

Echo[®] liquid handler



The Echo liquid handler:

Traditional Liquid Handlers



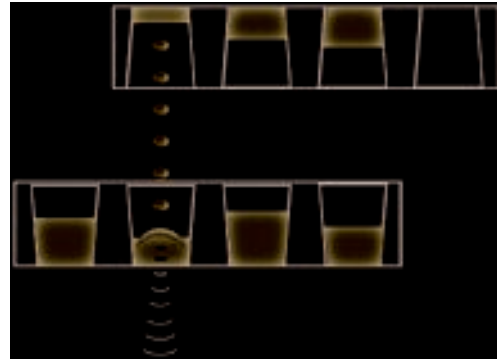
- Use motors to aspirate and dispense
- Treat every sample the same



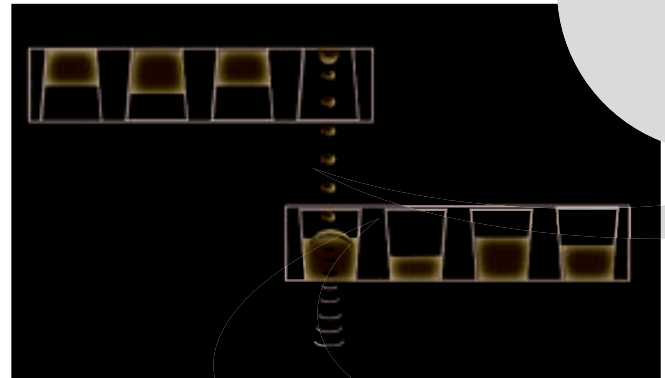
- Tip plastics may leach
- Liquids and sample may stick
- Cross-contamination risk
- Waste from tip washing or disposal

Transferring Liquids with Sound

The Echo Liquid Handler



- Use acoustic energy to transfer
- Treat every sample individually



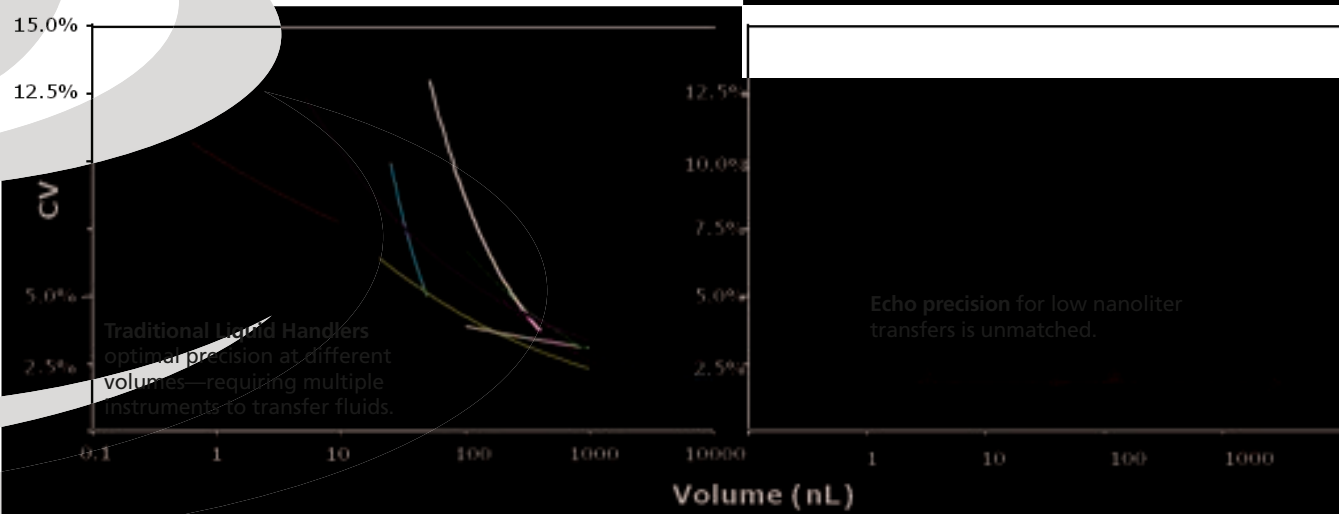
- Any-well-to-any-well transfer
- Nothing contacts the sample
- Tipless, no cross-contamination
- Nothing to wash or throw away!

