

PIXUL™ Multi-Sample Sonicator

powered by Matchstick Technologies

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Active Motif Limited Warranty

Active Motif warrants that the PIXUL Multi-Sample Sonicator will be free from defects for 12 months from the date of delivery when used under normal working conditions and in accordance with manuals and other documents. Any component that proves defective during this period will be repaired or replaced at no cost to the purchaser. Active Motif will provide a shipping container and instructions for the customer to return the instrument for repair or replacement. All shipping charges during the warranty period will be paid by Active Motif. In the event of a warrantable defect, please contact Active Motif for a return authorization and instructions prior to returning any instrument or parts.

The warranty is void if failure of the instrument or parts, including all firmware or hardware, has resulted from accidents, abuse, improper maintenance, usage, or repair, or misapplication by the customer. It is also void if damage is caused by any unauthorized modifications made to the instrument.

The warranty is limited to repair or replacement only, is not transferable, and is available only to the original purchaser.

The warranty is void if the instrument is run without Active Motif Coupling Fluid (cat. no. 53136) in the cooling reservoir. Coupling Fluid not only acts as the cooling liquid, but is also required for the transmission of energy from the transducers to samples in the wells. Failure to run the instrument without Active Motif Coupling Fluid will damage the transducers samples.

The warranty is void if the instrument is run without the proper plate (cat. no. 53139) or without liquid/water in every well of the columns in the 96-well plate that are being sonicated. Permanent damage to the transducer and electronic circuits could result if the transducer is operated without liquid/water in every well of the columns in the 96-well plate that are being sonicated.

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General Warnings

Don't run the PIXUL™ Multi-Sample Sonicator without PIXUL Coupling Fluid (Cat. No. 53136).

Tilting the PIXUL instrument can result in spillage of Coupling Fluid.

Do not unplug or power off the PIXUL instrument during a run. Loss of power to the instrument while a file is open can result in corruption of the data file and operating system.

It is recommended to change the PIXUL Coupling Fluid every 2 months.

PIXUL Coupling Fluid temperature should be approximately 15°C at the start of the sonication run. Don't exceed a Coupling Fluid temperature of 35°C during sonication. If Coupling Fluid temperature is maintained within this range, in-well thermal monitoring indicates that the temperature of the sample is within the normal range experienced by samples in all major sonication instruments (please see referenced publication on page 9).

Only use room temperature (not previously frozen) 96-Well PIXUL Plates (cat. no. 53139) with the PIXUL instrument. Place plates with well A1 in the upper left corner. All wells in columns being sonicated **MUST** be filled with fluid. Do not reuse plates from partial runs, as this can lead to issues with shearing consistency and sample contamination.

Don't lift the external lid during processing of samples. Lifting the external lid will stop the run, initiating drainage of Coupling Fluid from under the plate, necessitating re-circulation of Coupling Fluid to start over from the beginning processing samples. The run will not resume from the point in time it was interrupted.

Any technical modifications to the device are prohibited. Service works may be carried out only by qualified personnel.

Overview

Active Motif's PIXUL™ Multi-Sample Sonicator is a high-throughput instrument for mechanical shearing of DNA, RNA, chromatin, or protein from purified samples, cells, or tissue. This system utilizes ultrasound transducers to create focused ultrasonic waveforms, transmitted through PIXUL Coupling Fluid, to a 96-well microplate (cat. no. 53139). This flexible system allows for up to 12 unique sonication parameters (one for each column of wells) to be set in the 96-well plate, generating consistent and reproducible fragmentation profiles in just 1 to 30 minutes per plate, depending on sample type.

product	format	catalog no.
PIXUL™ Multi-Sample Sonicator	1-96 samples	53130

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Introduction

PIXUL™ Multi-Sample Sonicator

Next-generation sequencing applications, such as ChIP-Seq, RNA-Seq, RIP-Seq, exome, and whole genome sequencing, require precise sample fragmentation (200-600 bp) for compatibility with short read sequencing platforms. Shearing by mechanical sonication, as opposed to enzymatic methods, is preferred for its unbiased nature and ability to produce a relatively narrow fragmentation profile. However, the currently available sonication systems can be incompatible with high-throughput sample processing. The PIXUL Multi-Sample Sonicator provides a flexible and reproducible shearing profile for up to 96 samples processed in parallel.

