kg)

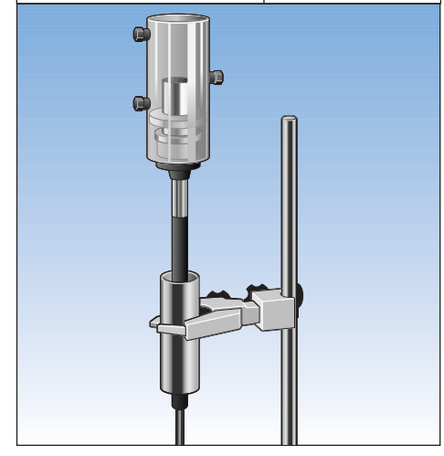
MICROPROBES

Part #	P-1	P-2	P-3	P-4
Processing Vol.	0.5-15 ml	2-25 ml	0.2-5 ml	5-50 ml
Tip Diameter	1/8" (3.2 mm)	3/16" (4.8 mm)	3/32" (2.4 mm)	1/4" (6.4 mm)
Intensity	Very High	High	Very High	Medium
Amplitude*	180 µm	80 µm	170 µm	60 µm
Length	5" (127 mm)	4 1/4" (108 mm)	5 5/8" (143 mm)	4 5/8" (117 mm)

* Double (peak-to-peak) amplitude of the radiating face of the tip in micrometers on the Microson™ operating at output control setting 20.

MICROSON™ CUP HORN

Part #	431M
Cup I.D.	1 1/2" (38 mm)
Radiating Face Diameter	9/10" (23 mm)
Overall Length	4 1/2" (114 mm)
Max. Size Vessel	50 ml/22 mm dia.



To order call 1-800-645-9846

TECHNICAL DATA

MICROPLATE HORN

The Microplate Horn comes complete with a required acoustic enclosure to protect users from the sound waves generated by this horn, as well as all the attachments required to control and replace the water in the horn reservoir.

Part # 431MP includes one each of the following:

- Microplate Horn
- Acoustic Enclosure
- Syringe
- Pinch Clamps
- Silicone Tubing

Note: The Microplate Horn is also available as part of a complete package, part # S3000MP which also includes the S3000 generator, convertor, cable and wrench set.

SPECIFICATIONS

Horn Reservoir	
Dimensions	6.5” O.D. x 5.9” I.D. x 0.6” deep (16.5 cm x 15.0 cm x 1.5 cm)
Acoustic Enclosure	
External Dimensions	10.0” wide x 10.0” deep x 17.0” high (25.4 cm x 25.4 cm x 43.2 cm)

TECHNICAL DATA

HORNS/ PROBES

HORNS

STANDARD

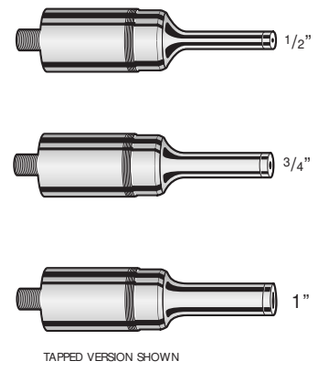
Horns are made of titanium and are offered in 2 different versions.

Solid horns are constructed of a single piece of titanium. **Tapped** horns are furnished with replaceable tips. **Tips** are available in solid titanium or in Sapphire coated titanium (Sapphire coating extends tip life).

Note: consult charts below for available options.

STANDARD

Part #	Processing Vol.†	Tip Diameter	Type	Intensity	Amplitude*
200	10-250 ml	1/2" (12.7 mm)	Tapped	High	120 µm
201	10-250 ml	1/2" (12.7 mm)	Solid	High	120 µm
201S	10-250 ml	1/2" (12.7 mm)	Sapphire	High	120 µm
207	25-500 ml	3/4" (19.1 mm)	Tapped	Medium	60 µm
208	25-500 ml	3/4" (19.1 mm)	Solid	Medium	60 µm
208S	25-500 ml	3/4" (19.1 mm)	Sapphire	Medium	60 µm
209	50-1000 ml	1" (25.4 mm)	Solid	Low	30 µm
210	50-1000 ml	1" (25.4 mm)	Tapped	Low	30 µm
210S	50-1000 ml	1" (25.4 mm)	Sapphire	Low	30 µm



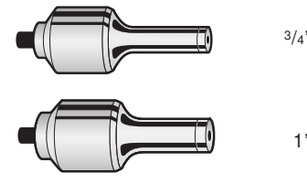
TAPPED VERSION SHOWN

HIGH INTENSITY

High intensity horns generate twice the amplitude (and higher intensities) when compared with standard horns of the same diameter.