Transfer every sample with confidence!

Better transfers using sound

The Labcyte® Echo 500 series revolutionizes liquid transfer by using acoustic energy to eject fluids. The instruments focus sound waves directly under a microplate well and 'listen' for the reflection (or echo) to determine the composition and fluid height. This happens automatically—in milliseconds—allowing for precise and accurate transfer of 2.5 nL droplets into an inverted microplate positioned above. Large volume transfer is achieved by transferring several hundred droplets per second.

Traditional liquid handlers have a two-step aspirate and dispense process with an optimal volume range for accurate and precise transfers. Echo liquid handlers transfer 2.5 nL repeatedly, so precision and accuracy are consistent over a larger volume range. Echo precision for low nanoliter transfers is unmatched by tip-based, motor-driven liquid handlers.



Adapted from J. Comley, *Drug Discovery World*, pp. 43-54, Summer 2004.

Discovery without tips

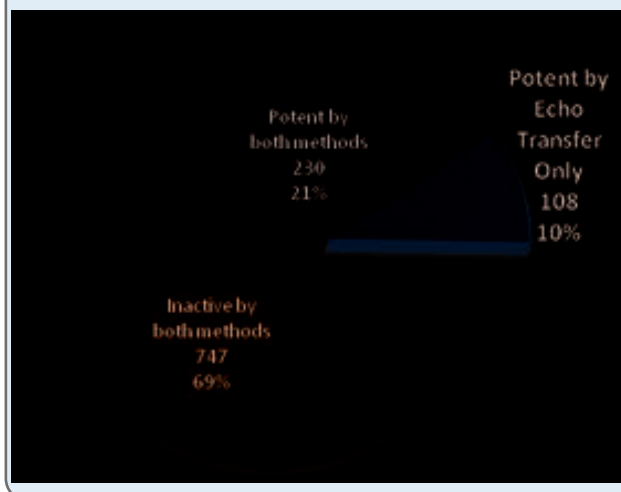
Tips shouldn't interfere with discovery

Traditional liquid handlers operate on two large assumptions: nothing from the tip or the instrument enters the sample, and small molecules and proteins do not stick. In some cases these assumptions are incorrect.¹ Workflows created due to limitations from tip-based transfer can also cause lower reported potency.^{2,3}

What have you missed using traditional liquid handlers?
How can the Echo liquid handler improve your research?

10% missed active compounds

Bristol-Myers Squibb presented data showing 10% of a compound screen were reassessed as more potent after rescreening with an Echo liquid handler.²



259x more potent

AstraZeneca demonstrated better compound potency when transferring directly with an Echo liquid handler instead of a serial dilution process.³

Compound Number	Echo Liquid Handler IC ₅₀ (μM)	Traditional Liquid Handler IC ₅₀ (μM)
4	0.003	0.146
5	0.002	0.553
6	0.007	0.973
7	0.003	0.778
8	0.004	0.445
9	0.052	0.170
10	0.064	0.817
11	0.486	3.03

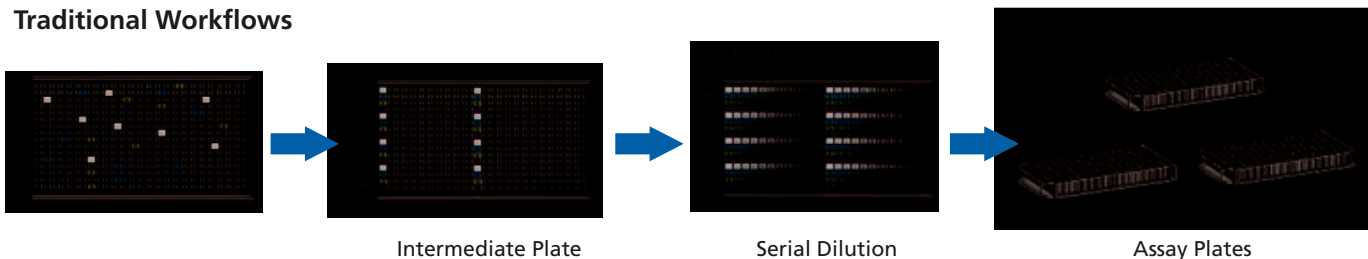
What have you missed using traditional liquid handlers?

