

## Operation Manual

# **PULSE** **650** Ultrasonic Homogenizer

**Benchmark**  
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**Thank you for your purchase of a Benchmark Pulse 650 Ultrasonic Homogenizer. This manual contains instructions for the proper operation and care of this instrument. Please read it carefully before operation and keep it available for future use.**

**Prior to initial operation:**

**The Pulse 650 is shipped in 2 cartons. Please check the instrument and the accessories against the packing list when you first open the shipping cartons. Report any damage, discrepancy, or missing items to the supplier immediately. Any shipping damage should be reported to the transportation carrier**

### **I. Packing List**

1. Ultrasonic generator
2. Transducer assembly with 6mm horn
3. Soundproof box (in separate packing box)
4. Power cord
5. 2X extra fuses (inside the power cord bag)
6. User manual
7. Temperature probe

### **II. General Description**

The Pulse 650 Ultrasonic Homogenizer features a 7 inch touch screen and a centralized computer system that allows for programming ultrasonic output, gap time, power, duty cycle and temperature. The system also features temperature monitoring, automatic frequency tracking and a fault alarm. The ultrasonic generator, transducer components and soundproof box make up the Pulse 650 system. The transducer connects by cable to the generator. The generator and soundproof box can be placed side by side or stacked to save laboratory space.

The Pulse 650 utilizes ultrasonic cavitation in liquid to lyse cells from bacteria, viruses, animal, and plant tissues. It can also be used for emulsification and separation, degassing, cleaning, preparation of nanomaterials, dispersion and accelerated chemical reactions.

### III. Specifications

Output power	6.5-650W (adjustable)
Working frequency	20-25KHz with automatic tracking
Process capacity	0.1-500ml (need to match corresponding horn)
Timer	0-99 Hours 59 Minutes 59 Seconds
Working mode	Pulsed
Pulse	0.1-99.9 Seconds adjustable (interval/working)
Temperature monitoring	0° - 100°C
Alarm	Fault, temperature, time
Input method	Touch screen
Display	4.3 inch TFT
Display content	Temperature, power, time, etc.
Protective device	Program automatic error correction, overload, over temperature protection display
Program storage	20 programs
Password	Can set up user password protection
Standard configuration	Ultrasonic generator (host), sealed transducers, and 6mm horn (process capacity 10ml to 100ml)
Optional horns	Φ2, Φ3, Φ6, Φ8, Φ10, Φ12
Power supply (AC)	120V, 60Hz or 240V, 50Hz
Warranty	2 years

### IV. Precautions before use

**Familiarize yourself with the manual and instrument:** Before using the Pulse 650, read this manual thoroughly and familiarize yourself with the operation of the instrument.

The operation, maintenance and repair of the instrument should comply with the basic guidelines and safety warnings below. Noncompliance may interfere with the useable life of the instrument and safety protection and may void the warranty.



There are no user serviceable parts inside the generator or the transducer. Do not attempt to open the generator cover or transducer case. Doing so may result in bodily injury and will void the warranty.



Check that the local power supply matches that of the unit. The power socket and power information are located on back panel of the generator. A grounded electrical outlet must be used to power the generator.



Make all cable connections before powering on the generator. Before use, inspect the cables for cracks. Do not operate the unit if any cables are damaged. Do not touch any open cable connections while the power is on. Do not attempt to disconnect the transducer cable while the generator is powered on.



Do not submerge the generator or converter in liquids of any kind. Do not allow moisture to enter the generator or transducer.



Do not operate the Pulse 650 without the soundproof box in place or with the door to the box open.



Never touch the tip of the vibrating probe or activated horn. Doing so can cause severe injury. Never power up a horn or tip that is not submerged in liquid as this will damage the instrument.



Do not touch the bottom or sides of the sample container with an activated horn/probe. Doing so may shatter, crack or melt the sample container. Before use, inspect the sample container for any cracks, chips or other damage. Do not use a damaged sample container.



In case of a power failure, wait at least 5 minutes before restarting the generator.



Do not turn off the generator while operating a horn. Always use the stop function on the status screen.

## V. Installation

The instrument should be installed in a well-ventilated area on a stable bench top. A suitable, grounded electrical outlet should be located nearby.