HIGH INTENSITY

Part #	Processing Vol.†	Tip Diameter	Type	Intensity	Amplitude*
305	25-500 ml	3/4" (19.1 mm)	Tapped	High	120 µm
310	50-1000 ml	1" (25.4 mm)	Solid	Medium	60 µm
311	50-1000 ml	1" (25.4 mm)	Tapped	Medium	60 µm



TAPPED VERSION SHOWN

* Double (peak-to-peak) amplitude of the radiating face of the tip in micrometers on Sonicators operating at output control setting 10.

† Processing volumes may be doubled by using a magnetic stir bar.

REPLACEMENT TIPS

Solid Titanium Only

Part # 406 for 1/2" (12.7 mm) Tapped horns
Part # 407 for 3/4" (19.1 mm) Tapped horns
Part # 408 for 1" (25.4 mm) Tapped horns

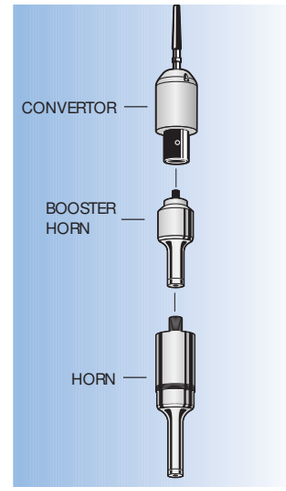
To order call 1-800-645-9846

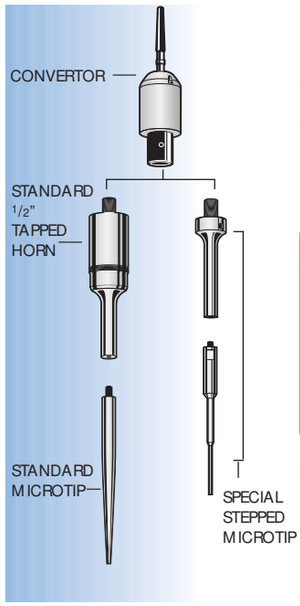
(See reverse side for additional information.)

BOOSTER HORNS

Booster Horns attach between the convertor and standard horn and are used to increase amplitude/intensity of standard horns by the gain ratio indicated.

Part #	For Use With	Gain Ratio
328A	All Standard Horns	2 to 1
328B	3/4" and 1" Standard Horns Only	2.5 to 1
328C	1" Standard Horns Only	3 to 1





MICROTIP HORNS

All Microtip Horns must only be used as extensions of the standard 1/2" tapped horn, part # 200 with the exception of the special Stepped Microtip part # 420.

MICROTIP HORN

Part #	Processing Vol.	Tip Diameter	Type	Intensity	Amplitude*	Length
418	0.2-5 ml	1/16" (1.6 mm)	Tapered	Ultra High	320 µm	7" (17.8 cm)
419	0.5-15 ml	1/8" (3.2 mm)	Tapered	Ultra High	240 µm	6 1/2" (16.5 cm)
419A	2-25 ml	3/16" (4.8 mm)	Tapered	Very High	150 µm	6 1/8" (15.5 cm)
419B	5-50 ml	1/4" (6.4 mm)	Tapered	High	115 µm	5 7/8" (14.9 cm)
420†	0.5-15 ml	1/8" (3.2 mm)	Stepped	Very High	205 µm	5 1/2" (14 cm)

* Double (peak-to-peak) amplitude of the radiating face of the tip in micrometers on Sonicators operating at output control setting 5.
†Two piece probe.

