Acoustic Droplet Ejection

Low-volume liquid transfer

Fast and flexible!

Precise and accurate!

- **Transfer fluids touchlessly**
- **Miniaturize high-throughput assays**
- **Automate dose-response and cherry pick applications**
- **Eliminate costly consumables and waste**

Specifications
Echo Liquid Handlers

Client Software: Microsoft® Windows® based graphical user interface.
Menu driven protocol definition, calibration, validation testing, and diagnostics.

Operating Environment: 22°C±6°C (72°F ±11°F). Up to 80% relative humidity.

Dimensions: 52 cm W x 68 cm D x 91 cm H (20" W x 24" D x 36" H).

Weight: 110 kg (242 lbs).

Source Plate: Echo Qualified flat-bottom microplates.

Destination Plate: Most rigid SBS standard microplates <14.5 mm height.

Survey Capability: DMSO concentration (on 550 and 555 systems) and well fill-volume (on all systems) retrievable from database.

Dynamic Range of Instrument: 2.5 to 10,000 nL (source plate dependent, all source plates to 1000 nL); higher volume transfers with extended transfer time.

Transfer Volume Resolution: 2.5 nL.

Transfer Volume Accuracy: <10% deviation from target volume.

Transfer Volume Precision: <8% CV.

Transfer Modes: Single-drop and multi-drop.

DMSO Hydration Accuracy: <8% deviation from actual (on 550 and 555 systems).

Hydration Precision: <5% CV (on 550 and 555 systems).

Well Volume Accuracy: <10% deviation from actual.

Well Fluid Depth Precision: <5% CV.

All Echo liquid handlers are fully integration ready.

All Echo systems are immediately compatible with Echo Dose-Response and Echo Cherry Pick software.

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LABCYTE

Echo® Liquid Handlers

Echo Echo Echo

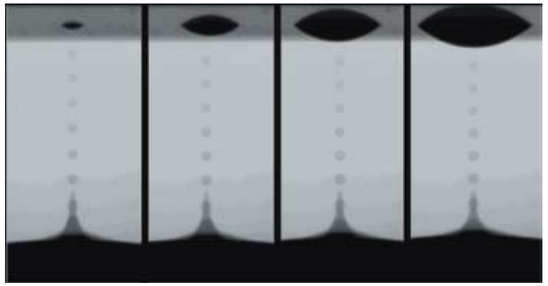
Echo Liquid Handlers

"Touchless" Transfer Technology

"Touchless" means no pipettes or pin tools to wash or throw away:
Dramatically cut consumable expenses by eliminating disposable tips and cleaning washes.

Direct microplate-to-microplate transfer: Drops move directly from the source plate to a dry or wet destination well. No dilutions required.

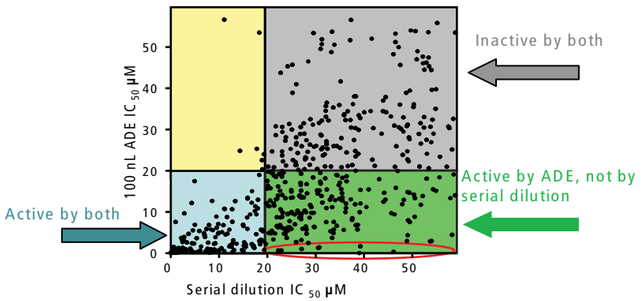
Non-invasive–nothing touches your sample fluids: No contamination, no carry-over. Save compounds by eliminating wasteful dilutions.



2.5 nL droplets move from the source plate to the destination where they are captured by surface tension forces. Transfer more droplets for a greater transferred volume.

Precise: Guaranteed < 8% CV over the entire volume range for calibrated fluids with Echo qualified plates.

Flexible: Transfer from 384- or 1536-well source plates into 96-, 384-, 1536- or 3456-well destination plates using a wide variety of user-definable transfer protocols. For example, transfer from a 384-well source to a 384-well plate or from a 1536-well source plate to a 1536-well plate, by quadrant or interleaved. Reformat four 384- well microplates into a single 1536-well plate. Reformat nine 384-well microplates into a single 3456-well plate. Downstack from one 1536-well plate to four 384-well plates or 16 96-well plates. Cherry pick samples from any well to any well. Set up variable volume dose-response plates.



The IC_{50} values of more than 1000 compounds were measured under conditions identical except in the method used to obtain concentration gradients. The horizontal axis gives the value obtained when traditional serial dilutions were used to make the concentration gradient. The vertical axis shows the IC_{50} value for each analyte when ADE is used to obtain a concentration gradient without serial dilutions. The compounds in the green quadrant, approximately 10% of the total, had IC_{50} values greater (i.e., lower potency) than 20 µM when concentration gradients were made with serial dilutions but under 20 µM when the concentration gradients were made with acoustic droplet ejection. The erroneous values obtained from serial dilutions are caused by absorption of analyte to the tips used in transfer to the wells in which the serial dilutions are performed. Some compounds showed an apparent loss of biological activity greater than three orders of magnitude when serial dilutions were used.

