

# MICROSON™

**XL 2000**

**ULTRASONIC LIQUID PROCESSOR**

**OPERATOR'S MANUAL**



**53 Church Hill Road  
Newtown, CT 06470 USA**

**203.426.0101tel**

**877.338.9636 toll free**

**203.426.7026 fax**

**[info@sonicator.com](mailto:info@sonicator.com)**

**[www.sonicator.com](http://www.sonicator.com)**

## TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	SAFETY PRECAUTIONS	2
	SAFETY REMINDER	3
	SPECIFICATIONS	4
	CONTROLS DIAGRAM	5
<b>I</b>	<b>INSTALLATION</b>	
	A. Power Requirements	6
	B. Inspection	7
	C. Placement of Equipment	7
<b>II</b>	<b>OPERATION</b>	
	A. Principle of Ultrasonics	8
	B. Description of Major Components	8
	C. Description of Controls and Indicators	8
	D. Preparation for Use	9
	E. Operation	9, 10
	F. Care of Microprobe Tips	11
<b>III</b>	<b>REPAIR AND REPLACEMENT</b>	
	Return of Equipment	12

## **SAFETY PRECAUTIONS**

Read ALL Instructions before Installing or Using Equipment

### **XL-2000 Microson™ Ultrasonic Homogenizer Instruction Manual**

Your new Microson™ Ultrasonic Liquid Processor has been designed and tested to assure maximum operator safety. However, no design can completely protect against improper usage, which may lead to bodily injury and/or property damage. For total safety and equipment protection, read the instruction manual carefully before attempting to operate this equipment. Observe the following **WARNINGS:**

- High voltage is present in the generator (power supply), convertor and high frequency cable. Do NOT attempt to remove the generator cover or convertor case. Do not touch open connection with power engaged.
- Do NOT operate generator with convertor disconnected.
- The Microson™ Ultrasonic Homogenizer must be properly grounded with a 3-prong plug. Test electrical outlet for proper grounding before plugging in unit.
- Install the Microson™ in an area free from excessive dust, dirt, explosive and corrosive fumes and from extreme temperature and humidity.
- NEVER touch a vibrating horn or probe.
- NEVER immerse the convertor in liquids of any kind.
- Refer to the enclosed safety reminder.

## **SAFETY REMINDER**

Safety precautions regarding the operation and handling of high voltage equipment is prominently indicated in the instruction manual. This letter serves as a safety reminder to the operator to visually and physically inspect the unit to insure optimum and safe performance.

This inspection should be scheduled as a routine maintenance procedure, and done with the Ultrasonic Liquid Processor in the OFF position with the unit unplugged from the AC power source.

Long exposure to acids or caustics results in corroding metal parts or components. Check the rear of the generator, convertor, and cables for any signs of rust or discoloration. If discoloration is found, move the Ultrasonic Liquid Processor away from the source of the contaminant.

Examine the condition of the high voltage cable, which attaches the convertor to the power supply. Inspect the wire insulation for damage, such as burning from hot plate contact, or wear or breakage from extended use or rough handling.

Inspect the cable connectors by gently pulling on the wire while holding the body of the connector. The cable connector and rubber boot protector at the end of the cable should be tight to the wire, with no movement possible and no cracks or frayed ends visible. Do not subject the cable ends to severe bending loads while performing these tests. Return the convertor assembly immediately if your cable does not pass the above inspection.

Should the convertor/cable assembly be subjected to misuse, such as dropping or a severe pulling force on the wire itself, the cable must be inspected as above.

Should the Ultrasonic Liquid Processor stop functioning, shut the unit off and inspect cable as above BEFORE any other action is taken.

**DO NOT USE A CABLE WITH BROKEN END CONNECTIONS, EXPOSED WIRES OR FRAYED INSULATION. HIGH VOLTAGE IS PRESENT IN CABLE AND MAY POSE A SHOCK HAZARD. DO NOT TOUCH CONVERTOR ASSEMBLY UNTIL POWER SWITCH OF GENERATOR IS IN OFF POSITION AND UNIT IS UNPLUGGED.**

If the operator is in doubt as to the condition of the unit, call 800-694-9612 to speak with a customer representative for prompt attention.

In general use, the cable assembly should not be used to carry the convertor or pull it toward the user. Make certain the cable always has slack and is never tensioned. Move the generator or convertor assembly closer to one another to accomplish this. If this is not possible, contact Qsonica to obtain a longer assembly.