Furthermore, high-throughput sonication on other platforms is currently limited by the cost of consumables (tubes, plates, and reagents). However, the low cost, round-bottom plates (cat. no. 53139) used in the PIXUL instrument are compatible with cell culture and shearing, eliminating sample transfer steps that are inconvenient and can lead to loss of sample. Furthermore, the PIXUL Coupling Fluid does not require lengthy degassing and can be adequately circulated and ready for sonication in approximately 15 minutes.

Sonication of the samples is quick and easy. Using the touchscreen user interface, researchers are able to specify unique sonication parameters for each column of the 96-well plate, enabling processing of many sample types for many different applications in the same microplate. Most runs are complete within 10-30 minutes, ensuring that sample sonication will not be the bottleneck for your high-throughput applications.

Technical Specifications:

Dimensions (h, d, w)	45 cm x 59 cm x 34 cm (17.7 in x 23 in x 13 in)
Weight	23 kg (50.7 lbs)
Power Requirements	100-240 VAC, 50-60Hz, 6 A max. at 115 VAC
Operating Environment	15°C to 25°C (59°F to 77°F), max. 85% relative humidity
Storage Temperature	5°C to 25°C (41°F to 77°F)
EMC	Complies with EN IEC 61326-1, "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements", Class A. Complies with FCC Part 15 Class A radio emissions requirements for the USA and ICES-001 for Industry Canada. Complies with EU EMC Directive 2014/30/E.
Safety Certification	UL Listing - certified to comply with UL 61010-1, 3rd Edition cUL Listing - certified to comply with CAN/CSA C222.2 No. 61010-1-12, 3rd edition CE Mark - complies with EN/IEC 60601-1 3rd edition
Operating System	User interface, software and processors are fully integrated into the instrument
Chiller	Chiller is fully integrated into the instrument
Sample Processing Capacity	Sample processing uses round bottom 96-well microplates (Corning Cat. No. 3799), 200 µL per well
Recommended Batch Size	1 to 96
Applications	DNA Shearing RNA Shearing Chromatin Shearing Protein Extraction

Included Accessories:

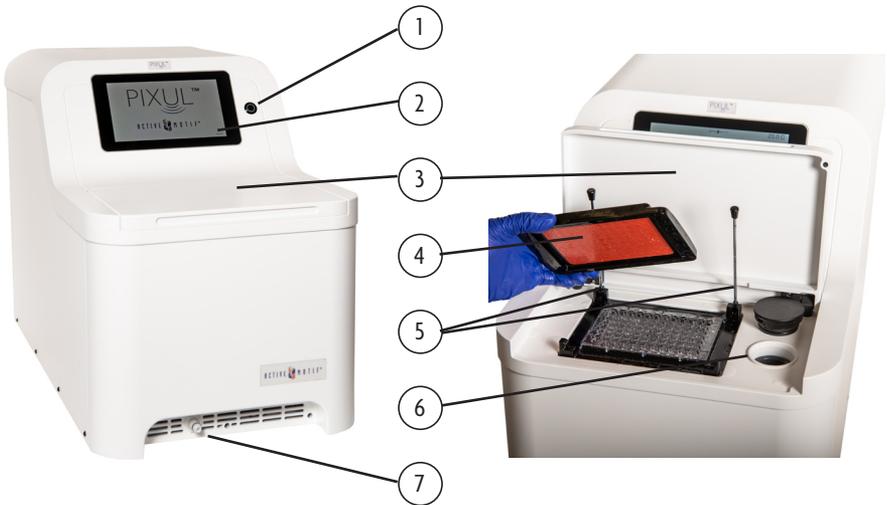


a. Drain tube



b. Shipping cap

PIXUL™ Multi-Sample Sonicator Exterior Components



1. **Main Power Button:** Press to turn on the PIXUL instrument. Power switch on back side of the PIXUL instrument must be turned on first.
2. **Touchscreen User Interface:** Will initiate once main power button is pressed. Use the touchscreen to circulate the PIXUL Coupling Fluid, select sonication parameters, monitor Coupling Fluid temperature, and monitor the time remaining for the run.
3. **Exterior Lid:** Lift to install sample plate. Lid must remain down during sonication run.
4. **Pressure Distribution Plate Cover:** Sits directly on top of the sample plate and is secured down with the plate-securing rods.
5. **Plate-Securing Rods:** Once the sample plate has been placed with well A1 in the upper left corner and covered with the pressure distribution lid, clip these rods down to secure the plate prior to closing the exterior lid.
6. **Coupling Fluid Reservoir:** Lift cap to fill reservoir with PIXUL Coupling Fluid (approximately 0.5 L capacity). Add Coupling Fluid periodically to maintain the minimum level (about one inch below the top of the reservoir). It is recommended to drain old Coupling Fluid and add new Coupling Fluid every two months.
7. **Drain:** To drain PIXUL Coupling Fluid from the Coupling Fluid reservoir, ensure that no plate is installed. Then, connect the drainage tubing to the drain. Coupling Fluid should begin to flow.

Installing the PIXUL Multi-Sample Sonicator

The following instructions detail the installation procedure for the PIXUL Multi-Sample Sonicator. Only attempt to install this instrument after reading these instructions.

No special tools are required for installation.

The PIXUL instrument is intended for indoor use, and the power plug must be grounded.

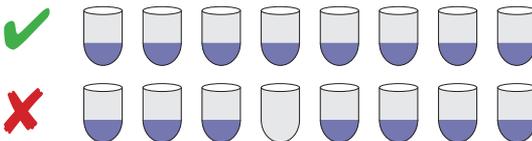
Place the PIXUL instrument on a level, non-slip surface with sufficient load bearing capacity. Do not place anything heavy on the PIXUL instrument.

Do not cover the ventilation openings. Provide at least 20 cm of clearance to allow proper airflow. Toxic vapors can be produced depending on the type of operation. Ensure sufficient extraction of the vapors.

1. Open the boxes and cut the shipping straps. Remove the molded styrofoam packaging, protective clear wrapping, and any tape securing moving parts. Inspect the instrument and accessories immediately after delivery for completeness and transport damage.
2. Place the PIXUL instrument on a bench. Always make sure the PIXUL is on a level surface.
3. Fill the reservoir of the PIXUL instrument with approximately 0.5 liters of PIXUL Coupling Fluid. The fluid level should reach about an inch below the reservoir top. If you accidentally overfill the reservoir, wipe up any spilled Coupling Fluid and suction Coupling Fluid out of reservoir until it reaches the appropriate level.
4. Plug the power cord into the back side of the PIXUL instrument and the wall outlet.

Operating the PIXUL Multi-Sample Sonicator

Warning: A 96-Well PIXUL Plate (cat. no. 53139) should be mounted and secured prior to attempting to circulate the PIXUL Coupling Fluid. Load your samples into the 96-Well PIXUL Plate in the same orientation as will be indicated on the instrument touchscreen. **Any wells lacking sample in the columns being sonicated MUST be filled with liquid (water or buffer).**



Be sure to seal the plate well with an adhesive plate seal to prevent the samples from spilling. Coupling Fluid should be circulated and allowed to cool to approximately 15°C prior to initiating sample processing.

1. Ensure that the PIXUL Coupling Fluid level is about an inch (2.5 cm) below the reservoir top. Do not overfill.
2. Switch on the power switch on the back side of the PIXUL instrument.

- Press the main power button on the front side of the PIXUL instrument. The touchscreen will start initializing.
- Load a sample-containing 96-Well PIXUL Plate (cat. no. 53139) into the PIXUL instrument. Lift the external lid, place the plate with well A1 in the upper left corner, secure down the pressure distribution lid on top of the plate with plate-securing rods, and close the external lid.



- On the touchscreen, press Circulate to initiate PIXUL Coupling Fluid cooling. You cannot start the sonication run without circulation active. You can monitor Coupling Fluid temperature in the upper right hand corner of the touchscreen.
- On the touchscreen, select the plate columns for which you would like to set sonication parameters. Columns selected together will be outlined in the same color, and be processed with the same parameters.
- On the left side of the touchscreen, you can use the left and right arrows to select from saved presets of sonication parameters. You can also use the add and delete buttons to add or remove a row of process settings.