HORN EXTENDERS

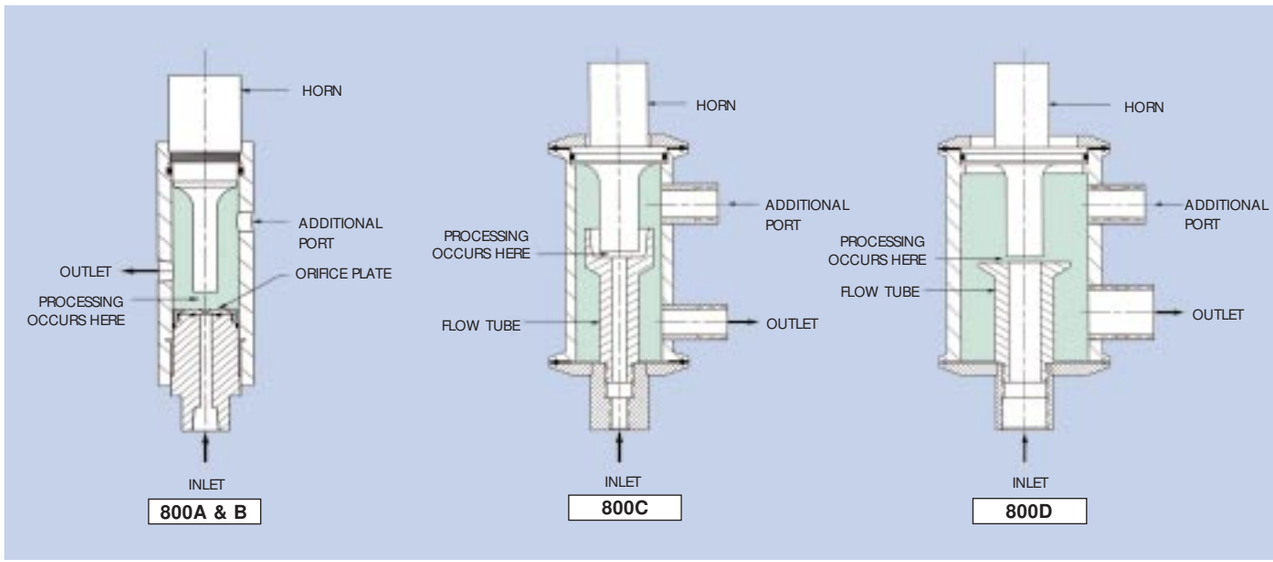
Some applications may require the use of long-necked vessels which will not accommodate the standard probe due to their length. To process using such vessels, horn extenders are available. For assistance in selecting the appropriate extender for your application, please call customer service.

To order call 1-800-645-9846

TECHNICAL DATA

FLOCELL®

IN-LINE PROCESSING



ORDERING INFORMATION

800A and **800B** are supplied complete with casing, horn, 3/32" orifice plate and 1/8" orifice plate.

Replacement Orifice Plates

Part #

842 3/32" Orifice plate
843 1/8" Orifice plate
840 Blank orifice plate with pilot hole (extremely low flow rates)

800C is supplied as Flocell® casing only. Horn and matching flow tube must be specified and ordered separately.

Part #

821CT 3/4" Tapped processing horn
821C 3/4" Solid processing horn
822CT 1" Tapped processing horn
822C 1" Solid processing horn
845 Flow tube for use with 821C or 821CT
846 Flow tube for use with 822C or 822CT

800D is supplied as Flocell® casing with flow tube. The horn must be specified and ordered separately.