¹ Weibel, R. et al. *JALA*, 15: 1369, 2010; Belaiche, C. et al. *Clin. Chem.*, 55:1883, 2009; Watson, J. et al. *J. Biomol Screen*, 14:566, 2009; McDonald, G.R., *Science*, 322:917, 2008.

² Spicer, T. et al. Presentation at Drug Discovery Technology, Boston, MA, August 2005.

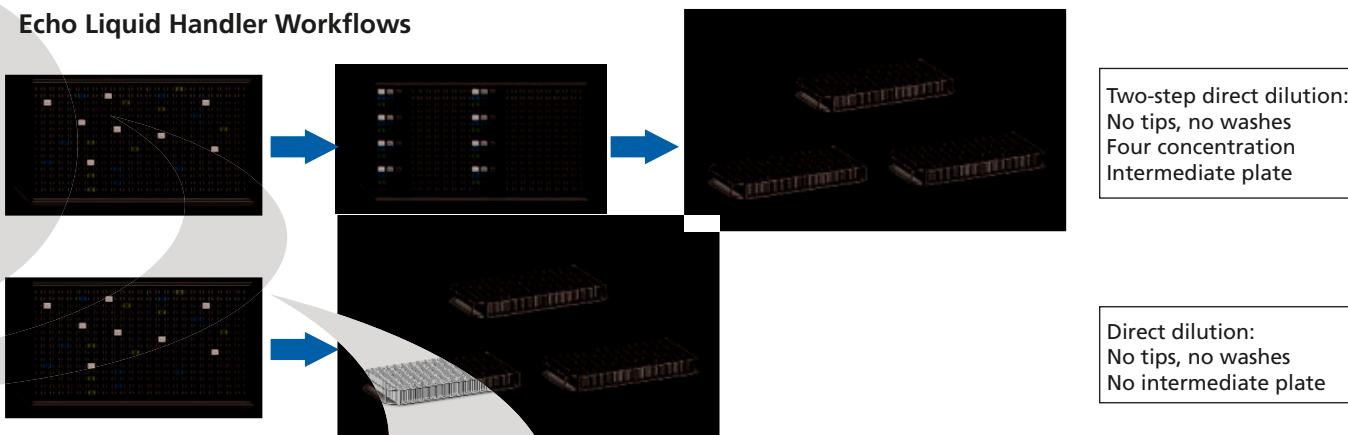
³ Barlaam, B.C. et al. U.S. Patent 7,718,653, 2010.

Traditional Workflows



To create assay plates using a traditional liquid handler, samples must be chosen from a library and transferred to an intermediate plate. Samples are serially diluted to generate a dose response curve, and another set of transfers is made to produce assay plates. Traditional liquid handlers require a fixed-tip head (and extensive washes to prevent cross-contamination) or disposable tips which add to the process cost. A large number of pipetting steps propagates error throughout the process.

