



# **4002 SERIES ULTRASONIC GENERATOR**

## **OPERATOR'S MANUAL**

**L&R Manufacturing Company**  
577 Elm Street  
Kearny, NJ 07032-3604 USA

**CN 80406 Rev. E**

## TABLE OF CONTENTS

<b>1.0</b>	SYSTEM DESCRIPTION
<b>2.0</b>	OPERATION, WARNINGS AND CAUTIONS
<b>3.0</b>	SPECIFICATIONS
<b>4.0</b>	INSTALLATION PROCEDURE
<b>5.0</b>	DIGITAL TIMER OPERATING INSTRUCTIONS
<b>6.0</b>	SYSTEM CONTROL
<b>7.0</b>	REPLACEMENT PARTS LIST



**WARNING:** If the equipment is used in a manner not specified by the manufacturer the protection provided by the equipment may be impaired.

## 1.0 SYSTEM DESCRIPTION

The 4002 Ultrasonic Generator is a modular design, consisting of a main controller housing and able to accept from one to three generator boards. Each board is capable of driving a separate immersible transducer module, or a group of transducers bonded to a tank. Generator modules can be individually or simultaneously operated with timer. Features include constant power output circuitry, as well as short circuit protection.

The ST versions of the 4002 ultrasonic generator incorporate sweep circuit technology which varies the operating resonant frequency  $\pm 2$  KHZ at a user adjustable rate ranging from 1-100 Hz.



## OPERATION WARNINGS AND CAUTIONS:



## 2.0 WARNINGS & CAUTIONS

- WARNING:** Ground unit properly, connect safety ground wire to approved Earth Ground, Connect power to an approved supply source with ground, Do not operate or apply power to a system until ALL Protective Earth (PE) grounds have been connected.
- WARNING:** Avoid use of flammable solutions such as gasoline, benzene, benzol, etc. in cleaning tank.
- WARNING:** Disconnect all Mains Power prior to any service
- WARNING:** Insure proper system grounding.
- Keep area and equipment dry and clean.
- WARNING:** Do not open generator while unit is plugged in. Dangerous high voltages are present.
- CAUTION:** Do not operate system without cleaning solution in tank. Solution level must be at least 3 inches above transducer for non heated units and at least 3 inches from the tank rim on heated units..
- Do not overfill tank.
- Allow clearance at front and rear of generator for air flow.
- Always turn unit OFF when not in use.
- Keep top of transducer free of debris and any accumulated dirt or sludge.
- WARNING:** Service must be done by competent personnel only.
- Caution:** Hearing protection required for operator as designated by local safety codes.

### 3.0 SPECIFICATIONS

MODEL NUMBER	PRODUCT CODE	Voltage	BOARD SECTIONS	TOTAL POWER	Main FUSE Data	CURRENT REQUIREMENTS
4002-1/6	17677 17678	117 230	1 1	600 W 600 W	T10.0A/250V T5.0A/250V	5.1A 110V 2.7A 230V
4002-2/6	17685 17686	117 230	2 2	1200 W 1200 W	T20.0A/250V T10.0A/250V	10.2A 110V 5.4A 230V
4002-3/6	17693 17694	117 230	3 3	1800 W 1800 W	T30.0A/250V T15.0A/250V	15.3A 110V 8.1A 230V
4002-1/5	17679 17680	117 230	1 1	500 W 500 W	T10.0A/250V T5.0A/250V	4.3A 110V 2.3A 230V
4002-2/5	17687 17688	117 230	2 2	1000 W 1000 W	T20.0A/250V T10.0A/250V	8.6A 110V 4.6A 230V
4002-3/5	17695 17696	117 230	3 3	1500 W 1500 W	T30.0A/250V T15.0A/250V	12.9A 110V 6.9A 230V
4002-1/3	17683 17684	117 230	1 1	300 W 300 W	T10.0A/250V T5.0A/250V	2.7A 110V 1.36A 230V
4002-1/4	17681 17682	117 230	1 1	400 W 400 W	T10.0A/250V T5.0A/250V	3.6A 110V 1.8A 230V
4002ST-1/6	18245 18246	117 230	1 1	600 W 600 W	T10.0A/250V T5.0A/250V	5.1A 117V 2.7A 230V
4002ST-2/6	18261 18262	117 230	2 2	1200 W 1200 W	T20.0A/250V T10.0A/250V	10.2A 117V 5.4A 230V
4002ST-3/6	18277 18278	117 230	3 3	1800 W 1800 W	T30.0A/250V T15.0A/250V	15.3A 117V 8.1A 230V
4002ST-1/5	18241 18242	117 230	1 1	500 W 500 W	T10.0A/250V T5.0A/250V	4.3A 117V 2.3A 230V
4002ST-2/5	18257 18258	117 230	2 2	1000 W 1000 W	T20.0A/250V T10.0A/250V	8.6A 117V 4.6A 230V
4002ST-1/3	18233 18234	117 230	1 1	300 W 300 W	T10.0A/250V T5.0A/250V	2.7A 117V 1.4A 230V