**Do not locate the Pulse 650 in direct sunlight, near sources of heat (exhaust from other instruments) or near a water source. Keep the unit free of dust.**

- Connect the power cord, transducer, temperature probe and soundproof box control cables according to the proper sockets on the back of the instrument. Check for the proper orientation of the cables before attaching.
- Insert the transducer into the soundproof box through the large opening in the top. Insert the temperature probe through the smaller opening.
- Be sure that the horn setting on the back of the generator (horn switch) matches that of the installed horn. The unit is supplied with a 6mm diameter horn installed.



**Rear panel of the generator showing cable locations**









## **VI. General operation**

The height of the platform inside the soundproof box is adjustable. Use the supplied remote control to raise and lower the platform using the up and down keys. The platform should be adjusted so that the end of the horn is immersed 10-30mm into the sample. The container should be placed so that the horn is in the center of the container.

Do not allow the horn to touch the wall of the container. The horn should be at least 4cm from the bottom of the container for the most efficient operation. If the horn is less than 4cm from the bottom, a no-load fault may occur. (For smaller volumes/lower power, below 500W, the clearance from the bottom of the beaker can be 8-10mm, but the horn must not be in contact with the bottom of the beaker.)

Perform a trial run to familiarize yourself with the instrument:

1. Add water to a 250ml beaker and place it on the platform in the soundproof box. Adjust the platform so that the horn is immersed 1-2cm and centered in the container. The temperature probe may also be placed in the container, making sure that it does not come into contact with the transducer or horn.
2. Ensure all the cables are connected at both ends. Check that the horn selector switch is set to the right size. Turn on the power switch located on the back of the generator.
3. The startup interface will appear. If the password prompt appears, enter the default password, 123456. If password protection is required, touch the radio button next to "Enable Password". Enter the default password, and then enter the new password and confirm. After entering the password, the programming interface, below, will appear.

Prog No	Run Time
Horn	Total Time
	Ultrasound on
	Ultrasound off
	Alarm Temp
	Real Time Temp
	
    	
<p>Operation   Stop   Test   Light   Sterilize</p>	

4. Be sure that the horn setting on the screen matches the attached horn. If not, change the setting (the horn supplied with the unit is 6mm). To set the working parameters, touch the value next to the parameter. A numeric keypad will pop up allowing the parameter to be changed. Ultrasound on and off cannot be set to 0. Ultrasound on is suggested to be 1-4S and ultrasound off 2-8S.

5. Pressing the “Test” button will test to see that the system is working. Pressing “Operation” will start the program. The unit can be paused by pressing and holding the operation button for a short time. Press operation again to resume. Pressing the “Stop” button will stop operation.

The “Light” button controls the operation of the light inside the soundproof box. The “Sterilize” button controls operation of the UV light for sterilization of the chamber.

To sterilize the chamber, press “Sterilize”. This will activate the UV light. Allow the light to remain on for 15 minutes, then press the sterilize button again to turn the light off. Note that this function is for sterilization of chamber surfaces and not for sterilization of samples.



**Note: Ensure that the probe value, probe switch on the back of the unit and installed probe are all in agreement.**



**For a new horn, the power output should not exceed 80%. For a new 2mm horn do not exceed 50%**



**Do not start operation when the horn is not inserted into the liquid. Damage to the instrument will result!**



**Do not open the door or place hands into the chamber while the UV light is turned on as injury may result.**

6. If the thermometer icon above “alarm reset” turns red during operation, the temperature of the sample has exceeded the set temperature. If the arrow around the thermometer turns red, there is an overload or fault alarm. Pressing and holding the alarm reset button will cancel the alarm. Reducing the power ratio will cancel an overload alarm.

7. The Pulse 650 will display waveform functions such as time and power while the instrument is working. The display in the lower left corner will dynamically display the working status of each function.

#### **Additional operating notes:**

1. Temperature protection set point should be 1-3°C than the room temperature or the sample temperature. Operation will stop if the sample temperature rises above the set point.

2. Operating in multiple shorter cycles – ultrasonic on 1-3 seconds with a gap time of 2-6 seconds works more efficiently than long-term cycles. To prevent the sample from heating up, use a longer gap time. Samples may also be placed in an ice bath.