## **SPECIFICATIONS**

### **Generator**

Dimensions: 33cm W x 19cm D x 17cm H (13" x 7.5" x 6.7")

Weight: 4.2 kg (9.2 lb.)

Input Voltage: 115 VAC nom. (switchable to 220 VAC nom.) 50/60 hz

Full Load Current: 1.65 amps at 115v/ 0.8 amps at 220v

Fuse Rating and Type: 3 amp/1.5 amp Fast acting

Voltage Tolerance: +/- 10% nominal voltage

Output Voltage/Frequency: 950 Vrms (maximum) 22.5 kc (nom)

### **Convertor**

Dimensions: 17cm L x 3cm Dia. (6.7" L. x 1.18" Dia.) without probes

Weight: 0.2 kg (0.5 lb.)

Materials: Aluminum case and Front Driver

### **Environmental**

Pollution Degree 1

Temperature Limits: 50° F - 110° F (10° C - 43° C)

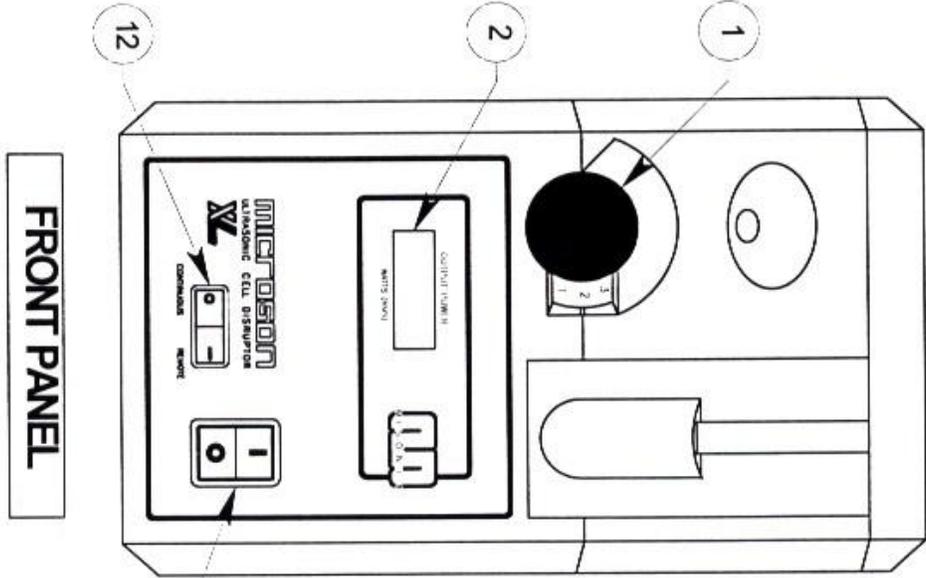
Barometric Pressure: Unlimited (Note: In high vacuum areas, additional cooling provisions may be needed. Contact factory)

### **Accessories**

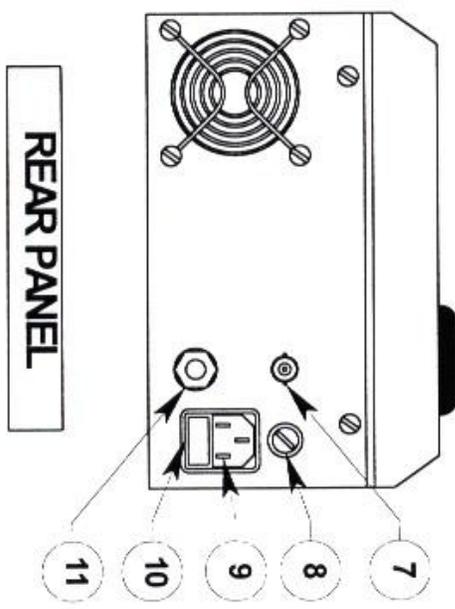
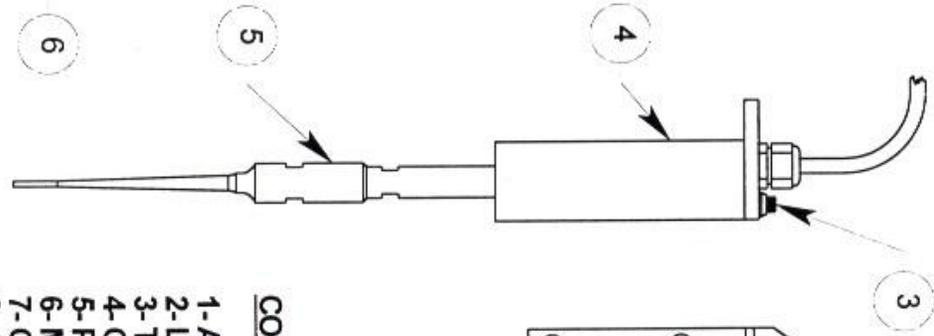
Use only accessories and probes listed in the catalog by the manufacturer as suitable for use with this appliance. Do not attempt to fabricate ultrasonic tooling or accessories unless approval has been obtained from the manufacturer in advance.