Note: Board section fuse is T10.0A/250V for 117 volt units and T5.0A/250V for 230 volt units

\*\* Generator line frequency is 50/60 Hz

\*\*\* Do Not position equipment so that it is difficult to operate the disconnecting device.

\*\*\*\* Disconnect unit from mains by unplugging the line cord.

**SYSTEM CONTROL:** Individual section ON/OFF power switch. "Ultrasonics On" indicator light. 99 minute digital timer with L.E.D. standard display. Optional 99 Hour Timer Control. Optional Remote Control. Sweep rate adjustment, ST version, power control (optional). Wattmeter (optional).

**ULTRASONIC FREQUENCY:** 43 KHz. Opt. Sweep Range: +/- 2Khz, Sweep Rate: 1—100 Hz

#### Generator Overall Dimensions:

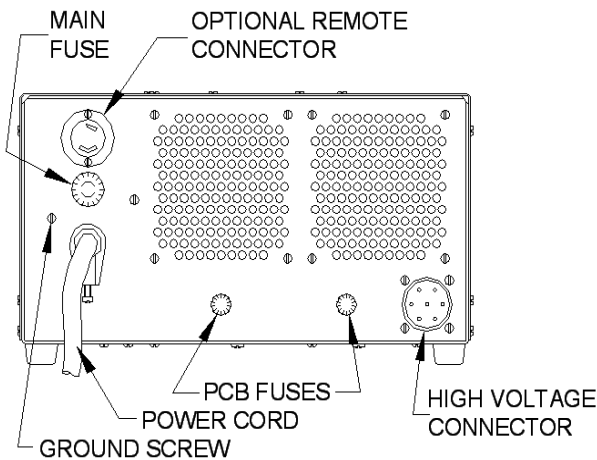
Model Number *	Overall Size	Weight
4002-1/6	9.2"Wx8"Hx17.7D	18Lbs
4002-2/6	14"Wx8"Hx17.7"D	28Lbs
4002-3/6	22"Wx8"Hx17.7"D	38Lbs

- Last digit in model number may be 6, 5, 4, 3 or a suffix of ST.

### 3.1 ENVIRONMENTAL:

- Allow 3" behind generator for cable, connectors and air flow.
- Generator to be located in a dry location, 0-35°C, RH 96% Non-Condensing non-corrosive atmosphere below 2000 M altitude.
- Units can be stacked or stand side by side (min. 2" between sides). DO NOT place units other ways.

### 4.0 INSTALLATION PROCEDURE:



After carefully removing the system from its carton and box, remove all packing material and place the generator on a convenient surface away from liquid splash, allowing for air-flow at front and rear of generator.

With the AC line-cord disconnected and power switch in the OFF position, connect transducer ultrasonic cable to rear of generator.