Adjust the following parameters (See Appendix, Section A for further details):

Pulse: The number of cycles per pulse

PRF: Pulse Repetition Frequency; the kHz frequency of pulse repetitions

Process Time: Time a given column is actively processed. Process timers for all columns run simultaneously, so the total run time for the entire plate is equal to the time of the column(s) chosen to have the longest process time. For example, a plate with the following column-associated process times will take a total of 21 minutes:

Columns	Process Time
1, 2 and 4	18 minutes
3, 6, 9, 10 and 12	12 minutes
5, 7 and 8	21 minutes
11	0 minutes

Burst Rate: The frequency with which the burst (a set of pulses) transitions from one column to the next; this parameter is always the same for all columns. We recommend using the following parameter specifications as a starting point, and adjusting Process Time to optimize for your specific sample and application:

Note: The software will not allow settings that could damage the transducers and the upper limits are a maximum Pulse of 50 or a maximum PRF of 1.00. We recommend a minimum Burst Rate of 20.00. Varying the Process Time is typically the only parameter that needs adjusting, with longer Time needed for difficult samples such as adipose tissue.

Sonication Parameter	DNA** (Cells & Tissue)	Chromatin** (Cells & Tissue)	DNA/RNA** (Purified)	Protein** (Cells & Tissue)
Pulse [N]	50	50	50	50
PRF [kHz]	1.00	1.00	1.00	1.00
Process Time	30:00	30:00	10:00-30:00	1.00 - 2.00
Burst Rate [Hz]	20.00	20.00	20.00	20

*Labile marks, like phosphorylated epitopes, may be preserved better by discontinuous sonication (e.g. rather than 30 minutes, 4 rounds of 4-6 minutes each, where the PIXUL Coupling Fluid is allowed to circulate and cool between runs).

**Please see our Quick Guides for additional details on sonication recommendations.

8. Once the PIXUL Coupling Fluid has reached approximately 15°C, press Start on the touchscreen. The time to completion will appear in the top left hand corner of the touchscreen.
9. Once the run has completed, open the external lid. PIXUL Coupling Fluid will drain from underneath the sample plate for the next few seconds.
10. Unload the sample plate.
11. To turn off the PIXUL instrument, press the main power button on the front side of the PIXUL instrument and switch the power switch off on the back side of the PIXUL instrument

Maintenance

- Before all maintenance work, you should ensure that decontamination of the device has been performed if it came into contact with hazardous materials.
- Ensure all components of the PIXUL instrument are at room temperature before touching them.
- Before and after each use, wipe down the plate loading area with a damp cloth, and then dry. You may remove the external lid to aid in this cleaning.
- At daily intervals, inspect the drain plug by visual inspection from the outside.

- At monthly intervals, inspect the PIXUL instrument, and clean the touchscreen with water and detergent. Do not use acetone or solvents as these may cause damage.
- At bimonthly intervals, it is recommended to drain and replace PIXUL Coupling Fluid. To drain Coupling Fluid, attach the drain hose to the drain on the front of the instrument and ensure that no plate is loaded into the instrument. Once the hose is attached, the Coupling Fluid will begin to flow. Be ready to capture draining Fluid in a waste collection container or sink. Be ready to capture draining Fluid in a waste collection container or sink.
- To ship the PIXUL, the Coupling Fluid must be drained, and the Shipping Cap that came with the instrument must be used as the cover for the Coupling Fluid Reservoir. There also must be a microplate in place and secured with the Pressure Distribution Cover and Plate-Securing Rods.

Touchscreen Messages and Errors

Checking for microplate/No microplate detected - The PIXUL instrument ensures that a plate is loaded prior to commencing Coupling Fluid circulation or sonication run.

Removing fluid from microplate area - The PIXUL instrument automatically drains Coupling Fluid when the external lid is opened.

Unable to start processing. No columns are enabled. - The PIXUL instrument requires the Pulse, PRF, Process Time, and Burst Rate to be set for at least one column before the sonication run will initiate.

Circulation must be enabled before starting process. - On the touchscreen, Circulate must be pressed and the Coupling Fluid allowed to circulate and cool before processing will initiate.