Part #

822DT 1" Tapped horn
822D 1" Solid horn

Replacement Flow Tube

Part #

847 Flow tube

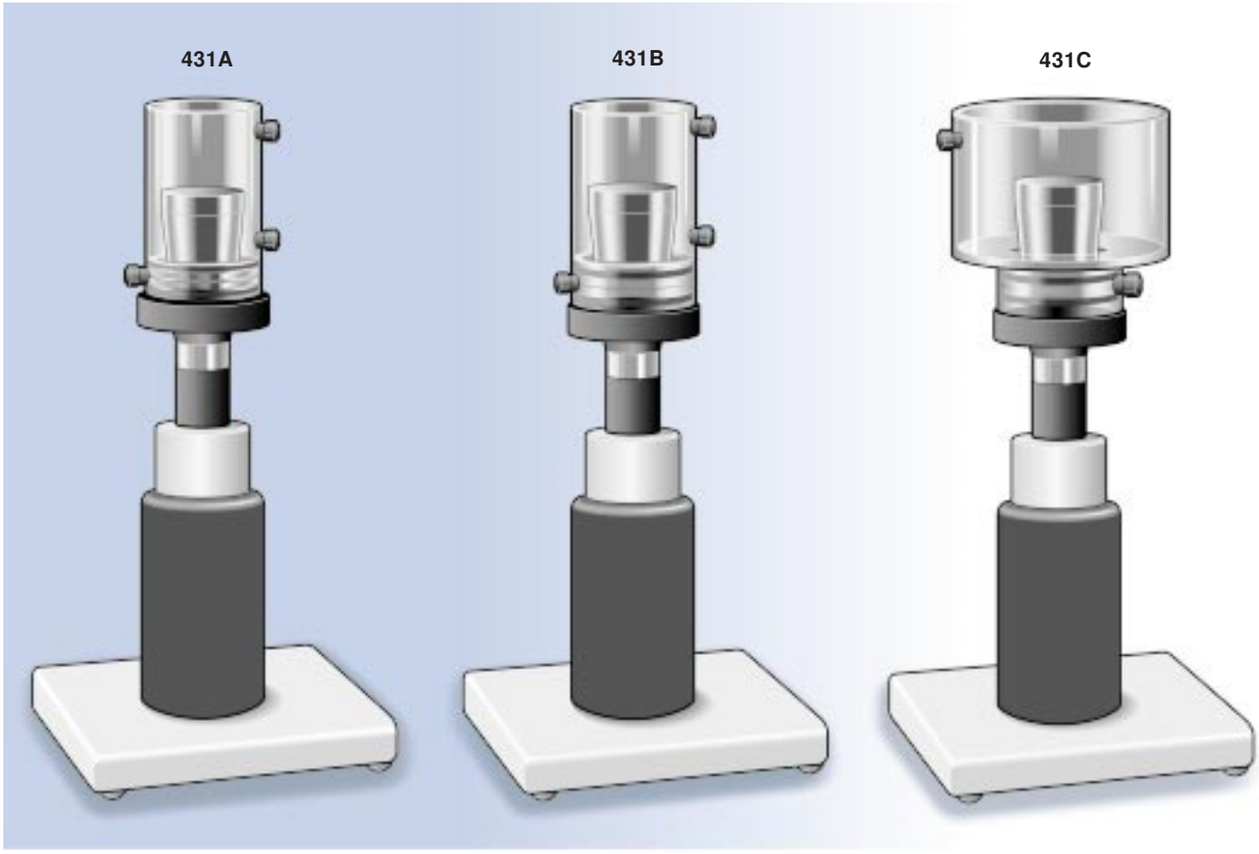
Part #	800A	800B	800C	800D
Maximum Flow Rating	0.67 lpm	0.67 lpm	20 lpm	40 lpm
Material of Body Tube	Translucent Polycarbonate	Stainless Steel	Stainless Steel	Stainless Steel
Static Pressure Rating	50 psi (350 kPa)	100 psi (700 kPa)	100 psi (700 kPa)	100 psi (700 kPa)
Inlet/Outlet size	1/4" NPT	1/4" NPT	1/2" NPT	1" NPT

* lpm = liters per minute

To order call 1-800-645-9846

TECHNICAL DATA

CUP HORN



SPECIFICATIONS

Part #	431A	431B	431C
Cup I.D.	2 1/2" (6.4 cm)	3" (7.6 cm)	5 1/2" (14.0 cm)
Radiating Face Diameter	2" (5.1 cm)	2" (5.1 cm)	2 1/2" (6.4 cm)
Overall Length	7" (18.0 cm)	7" (18.0 cm)	7" (18.0 cm)
Max. Size Vessel	150 ml	250 ml	2000 ml

Cup horns require the stand shown above (Part # 448) which must be ordered separately.

TECHNICAL DATA

MISCELLANEOUS

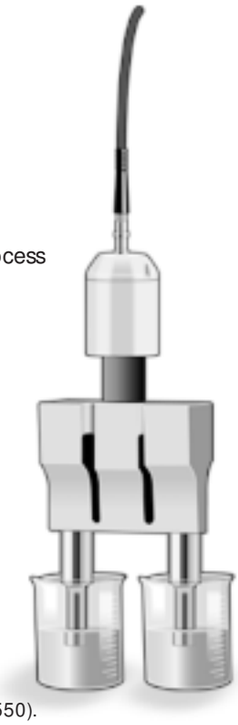
SONABOX™ ACOUSTIC ENCLOSURE

The Sonabox™ reduces noise down to safe, comfortable levels. All Sonicator® horns and attachments are compatible with the Sonabox™ except the 431MP which comes with a custom acoustic enclosure.