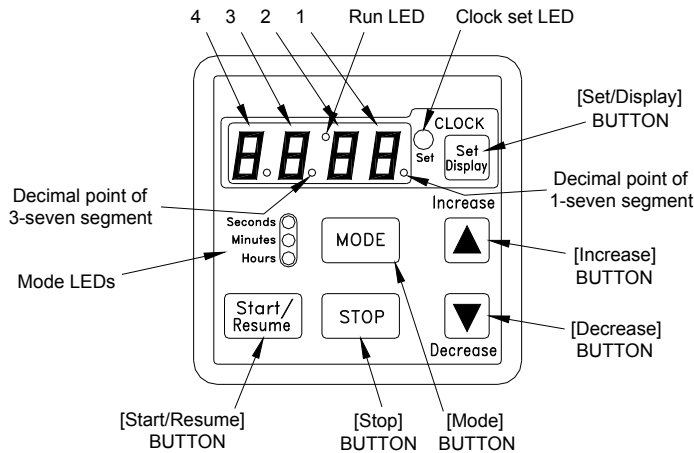
Fill tank with recommended L&R solution properly diluted, or equivalent, to proper level (minimum of 3 inches above top of transducer for non heated system

and no less than 3 inches from the top for a heated tank). Note that solution displacement, when submerging part to be cleaned, must be taken into account. Prevent the solution level from getting lower than the minimum to prevent heater failure or transducer failure. Turn heater and ultrasonic power off before draining tank.

Plug generator's AC line-cord into a suitable 3 wire grounded outlet (see power requirement). Unit grounding is essential for operator's safety. On units with a separate grounding wire connect the ground wire to the receptacle ground first.

### 5.0 DIGITAL TIMER OPERATING INSTRUCTIONS

Minimum operating time is 2 seconds, maximum 99 minutes 59 seconds.



#### Functionally Using the Timer

1. After applying an appropriate AC to the power input terminals, the display will be blank and the beeper will beep for ¼ second giving the user notification that the timer is now activated. The units' default is in Minute [Mode].
2. **Setting Time of Day** - Push and hold the button [SET/DISPLAY] for 1 second, the unit will default the time to 12:00am and enter the 'Clock Set' mode. While in this mode, buttons [MODE], [STOP] & [START/RESUME] are disabled and the clock set LED will be turned ON. The user now can set the time by pressing and holding either [INCREASE] or [DECREASE] button until the desired time is achieved. If you do not wish to set the time of day, skip step number 3.

The clock mode is a 12-hour with an am/pm display element. When the clock is being displayed and the clock is in the pm time frame, the decimal point of number 1-seven segment will be ON. Once the user has achieved the proper clock value, they need to exit the clock set mode by pressing and holding the button [SET/DISPLAY] for 1 second. After the 1 second, the beeper will beep for 1 second giving the user notification that the mode is now exited. Once the clock is set, the display will go blank and the clock set LED will turn OFF.

If the clock has been set and the user presses the button [SET/DISPLAY] for less than 1 second, the display will show the current time for a 5 second period and revert back to what was previously on the display.

3. **Setting Interval Timer** - In modes 1 – 3, the device functions as a simple countdown timer. When you set the value, press the button [START/RESUME]. When the value reaches 0, the relay is turned OFF and the beeper beeps 6 sets of 2 (250ms) beeps.

Repeat Feature- the timer will remember the last time set. If you desire to change the setting from the original setting, press start switch to recall previous setting then input new setting.

To enter one of the 3 countdown modes, press and hold the button [MODE] for 1 second. Holding down this button the mode will switch every 2 seconds. Each time the mode switches, the appropriate LED of mode LEDs will be turned ON and the value displayed will change to the modes default value. An audible ¼ beep will also be heard.

Mode 1 0 – 99 second: DEFAULT DISPLAY = 01

Mode 2 0 – 99 minute: DEFAULT DISPLAY = 00.00

Mode 3 0 – 99 hour: DEFAULT DISPLAY = 00.00

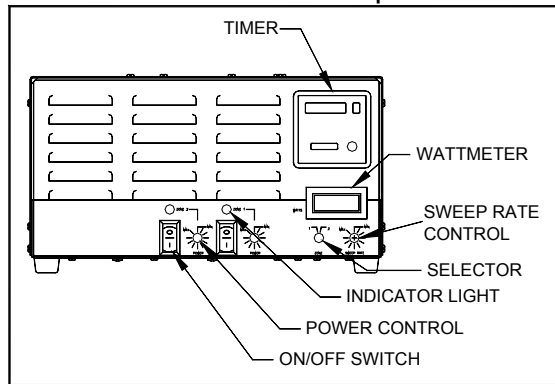
Once the countdown value has been set, you can now start the timer by pressing the button [START/RESUME]. The relay is turned ON. While the timer is counting down the user can stop the event by pressing the button [STOP]. The current countdown value will remain on the display. If you want to resume the session you just need to press the start button again. Counting will proceed from the point where stopped. During this operation, the run LED is blinked at once a second.