Lid is open. Please close lid to continue. - The external lid must be shut before processing will initiate.

Low pressure - The pressure of the Coupling Fluid is insufficient to initiate a sonication run. Please be sure that Coupling Fluid is filled to the appropriate level.

Error messages:

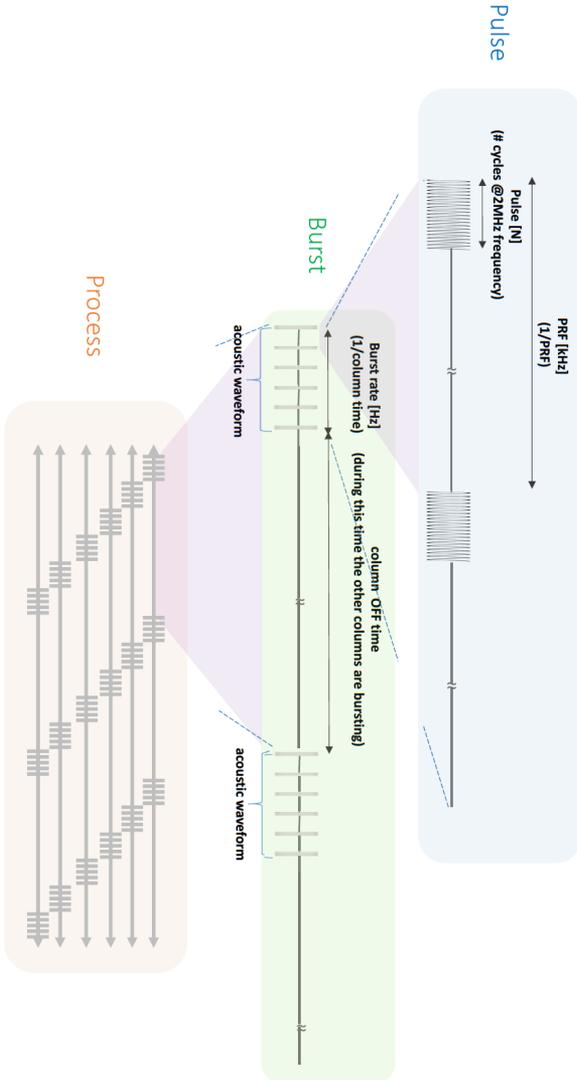
- Unable to start processing. No columns are enabled.
- Circulation must be enabled before starting process.
- Unable to communicate with device. Power off and on the system.
- Lid is open. Close lid to continue.
- Input parameter was invalid. Nearest valid value will be automatically selected.
- Power off and on the system.
- Checking for microplate.
- Removing fluid from microplate area.
- Low Pressure. pressure1 = 123 pressure2 = 123
- No microplate detected pressure1 = 123, pressure 2 = 123

References

1. Bomszyk, K., et al. (2019) *Nucleic Acids Research* 47(12): e69.

Appendix

Section A. PIXUL Sonication Parameters Guide



Section B. Troubleshooting Guide

Problem/question	Possible cause	Recommendation
Instrument will not turn on	No power is being supplied to the unit	Check that the power cord is securely plugged into both the PIXUL instrument and wall plug.
	Unit hasn't been properly turned on	Ensure that both the power switch on the back side and the main power switch on the front side of the PIXUL instrument are both turned on.
Sonication run will not start	Coupling Fluid is not circulating	Check to make sure that the Coupling Fluid has started circulating
Samples do not sonicate as expected	Plate is installed incorrectly	Ensure well A1 of the plate is placed in the upper left corner
	Samples are overheating	Monitor the Coupling Fluid temperature and ensure that it does not exceed 35°C during sonication. Reduce the Pulse and/or PRF values if necessary.
	Samples are not diluted in appropriate sonication buffer	Ensure that your sample is diluted in the recommended sonication buffer, as specified in Quick Guides and User Manuals. Consider running a positive control sample, available from Active Motif.
	Incorrect microplate used	Ensure that the proper microplate is used, Corning Cat. No. 3799.

Technical Services

If you need assistance at any time, please call Active Motif Technical Service at one of the numbers listed below.

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