NON-CONTACT
ULTRASONIC DNA INTERRUPTER

Product I Features

- No aerosol float produced - enhanced biological safety (e.g. branch bacteria, viruses, etc.)
- Eliminates the risk of sample cross-contamination
- Eliminates the traditional problem of probe wear and debris
- Can process a wide range of samples with a broad sample processing range
- Suitable for various standard containers
- Can be used for processing trace samples, as small as 5ul
- The automatic continuous rotation of the centrifuge tube makes the energy distribution of the ultrasonic wave more uniform
- Optional high and low temperature constant temperature water bath, customized rotating base for Eppendorf tubes of various diameters according to customer needs

LAWSON_Chou
WhatsApp

Product I Introduction

LAWSON20-A Non-contact ultrasonic DNA interrupter uses isothermal and non-contact methods to disrupt, homogenize, and mix samples. It is used for sterile, ultra-low-volume crushing and can break chromosomes through centrifuge tubes. It is specially tailored for pre-processing of second-generation sequencing DNA samples and chromatin immunoprecipitation experimental samples. Compared to traditional probe ultrasonic homogenizers, which directly contact the probe with the sample and can only process one sample at a time, resulting in a long experimental cycle. When dealing with thousands of samples, it is necessary to reuse the same probe, which can easily cause sample cross-contamination. The non-contact sample can be crushed in a closed container without producing infectious aerosols. The ultrasonic probe does not contact the sample, avoiding cross-contamination. For laboratories that process multiple samples per day or handle valuable samples, non-contact ultrasonic DNA homogenizers have the advantages of high throughput, low sample loss, and no cross-contamination. It has gradually become an indispensable standardized tool for ChIP (chromatin immunoprecipitation) and DNA cutting research platforms.

Advantages

Traditional probe-type ultrasonic cell disruptors have direct contact between the probe and the sample, leading to metal ion contamination and long experimental cycles, as only one sample can be processed at a time. For multiple samples, the same probe must be reused, which can easily cause sample cross-contamination. Additionally, because the depth of the probe insertion and the energy distribution of each ultrasound are not consistent, the repeatability and accuracy of experimental results are affected. Furthermore, because a closed system cannot be used, the aerosols or foam produced during the ultrasonic process can spread into the environment, posing potential biological hazards. In contrast, the non-contact ultrasonic cell disruptor can detect 4-32 samples simultaneously, with high experimental efficiency. The probe does not require frequent operation, and each sample is in a separate fully enclosed test tube, avoiding cross-contamination. The use of a 4-degree water bath ensures a uniform distribution of ultrasonic energy and full ultrasonic action. The ultrasonic parameters can be flexibly set, and the experimental steps are standardized, resulting in good experimental repeatability and high reliability of the results.

Application I Range

- ○ Fragmentation of DNA samples for second-generation sequencing.
- ○ Fragmentation of RNA.
- ○ Disruption of bacteria and cells.
- ○ ChIP assay (chromatin immunoprecipitation).
- ○ Sample preparation for high-throughput sequencing instruments.
- ○ Extraction of membrane proteins and other proteins.
- ○ Homogenization and emulsification reactions.
- ○ Ultrasonic treatment of expensive reagents.
- ○ Immunoprecipitation experiments and catalytic reactions.

NON-CONTACT ULTRASONIC DNA INTERRUPTER

Simple operation, fast time, usually the shortest time for an experiment is only 5 minutes.

The instrument has over current, over voltage, and over temperature alarm functions. When the temperature exceeds the set temperature, it automatically stops ultrasound and alarms to ensure the integrity of the sample

The microprocessor controller is equipped with password protection function, allowing for free editing of programs and automatic memory setting of programs.

The instrument is equipped with a rotating motor, which automatically rotates the centrifugal tube adapter continuously during ultrasound, making the ultrasound energy distribution more uniform.

Adopting a 7-inch medical grade resistor touch screen for touch operation, the screen displays real-time working parameters such as time, temperature, power, continuous mode, and gap mode. The operation is simple and convenient, with countdown display of running status.

Special

◇ High throughput, up to 60 samples can be processed simultaneously, with high experimental efficiency.

◇ No frequent operation of the probe is required, and each sample is in a separate fully enclosed test tube to avoid cross-contamination.

◇ The product is equipped with a variety of adapters ranging from 0.1ml to 15ml, suitable for different types of samples.

◇ The ultrasonic parameters can be flexibly set, and the experimental steps are standardized, with good experimental reproducibility and high result reliability.

◇ No special consumables are required, resulting in low experimental costs.

◇ The use of ultrasonic waves in a 4°C low-temperature water bath allows for even energy distribution and complete ultrasonic effects, with samples processed fully in a low-temperature environment to prevent denaturation.

Effect image of extracting DNA after ultrasound and focusing

Experimental I Results

○ To investigate the relationship between sonication time and fragment size of DNA samples from mouse-derived breast cancer 4T1 cells under different fragmentation conditions.

