

Operation Manual

PULSE  **150**
Ultrasonic Homogenizer

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Thank you for your purchase of a Benchmark Pulse 150 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 150 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 and 6mm horn
3. Soundproof box (in separate packing box)
4. Adjustable platform (inside soundproof box)
5. Power cord
6. 2X extra fuses (inside the power cord bag)
7. User manual
8. Temperature probe

II. General Description

The Pulse 150 Ultrasonic Homogenizer features a 4.3 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 150 system. The transducer connects by cable to the generator.

The Pulse 150 utilizes ultrasonic cavitation in liquid to lyse cells from bacteria, viruses, animal and plant tissues. It can also be used for emulsification and separation, defoaming, cleaning, preparation of nanomaterials, dispersion and accelerated chemical reactions.

III. Specifications

Output power	1.5-150W (adjustable)
Working frequency	20-25KHz with automatic tracking
Process capacity	0.1-150ml (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°C-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) one set Sealed transducers + 6MM horn one set
Optional horns	Φ2, Φ3, Φ6, Φ8
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 150, 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 the cable is 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 150 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.

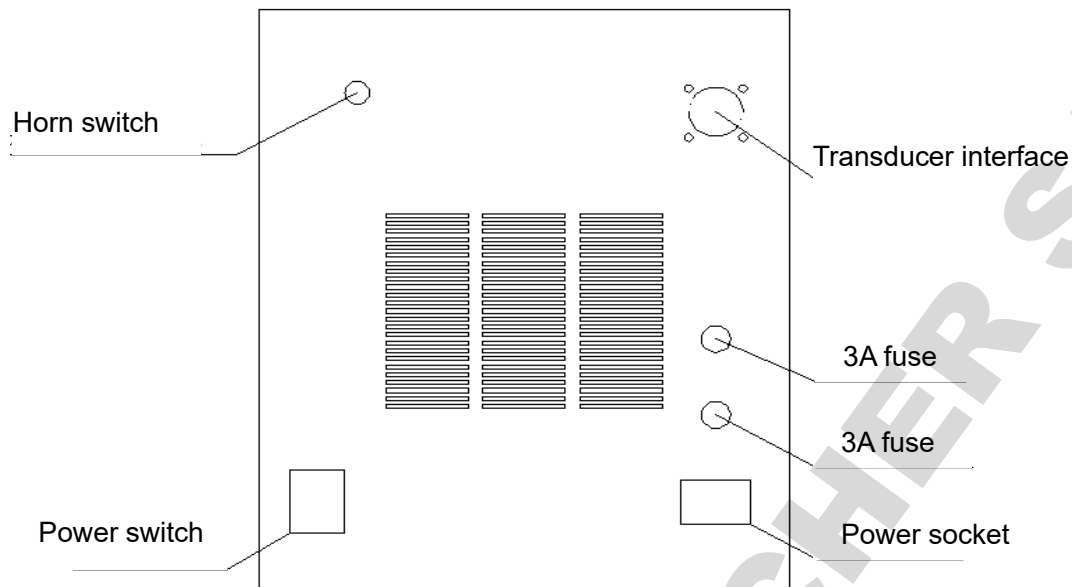
V. Installation

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 150 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 and temperature probe cables according to the proper sockets on the back of the instrument. Check for the proper orientation of the cables before attaching. Be sure to tighten down the threaded collar on both the temperature probe and transducer.
- 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