Part # 432B
Interior Dimensions: 9.25" Wide x 10.75" Deep x 19.75" High (23.5 cm x 27.3 cm x 50.2 cm)

DUAL HORN

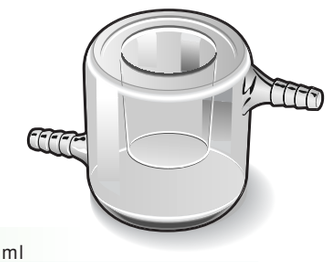
The Dual Horn allows a single Sonicator® and convertor to process two samples simultaneously.



Suggested Sonicator® accessories for Environmental Testing (see EPA Method SW846-3550).

Part # 351	Dual Horn
Part # 355	3/4" Stepped Extenders (must order 2)
Part # 356	Dual Beaker Holder (optional)
Part # 438	Convertor Stand and Positioner (optional)

COOLING CELLS



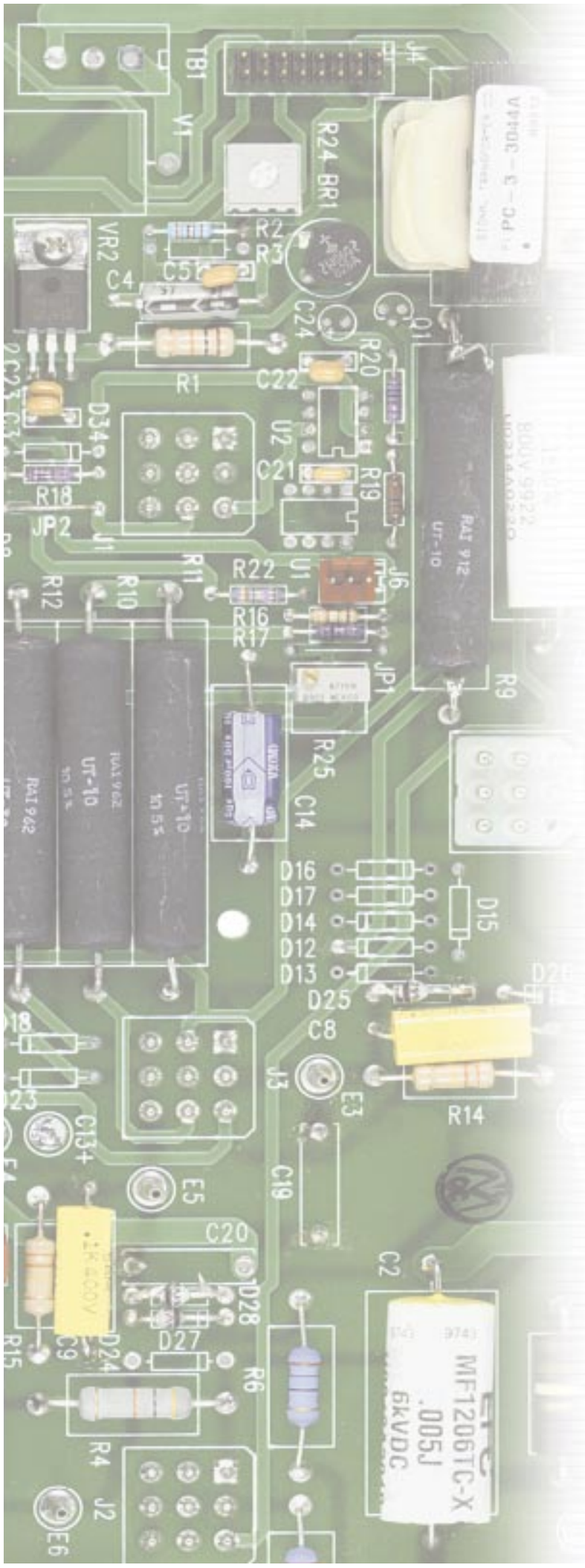
Part # 428	Volume 0.5 to 10 ml
	Water jacketed sonication vessel with conical well for use with Microtip probes.
Part # 428M	Volume 10 to 25 ml (as show above)
	Water jacketed sonication vessel with flat-bottom well for use with 1/2" horns.

ROSETT™

Conical shaped glass vessels with semicircular side arms to promote circulation and efficient cooling of sample. Available with jacket (J) for continuous coolant flow or without a jacket (call customer service for further information).

Part # 425 & 425J	Volume 5 to 15 ml
Part # 427 & 427J	Volume 100 to 450 ml

To order call 1-800-645-9846



MISONIX

1938 New Highway Farmingdale, NY 11735
Tel. 631.694.9555 • Fax 631.694.9412 • Toll-Free: 800.645.9846
www.misonix.com