Echo Liquid Handler Workflows

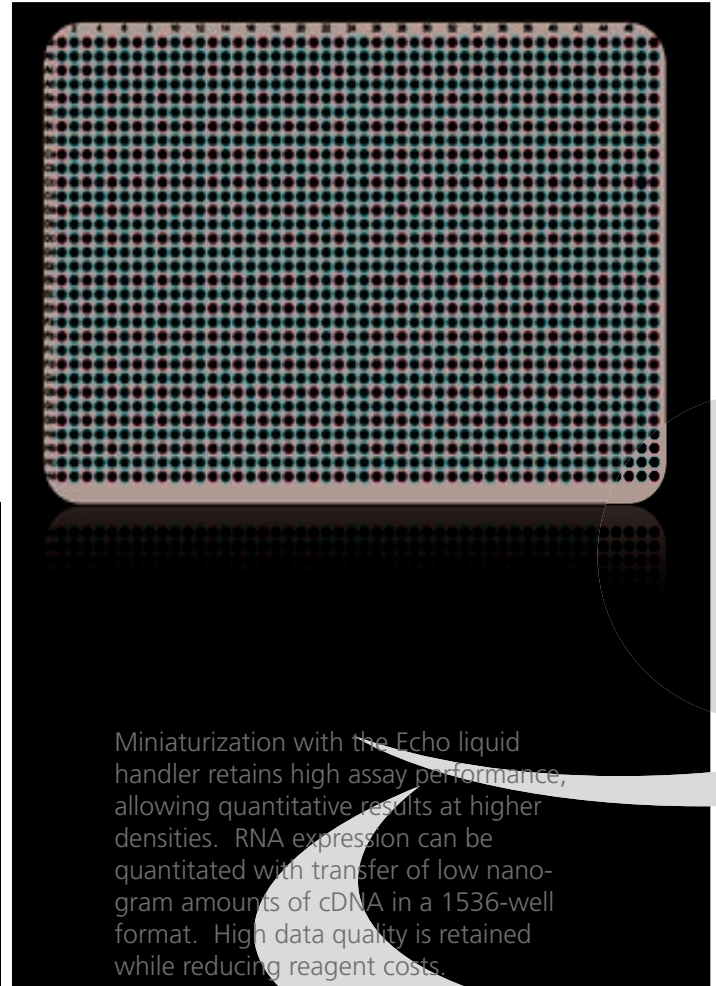
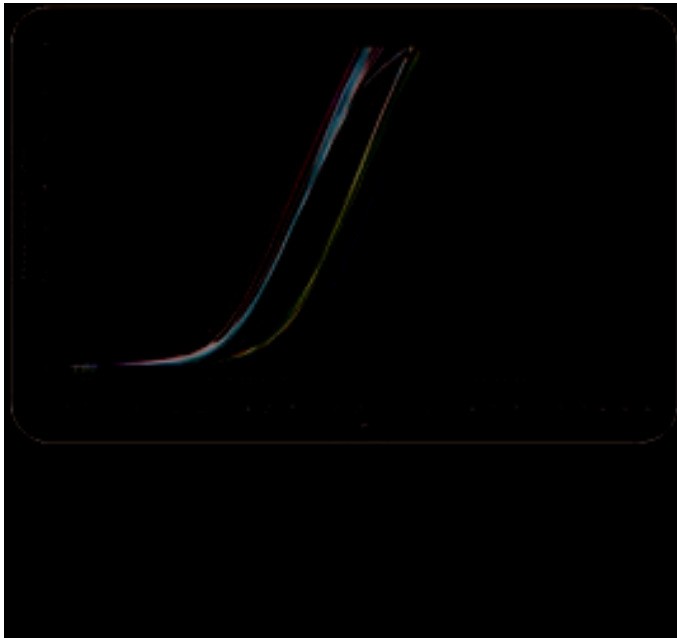


Any-well-to-any-well transfer is possible with the Echo Cherry Pick and Dose-Response applications. Intermediate plates can be created at four intermediate concentrations, with direct dilution into assay plates. Since the Echo liquid handler can transfer volumes starting at 2.5 nL, design of experiments (DOE), assays, and direct dilution can be accomplished without generating intermediate plates—and without generating tip, plastic, and wash fluid waste and disposal costs.

Productivity increases as process steps are removed—reducing costs and error. In addition to the elimination of tip and washing costs in the workflow, Echo transfer precision and accuracy have allowed operators to decrease replicates and repeat testing. This further improves the cost benefits of the Echo liquid handler—many customers have calculated it paid for itself within a few years.

Assay miniaturization without contamination

Liquid transfer with the Echo 500 series allows for assay miniaturization to previously unattainable volumes. For example, the ability to precisely deliver all reagents of a qPCR experiment allows for zero cross-contamination in 384- and 1536-well plate densities. Detection methods allow reactions to be detected at volumes as low as 250 nL—with Echo transfer of individual components under 50 nL. The diagram to the right shows reactions transferred with cDNA (green) surrounded by reactions transferred without cDNA (red).



Assay Miniaturization

- Precise reagent transfer
- Enhanced reaction efficiency
- Elimination of cross-contamination
- Consistent results

Assay Assembly: RNAi assays with the Echo liquid handler

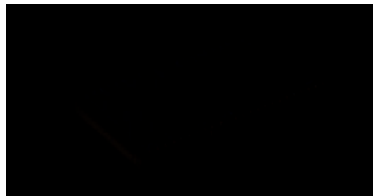
The Echo liquid handler can be used to transfer any volume to any well. These can be simple fluids (media for growing cells, buffer, or DMSO) or viscous solutions (lysis buffer, antibodies with glycerol, or transfection reagents). The transfer is gentle enough to harmlessly transfer cDNA, proteins, viable cells, and other assay components.