# CONTROLS DIAGRAM

GENERATOR



FRONT PANEL



REAR PANEL

## CONTROL INDEX

- 1- AMPLITUDE CONTROL KNOB
- 2- LCD POWER OUTPUT DISPLAY
- 3- TRANSDUCER PUSH BUTTON SWITCH
- 4- CONVERTOR
- 5- PROBE
- 6- MAIN POWER SWITCH
- 7- CONVERTOR CABLE CONNECTOR
- 8- 110/220V SELECTOR SWITCH
- 9- POWER CORD RECEPTACLE
- 10- FUSE 3A/115V  
1.5A/220V (FAST ACTING)
- 11- FOOT SWITCH JACK
- 12- CONTINUOUS / REMOTE  
ROCKER SWITCH

## **INSTALLATION**

### **WARNING!**

- High voltage is present in the generator, convertor and high frequency cable. Do not attempt to remove the generator cover or convertor case.
- Do Not touch any open cable connections on the unit while the power is turned on.

#### **A. Power Requirements**

The generator requires a single phase, grounded, three-wire, 115V or 220V, 50/60 Hz source, unless otherwise fitted, and has a 3 amp fuse for 115V service or a 1.5 amp fuse for 220V service. There is a select switch on the rear panel of the generator to set voltage for 115V (92 – 140RMS) or 220V (200 – 240 VRMS) service.

**CAUTION:** Do not operate a unit set for 115V service on 220V line or operate a unit set for 220V service on a 115V line.

**WARNING:** The electrical line cord is equipped with a 3-prong grounding plug. Do not remove the grounding prong under any circumstances. The plug must be plugged into a mating 3-prong grounded outlet.

**NOTE:** Only use IEC approved fuses. Do not use “slow blow” fuses or fuses rated above the amperage noted.

#### **Cleaning Instructions**

The generator and convertor may be cleaned using Windex™ or a similar acid-free cleaning solution, and an anti-static cleaning cloth. Probes can be cleaned with isopropyl alcohol and sterilized in an autoclave (probes only).

## B. Inspection

Your new Microson™ Ultrasonic Liquid Processor was thoroughly inspected, tested and carefully packed before leaving the factory. Prior to unpacking, carefully inspect the shipping carton for any evidence of damage. Claims for loss or damage sustained in transit must be made with the shipping company.

Unpack the unit from its shipping carton and check the contents against the packing list. Before disposing of the packing material, check it carefully for small items. Report any missing components to Qsonica immediately.

Visually inspect all external controls, indicators, and surfaces to detect any damage in transit. If damage has occurred, contact your carrier within 48 hours of delivery date. DO NOT OPERATE DAMAGED EQUIPMENT. Retain all packing material for future shipment.

## C. Placement of Equipment

A built in fan positioned at the back of the unit draws in cool air from the room to provide radiant and convectional cooling of the internal components. Therefore, DO NOT BLOCK THE FAN INLET. Position the generator so that air flows freely around the entire case.

## OPERATION

### A. Principle of Ultrasonics

The generator (power supply) converts conventional 50/60 Hz AC line power to 22.5 kHz electrical energy which is fed to the convertor where it is transformed to mechanical vibration. The heart of the convertor is a lead zirconate titanate electrostrictive (piezoelectric) crystal which, when subjected to an alternating voltage, expands and contracts. The convertor vibrates in the longitudinal direction and transmits this motion to the MICROPROBE which is immersed in the biological or liquid process solution. Cavitation results, in which microscopic vapor bubbles are formed momentarily and implode, causing powerful shock waves to radiate throughout the sample from the tip face. MICROPROBES amplify the longitudinal vibration of the convertor; higher amplification (or gain) results in more intense cavitation action and greater disruption.

The convertor is tuned to vibrate at a fixed frequency of 22.5 kHz. MICROPROBES are resonant bodies, also tuned to vibrate at 22.5 kHz; any change in mass or geometry can disturb the resonant frequency and cause failure or damage to the convertor or generator.