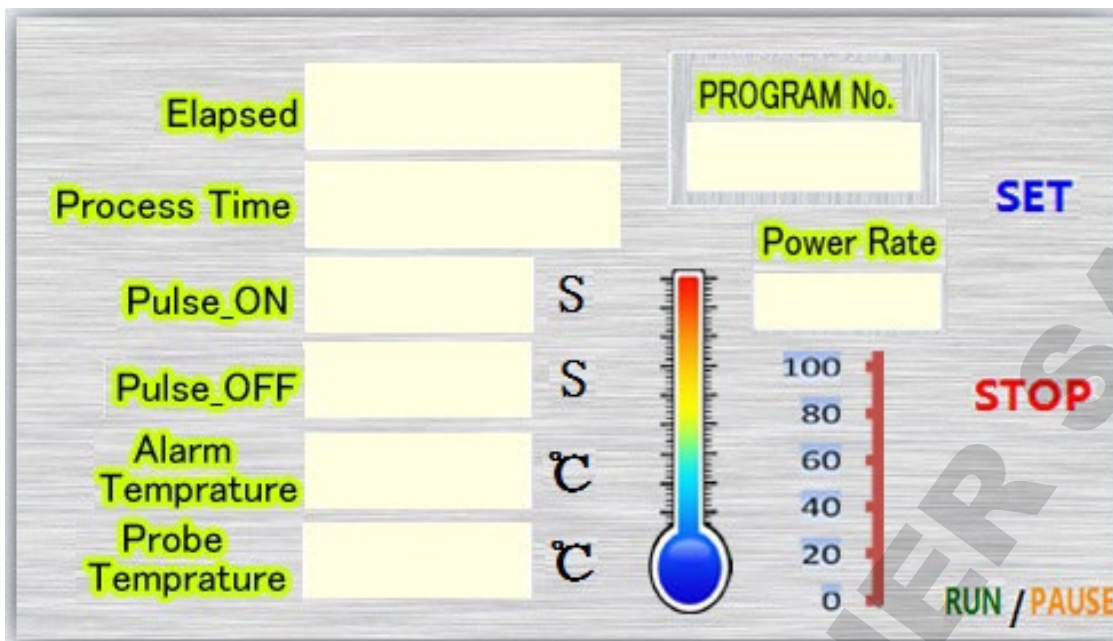
VI. General operation

The height of the platform inside the soundproof box is adjustable. The platform should be adjusted so that the end of the horn is immersed 10-20mm into the sample. The container should be placed so that the horn is in the center of the container.

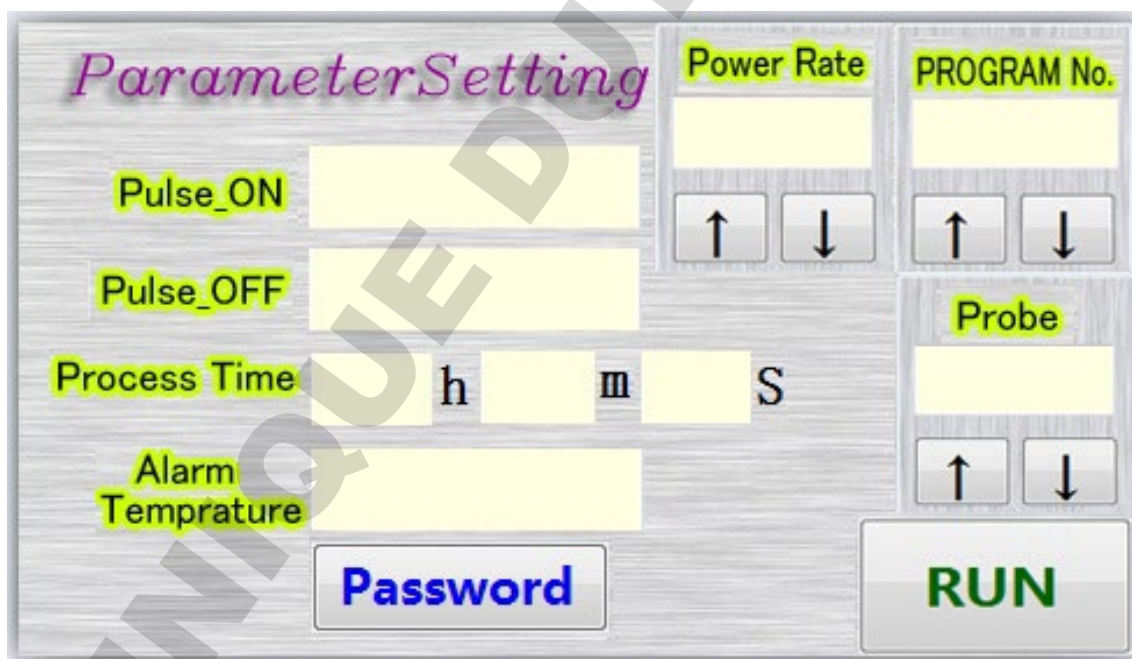
Do not allow the horn to touch the wall of the container. The horn should be at least 4cm from the bottom of the container for the most efficient operation. If the horn is less than 4cm from the bottom, a no load fault may occur.