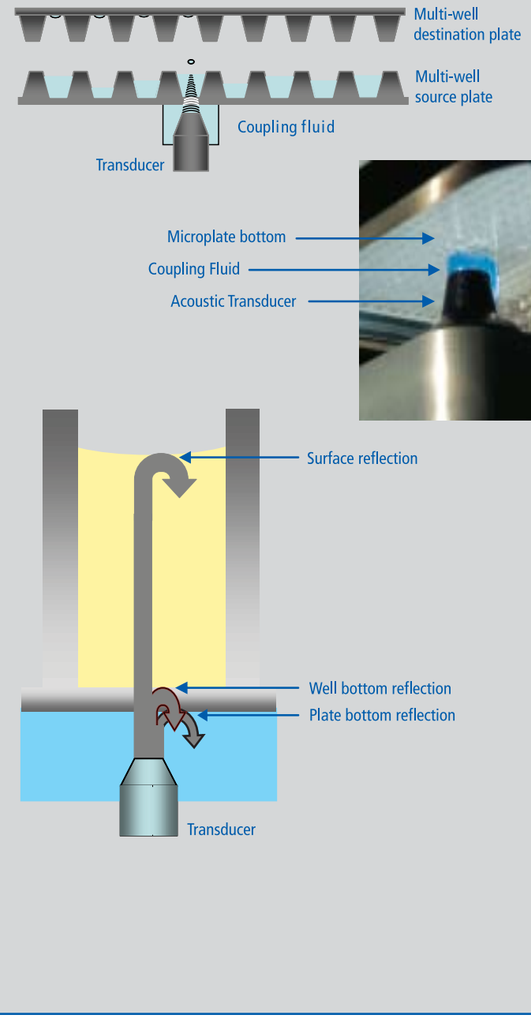
Graph modified from Spicer et al., *"Pharmacological Evaluation of Different Compound Dilution and Transfer Paradigms on an Enzyme Assay in Low Volume 384-well Format,"* a poster presented at Drug Discovery Technology, August 2005

Acoustic Droplet Ejection

Acoustic droplet ejection (ADE) is the state-of-the-art technology that moves liquids with sound. ADE is touchless and uses no tips or nozzles, thereby eliminating cross-contamination and reducing consumable waste while providing improved accuracy and precision. Any volume of liquid can be transferred from any well in the source plate to any well in the destination plate.

In the Echo liquid handlers, a precise and fluid-specific focused acoustic pulse propels a 2.5 nL droplet of the liquid from the surface. The droplet is captured by the destination plate. Transfer larger volumes with multiple droplets at up to 500 droplets per second.

All Echo liquid handlers determine well fluid depth by measuring the time of flight of the echo from the surface of the liquid.



Non-Invasive, Non-Destructive, Non-Contaminating

The Echo 555 liquid handler provides the best in sample throughput and fastest "touchless" throughput with more than 600,000 samples transferred in 24 hours, 1536-to-1536. Get unrivaled precision and accuracy in your sample transfers. The system measures and reports source well DMSO hydration information as well as source well volume.

The Echo 550 liquid handler introduced the world to ADE. This award-winning system eliminates sample cross-contamination while improving assay results. The system measures and reports source well DMSO hydration information as well as source well volume. You can upgrade it to 555 throughput as the needs of your lab increase.

The Echo 520 liquid handler provides the same highly precise and accurate ADE technology at a lower price to laboratories with lower throughput needs. You can upgrade it to 550 or 555 throughput as the needs of your lab increase. The system measures and reports source well volume.

All Echo systems

- can be upgraded to higher throughput systems.
- are automation-ready and are fully compatible with Labcyte application software.
- are low maintenance – no washing, no clogging, and no waste.
- provide the solid engineering and customer support worldwide for which Labcyte Inc. is known.

Microplate reformatting:

- 2.5 to 10,000 nL fluid transfer volumes, depending on source plate and fluid. Larger volumes extend transfer time.
- Wide range of fluids.
- Uses Echo qualified 384- and 1536-well source plates for optimal precision and accuracy.

	Accuracy		Precision (CV)		
	Transfer Volume	DMSO Hydration	Well Volume	Transfer Volume	DMSO Hydration
Echo 520	<10% error		<10%	<8%	
Echo 550	<10% error	<8% error	<10%	<8%	<5%
Echo 555	<10% error	<8% error	<10%	<8%	<5%

	Throughput (fluids from different wells transferred in 24 hours)			
	384→384		1536→1536	
	2.5 nL	100 nL	2.5 nL	100 nL
Echo 520	189,000	70,000	425,000	88,000
Echo 550	189, 000	126,000	425,000	200,000
Echo 555	325,000	238,000	673,000	332,000

All tests run with Echo qualified source plates. Throughput assumes 12-second external robot turn-around time. 384-Well polypropylene source plate used in 384 → 384 experiments.