### B. Description of Major Components

1. **Generator** (also known as the "power source") - includes the operating controls and power indicator, an On/Off switch, and separable three-wire grounded line cord with integral U.S. plug or Europlug, fuse, and high frequency cable connector.
2. **Convertor** (also known as the "transducer") - includes the transducer crystals, housing, and front driver (first stage of acoustic amplification) with ¼-20 threaded hole for the MICROPROBE.
3. **MICROPROBE** (also known as the "probe" or "tip") - resonant body with ¼-20 stud, serving as a second stage of acoustic amplification.

### C. Description of Operating Controls and Power Indicator

The front panel contains the Wattmeter with Digital LCD Display for monitoring power output, the Power Control Knob, Continuous/Remote Operation Switch, Convertor Rest and On/Off Switch. The **Wattmeter** measures the power (in watts) delivered to the convertor and probe, while the **Digital LCD Display** provides a continuous read-out of this value. The **Continuous/Remote Operation Switch** provides continuous operation or manual pulsing (utilize the thumb switch). The **Power Control Knob** provides continuous adjustment of probe intensity with gradations from 1 to 20. The **Convertor Rest** holds the convertor and probe when not in use, and the **On/Off Switch** contains a power light indicator. The back panel contains the line fuse and footswitch jack for use with **optional plug-in timer** or **On/Off Footswitch** (see page 10).

#### D. **Preparation for Use**

1. The Microson™ is easy to set-up. Simply attach one end of the convertor cable to the back of the generator. Plug one end of the power cord into the back of the unit and the other end into a three-pronged (grounded) wall outlet. Then make sure that the MICROPROBE is securely attached to the convertor. The unit is now ready to use.
2. To verify tightness of the MICROPROBE, use the open-end wrenches supplied. To install a new probe, first screw the probe into the convertor finger tight only. Then tighten the probe using the wrenches provided by placing the wrenches in the slots of the probe and the (black) front driver.
3. Instead of hand-holding the convertor, a simple three-prong lab clamp and lab stand may be used to hold the convertor and sample tube. Secure the clamp only to the large (1¼ or 32mm) diameter of the convertor. The movement of the MICROPROBE will be restricted if the clamp is placed on the probe or on the (black) front driver.

#### **Cautions**

- Never touch the tip of a live probe to your hand or skin
- Always allow the unit to reach room temperature before operating
- Do not operate the generator without the convertor attached
- Do not let the probe vibrate in air for more than just a few seconds
- Avoid touching the activated probe to the sides or bottom of the sample container, and do not place it down on the work surface
- Do not use the On/Off switch for pulsing, only use the optional plug-in footswitch to manually pulse the probe

#### E. **Operation**

The MICROSON™ does not require manual tuning. It has an automatic tuning feature and is fully self-tuning across a wide band of load conditions. To operate, follow these instructions:

- Simply hold the body of the convertor.
- Turn the power control knob to zero.
- Turn the power switch on.
- Allow digital reading to stabilize at 0.0.
- Place the probe into your sample with the tip at mid-depth.

#### **Continuous Operation**

Press the Continuous operation switch on the front panel

Adjust power setting to the appropriate intensity level for your sample

### **Pulsed Operation**

Press the Remote operation switch on the front panel  
Pulse as desired using transducer pulse button switch with appropriate intensity power setting

### **Footswitch Operation**

- Switch front panel switch to Continuous operation
- Insert footswitch plug into jack on rear of the unit
- Set desired power intensity level
- Pulse as desired using footswitch

The sides and end of the tip must **never** be allowed to come in direct contact with the container or hard surface. The stress resulting at the point of contact could cause fracture of the MICROPROBE or of the glass container.

Immerse the tip of MICROPROBE at least 1 to 1½ times the tip diameter into the solution (without touching the bottom).

Lower the tip into the solution to avoid aerosolizing and foaming. Aerosolizing and foaming generally occur when the tip is not immersed far enough into the solution, or if too high of a power setting is used by lowering the tip in the solution, decreasing power, and reducing solution temperature will normally prevent aerosolizing and foaming. In severe cases, use a narrow test tube and plastic film over the vessel. Push the tip through the film to sonicate. Be sure to clean the tip before sonicating another sample, since protein released from cell material acts like a wetting agent and tends to promote foaming. Once foaming occurs, reduce power below the cavitation level before proceeding. If the foam persists, the sample may have to be discarded.