The Echo liquid handler is calibrated at the factory and can be used out of the box after installation. Calibration and fine tuning by the operator are not required—so more time is spent generating assay data. Transfer protocols are simple and direct, even when changing reagents for a multi-step assay.

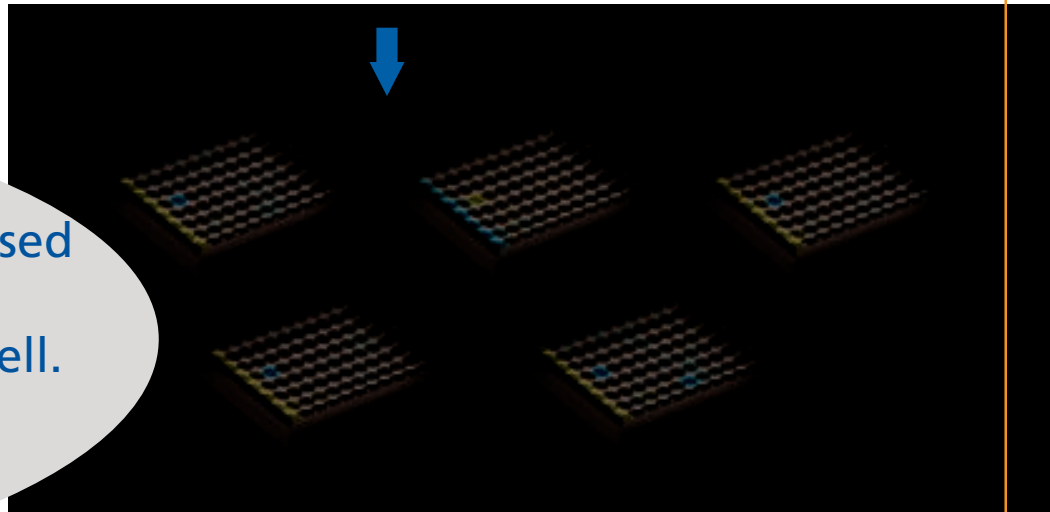
The Echo liquid handler can be used to transfer any volume to any well.



Transfer suspension or trypsinized cells at 2.5-1000 nL with the Echo liquid handler; backfill with media, incubate overnight.



Add transfection reagent, RNAi at 2.5-1000 nL, backfill with media and incubate as necessary.



Echo software and automation

Labcyte has a suite of Echo software applications to assist researchers in creating liquid handling protocols for specific applications. Each Echo application is designed around a specific liquid handling workflow and uses a combination of wizards and graphical interfaces to simplify the creation of plate formats, liquid transfer routines, and output files. Researchers can quickly create a variety of protocols off-line for the Echo liquid handler and use built-in simulators to validate every transfer before running live. The suite of Echo software applications enables the Echo liquid handler to quickly and efficiently accomplish any liquid handling task.

Echo Plate Reformat

- Easily reformat and replicate samples into assay-ready plates
- Quickly design complex plate maps for assay DOE or total assay assembly.

Echo Cherry Pick

- Transfer and replicate samples using pick lists
- Graphically design traditional or custom destination plate layouts

Echo Dose-Response

- Create IC_{50} curves and backfill automatically.
- Create intermediate plates automatically for direct dilution.
- Design plate layout to incorporate control wells.