○ Determine the fragmentation time required to achieve different target fragment sizes using 100% amplitude (300W), 10s sonication time, 10s interval, and 50μl sample volume.

○ Verify the reproducibility and uniformity of fragmentation efficiency under the same fragmentation conditions.

III、 Experimental conditions and methods

1. DNA sample source: gDNA from λ Phage, concentration: 20ngul
2. Parameter settings: Power 100% (300W), ultrasound time: 10s, interval time: 10s. The specific interruption conditions for each sample are shown in the table below

No.#	1	2	3	4	5	6	7	8	9	10	11	12
EP tube volume (ul)	200	200	200	200	200	200	200	200	200	200	200	200
Sample volume (ul)	50	50	50	50	50	50	50	50	50	50	50	50
Total duration of interruption (min)	1	1	1	2	2	2	3	3	3	4	4	4

No.#	13	14	15	16	17	18	19	20	21	22	23	24
EP tube volume (ul)	200	200	200	200	200	200	200	200	200	200	200	200
Sample volume (ul)	50	50	50	50	50	50	50	50	50	50	50	50
Total duration of interruption (min)	5	5	5	7.5	7.5	7.5	10	10	10	15	15	15

3. After the ultrasound interruption is completed, samples 1 to 18 are used with 1 × Beads recycling, 1.8 for samples 19-24 × Beads recovery and agarose gel electrophoresis were used to detect the interruption effect.

Figure 2: Electrophoresis detection results of samples (8 groups) with the same processing time after uniform mixing

The Marker bands are 100bp, 200bp, 300bp, 400bp (the brightest band), 500bp, and 600bp from bottom to top.

4. Comparison between the LAWSON ultrasound DNA interrupter and M220,Agarose gel electrophoresis test results:

Figure 3 : Results of comparison between LAWSON Ultrasound DNA Interrupter and M220

The results of electrophoretic detection after the interruption of the corresponding fragment size in M220 are shown in the graphs of 400bp, 300bp and 200bp wells. The results showed that there was no significant difference between the results of the interruptions to the same target fragment size under the respective interruption conditions.

Experimental I Conclusion

○ For a 50 ul reaction system (in 0.2 ml thin-wall PCR tube), recommended sonication time for DNA fragments with sizes of 400-600 bp is 2 min; for fragments with sizes of 300 bp, it is 4 min; and for probe capture, it is recommended to sonicate for 7-10 min.

○ With the increase of sonication time, the size of sonicated fragments becomes smaller with certain regularity.

○ Under the same sonication conditions, the reproducibility and uniformity of the sonication effect are good.

○ The longer the sonication time, the smaller the sonicated fragments, and the lower the DNA gel recovery rate.

NON-CONTACT
ULTRASONIC DNA INTERRUPTER

Technical I Parameters

Model	LAWSON20-A single-channel	LAWSON30-A dual-channel
Power	10-1000W continuously adjustable	25-2500W continuously adjustable
Sample processing quantity	30*0.1ml, 20*0.65ml, 11*2ml and 5 5-15ml tubes	60*0.1ml, 40*0.65ml, 22*2ml and 10 5-15ml tubes
Sonication sample volume	2ml or more, or less than 5μL	2ml or more, or less than 5μL
Single sonication time	0.1-99.9S	0.1-99.9S
Single interval time	0.1-99.9S	0.1-99.9S
Total time (sonication+interval)	1-99H59M59S	1-99H59M59S
Frequency range	20-40KHz	20-40KHz
Cooling system - temperature control range	Portably constant temperature bath host (compressor cooling) 2～40°C	Portably constant temperature bath host (compressor cooling)2～40°C
Temperature reading accuracy	±0.1 °C	±0.1 °C
Compressor power	600W	600W

Technical I Parameters

Model	LAWSON20-A single-channel	LAWSON30-A dual-channel
Ultrasonic tank volume	15*14*10cm	23*14*10cm
Adapter material	316 stainless steel material	316 stainless steel material
Noise level	<55dB	<55dB
Imported original multi-frequency ultrasonic transducer	3组	6组
Power supply (optional 110V)	220V/110V/ 50Hz/60HZ	220V/110V/ 50Hz/60HZ

Working I Principle

The non-contact ultrasonic gene disruptor uses a design that installs the ultrasonic generator at the bottom of the water tank. In traditional probe ultrasonic disruptors, the microflow phenomenon caused by ultrasonic waves can only occur in the area close to the probe. However, the non-contact ultrasonic cell pulverizer installs the ultrasonic generator at the bottom of the water tank, making the entire tank within the range of ultrasonic waves. The distribution of ultrasonic action is wide and balanced, reducing the formation of foam. During the experiment, the non-contact ultrasonic cell pulverizer's automatic and continuous rotation of centrifuge tubes ensures that the ultrasonic energy is distributed more evenly. During the experiment, the samples are placed in separate fully sealed centrifuge tubes, and there is no cross-contamination between the samples, avoiding the spread of aerosols