3. Continuous operation may cause a load error and shorten the life of the instrument.

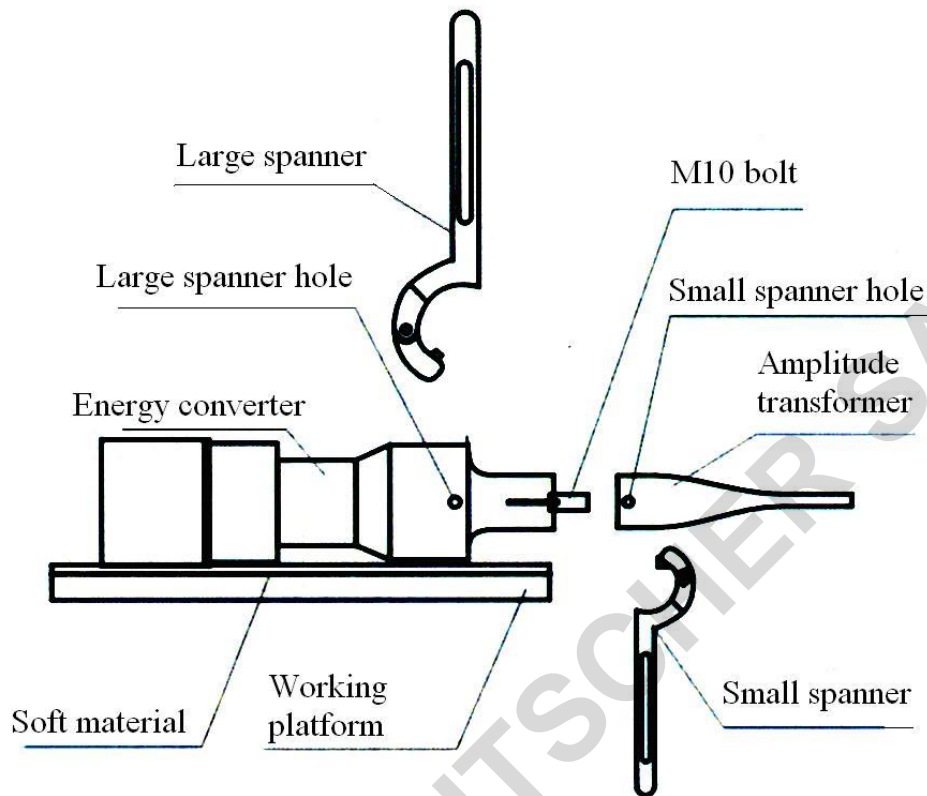
4. Capacity, time and power will be different for different types of cells. Optimum conditions should be determined by the user.

5. Periodically check the horn for corrosion. Over time, the horn will appear honeycombed or hairy. Use a file to restore a smooth, flat surface. A corroded horn will have poor performance.



**Warning: Turn off the power supply when you change or file the horn. Please re-select correct horn specification on the programming after restarting. Using the wrong setting may damage the horn.**

## VII. Removal and Installation of the Horn



- Place the transducer on a stable surface with a soft material under it such as a towel or piece of foam. Place the small spanner into the horn spanner hole and the large spanner into the transducer spanner hole as shown above. The large and small spanners should be oriented to the left and right.
- Stand facing the horn and hold the large spanner with left hand and small spanner with right hand. Move both hands upwards to loosen or downward to tighten.
- When changing the horn, such as the M10 screw on the horn, remove the bolts by hand, and then fasten the bolts on the transducer, and tighten.

### VIII. Recommended Conditions for Various Samples with the 6mm horn

Sample	Ultrasonic time (S)	interval time (S)	Total working time (Minute)	Power (%)	container (ml)	Lysis rate (%)
Treponema pallidum	1.5	2	10—20	30	20	Above 90
staphylococcus	1.5	2	10—25	35	20	Above 90
Mouse sciatic nerve	2	3	10—15	35	20	Above 92
Mouse liver	2	3	5—15	45	30	Above 95
Liver cell enzyme extraction	2	3	5—10	50	30	Above 95
Escherichia coli	2	3	10—15	50	50	Above 93
Pseudomonas aeruginosa	2	3	5—10	60	50	Above 92

### IX. Horns, Volumes and Power Ratios

Horns (mm)	Φ2	Φ3	Φ6	Φ8	Φ10	Φ12
Process capacity (ml)	0.1-5	3-10	10-100	20-200	30-300	50-500
Power ratio (1-100%)	1-40%	1-50%	1-70%	1-80%	1-90%	20-95%

For questions, concerns, warranty service or repairs, please contact Benchmark Scientific at [info@benchmarkscientific.com](mailto:info@benchmarkscientific.com) or 908-769-5555.

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