The highest intensity energy is concentrated directly under the tip and dissipates within ¼" (6mm) from the tip. Liquids and suspended solids to be processed must circulate freely in this zone. Whole tissue should first be finely divided or homogenized roughly in a mechanical device, such as a laboratory blender or rotary homogenizer, before being sonicated. Small pieces of tissue can be sonicated whole if trapped directly under the probe tip.

### **Operation with optional Plug-in Timer**

The timer allows the probe to be activated for a specific period of time between 1 to 15 minutes. At the end of the timed cycle the probe will be inactive indefinitely (the power to the unit remains on, however).

#### **For timed operation:**

1. Turn the power control knob to zero.
2. Turn the power switch on.
3. Allow digital reading to stabilize at ~ 0.0.
4. Place the probe into your sample at mid-depth.

5. Insert Timer plug into the footswitch socket on rear panel of generator.
6. Adjust the power setting to the appropriate intensity level for your sample.
7. Set the desired time on the timer. Once timer is set the probe will be activated. Unit will shut off at end of timed cycle. Repeat as necessary to process all samples.

### **Operation with optional Plug-in Footswitch**

The footswitch allows the user to manually activate the probe. The user may switch the probe on or off at their own discretion by depressing the footswitch. The footswitch is commonly used for "pulsed" sonication or for "hands-free" operation, allowing the operator to manipulate the sample with their hands.

#### **For footswitch operation**

1. Turn the power control knob to zero.
2. Turn the power switch on.
3. Allow digital reading to stabilize at ~ 0.0.
4. Place the probe into your sample at mid-depth.
5. Insert Footswitch plug into the footswitch jack on rear panel of generator.
6. Adjust the power setting to the appropriate intensity level for your sample.
7. Depress footswitch to activate output.
8. Hold footswitch down for desired period of operation.
9. Release footswitch to de-activate output. Repeat as necessary to process all samples.

**CAUTION: If Footswitch or Timer plug is removed from jack at rear of unit, then the unit will remain on indefinitely. In this event turn main power switch off to disengage unit.**

### **F. Care of MICROPROBE Tips**

Proper care of MICROPROBE tips is essential for good performance and long service life. Tightness of the probe, cleanliness of the mating surfaces and condition of the probe tip are all very important to overall performance. The probe tip is continuously subjected to intense shock waves, which cause cavitation erosion of the probe's tip. Keeping the tip face smooth and polished will significantly improve sonication efficiency and increase the useful life of the probe. The following maintenance procedures should be performed weekly:

- Check the tightness of the probe periodically with the open-end wrenches provided.
- Keep the stud threads and the mating surfaces between the probe and the (black) front driver clean and dry.
- Check the probe tip for signs of cavitation erosion and pitting.
- Polish the probe tip with a very fine emery cloth or sandpaper (#600) to remove any surface scratches or pitting.
- Do not file or grind the probe tips as this could bend or break them.
- Replace probes periodically, especially if they no longer tune properly, are badly pitted or eroded, or if they are bent or cracked.

## REPAIR AND REPLACEMENT

### A. Return of Equipment

**All repair requests must go through [www.sonicator.com](http://www.sonicator.com).**

Specific and easy to follow instructions are clearly displayed online. Failure to follow these instructions will cause significant delays in the repair or return process.

All requests for repairs and replacement parts should be directed to the Service Department at Qsonica, LLC. Always provide Model Number and Serial Number of both the generator and convertor with all requests for parts or service. In order to receive prompt attention, contact the Service Department and obtain an RMA (Return Material Authorization) Number before returning any equipment. Always return the generator, convertor and probe. Include a note with the unit stating the Model Number and Serial Numbers of both the generator and convertor, the RMA number and a brief explanation of the problem with the unit. If possible include:

- A Purchase Order Number
- Bill To and Ship To address
- The return method of shipment (usually we ship UPS Ground, prepaid and add)

### CAUTION

When using loose packing materials, such as foam pellets, shredded paper, or excelsior, be sure to wrap the generator and convertor separately in plastic bags or plastic wrap. Remove MICROTIP probes and pack separately in same outer carton.

### IMPORTANT NOTICE

By returning any material to Qsonica, the customer or the customer's agent thus certifies that any and all materials so returned are, or have been rendered, free of any hazardous or noxious matter or radioactive contamination and are safe for handling under normal repair shop conditions. Do **not** return any material for which such certification can not be made without prior approval from Qsonica, LLC.

The correct return address should read as follows:

Qsonica, LLC.  
RMA # \_\_\_\_\_  
53 Church Hill Road  
Newtown, CT 06470