Perform a trial run to familiarize yourself with the instrument:

1. Add water to a 50ml 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 connections on the back of the unit are made and turn on the power switch located on the back of the generator.
3. If the password prompt appears, type "123456" to enter the stand-by state. The screen below will appear.



4. Press “SET” to enter the parameter screen (shown below). Check that the proper horn size is shown. If not, touch the parameter on the screen to change it. From this screen, you can also modify the run parameters as needed. Touch the value in the box to set – a numeric keypad will appear. Change the value and touch OK to confirm. Note parameters cannot be set to 0. If desired, the parameters can be saved under a program number (1-20).



5. After setting the parameters, touch “RUN”. The display will show the status screen. Touch “RUN” again to start operation. Operation can be stopped by touching “STOP” or “PAUSE”.



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%

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

6. If the "RESET" key box changes to yellow during operation, the over-temperature alarm has been triggered. Check to see if the temperature has been set to low. If the color changes to red, then there is an overload or fault. Touch reset to cancel the alarm.

Additional operating notes:

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

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

3. 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.

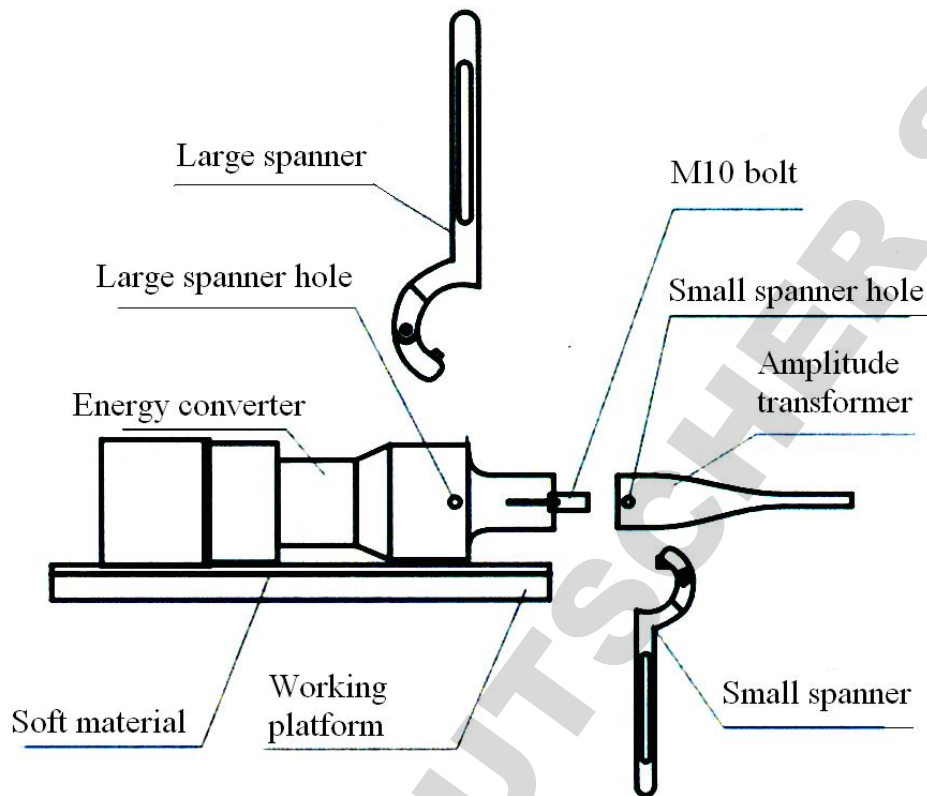


Warning: Turn off the power supply when you change or file the horn. Please re-select correct horn specification on the programming after restarting. Using the wrong setting may damage the horn.

4 Temperature of the sample can rise rapidly during sonication. The instrument should be operated in pulses of less than 5 second with a gap time of 2-6 seconds. The sample can also be placed in an ice bath

5. Sonication of cells works best when pulsed with sonication for 1-3 seconds and a gap interval of 2-6 seconds. A longer gap time will help to limit sample temperature increase. Continuous operation may cause a low load error and shorten the life of the instrument.

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
Process capacity (ml)	0.1-5	3-10	10-100	20-150
Power ratio (1-100%)	1-45%	1-55%	1-75%	1-90%

For questions, concerns, warranty service or repairs, please contact Benchmark Scientific at info@benchmarkscientific.com or 908-769-5555.

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