Once the timer has counted down to 0 and stopped, you can execute the same session (time value) by pressing the [START/RESUME] button again. This will recall the timer value and display it. At this point, you have two options. The first being the ability to change the value by using the [INCREASE] or [DECREASE] buttons and the second being the ability to use the same value and starting the event again by pressing the [START/RESUME] button.

## 6.0

### **SYSTEM CONTROL**

individual section ON/OFF power switch (not applicable on Single Generator). This switch is capable of turning the power on or off for a single generator section independent of the remaining sections.



#### **Ultrasonics On - Indicator light**

This pilot light is an indicator of the Ultrasonic Power going to the Ultrasonic tank. If the power is decreased then the light dims, if the power is increased then the light brightens. During normal operation the light can be seen to

pulsate - this pulsation is due to normal load fluctuations and the power regulation of the generator. Sweeping systems cause this light to pulsate due to it's continuous adjustment.

#### **Timer 99 - minute digital timer with L.E.D. (standard display).**

#### **ST Version (Sweep Option).**

Sweep rate adjustments. The sweep rate is adjustable from 1 Hz to 100 Hz via the front panel control knob. This control changes the sweep rate of all the generators simultaneously. This control adjusts the rate at which the generator changes it's sweep range (43 Khz +/- 2 Khz). For example, if the sweep rate knob was set to minimum the generators would sweep their frequency from 41 Khz to 45 Khz and then back to 41 Khz all in one second - this would be a sweep rate of 1. if the sweep rate was set to a maximum the generators would sweep their frequency from 41 Khz to 45 Khz and then back to 41 Khz one hundred times a second, this would be a sweep rate of 100.

#### **Power Control (Optional).**

Each generator has a power control function knob. This adjustment serves to select an operational power for the generator section from approximately 50%to 100% of the generator's power capability.

This parameter is adjusted to optimize the cleaning process to suite the need of the cleaning application. Hard cleaning of stubborn crud on the firearm usually require maximum power. General experience has shown that once a satisfactory setting has been selected that there is no further adjustment required.

#### **Wattmeter (Optional).**

The wattmeter section has a digital readout that displays the power of the selected generator section. There is a power meter selection knob mounted under the power meter. Set the knob to the position that corresponds to the system, the wattmeter can change +/- 10%. This change is due to the load change, sweeping and the generator CPO feature that constantly regulates the generator power to set the value.

## 7.0 REPLACEMENT PARTS LIST

DESCRIPTION	C/N
FUSE HOLDER	30129
FUSE 5 AMP	31591
FUSE 10 AMP	30126
FUSE 15 AMP	32291
FUSE 20 AMP	30128
FUSE 30 AMP	31913



**Please Record:**

**Serial #** \_\_\_\_\_

**Order Date** \_\_\_\_\_



## **One Year Limited Warranty**

L&R Manufacturing Company warrants this product for a period of one year from the date of purchase to be free of defects in material and workmanship. Machine will be repaired free of charge to the customer during the warranty period.

This warranty does not include damage or product failure resulting from misuse, abuse or transportation damage. Operating the machine dry is the most common misuse which results in failure.



**REVISION HISTORY**

C/N 80406

<b><u>REVISION</u></b>	<b><u>ECN#</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>APPROVED</u></b>	<b><u>DATE</u></b>
C	8294	SEE ECN	J.P.M.	01/22/2007
D	8316	REVISED SHEET 4, SEE ECN 8316.	J.P.M.	01/24/2007
E	8725	REVISED SHEET 5 2000 M was 2000 Ft	J.P.M.	11/17/2010