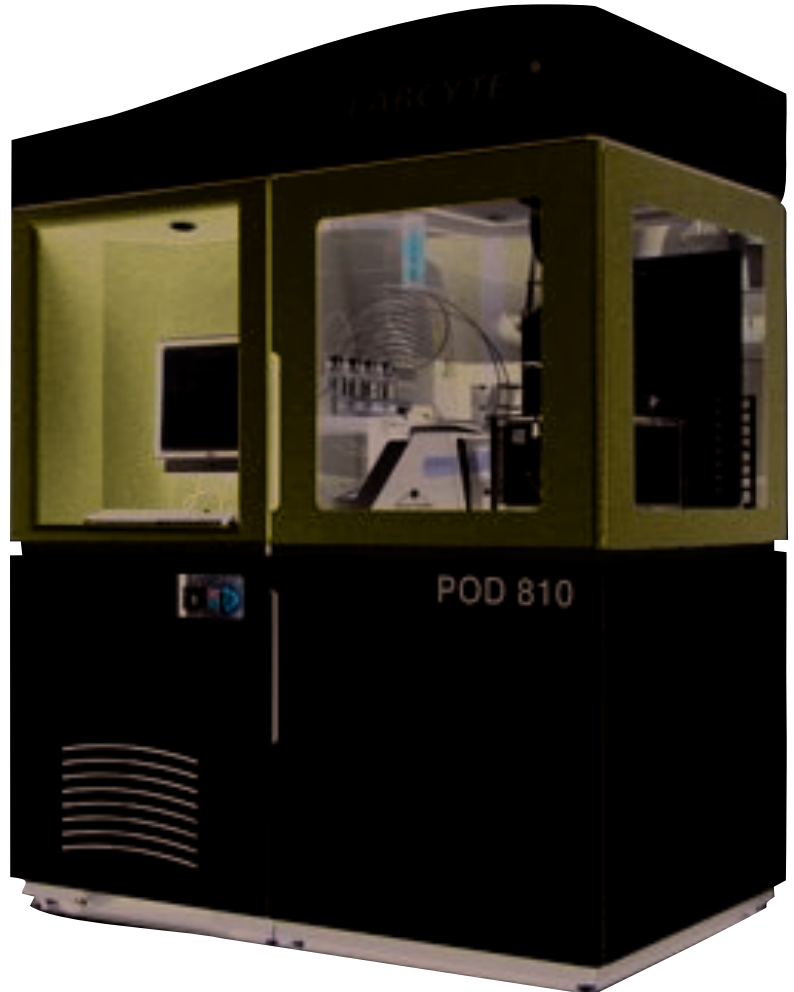


POD™ Automation Platform

For walk-away convenience and to meet multiple laboratory demands, Labcyte offers the POD automation platform. Echo software applications directly drive the POD system, ensuring the most efficient use of time, creating a perfect system for multiple operators. Researchers can walk up and quickly create protocols specific to their application, regardless of their automation expertise.

- Installed within 90 days of order, the POD system is ready for use immediately after site acceptance
- Additional options for environmentally controlled storage, plate handling and database integration are available

Alternate automation solutions are available from Labcyte.



Specifications

Labcyte offers three Echo liquid handler models to serve a wide range of assay and throughput needs. All three Echo liquid handler models offer the same superior accuracy and precision, and come pre-calibrated based on your liquid transfer requirements. This enables you to work with different transfer volumes and liquid types, without needing to continually adjust parameters. On the Echo liquid handler, an operator uses the software to identify the volume and transfer locations, and the instrument automatically sets the correct transfer parameters.

The Echo 555 is the fastest instrument and can achieve close to 750,000 transfers per day. The Echo 550 can be utilized for extremely fast assay and microplate setup times suitable for most laboratories. The Echo 520 is an entry-level model that is suitable for lower throughput operations. All Echo liquid handlers can be upgraded—increase throughput, add software tools and add additional transfer capabilities as your needs change.

	Echo 555	Echo 550	Echo 520
Transfer volumes of 2.5 nL	•	•	•
384- to 1536-well source microplates	•	•	•
96- to 3456-well destination microplates	•	•	•
Optional Barcode Readers	•	•	•
Source Volume Survey (DMSO)	•	•	•
Hydration Survey (DMSO)	•	•	
Aqueous Calibrations	•	•	

The Echo liquid handlers arrive pre-calibrated for the work that you need to do, so you are up and running with your new instrument quickly. This helps ensure that your team spends more time analyzing experimental data rather than constantly adjusting an instrument to perform for different protocols and applications. Many third-party automation integrators have successfully integrated the Echo liquid handler into other systems.

Since our inception in 2000, Labcyte has assembled a team of engineers and scientists to produce our award-winning instrumentation. Labcyte representatives are available at any time to discuss your applications and help evaluate the financial benefits of using the Echo liquid handler for your present and future applications. On site evaluations of Echo liquid handlers are also available.

Labcyte has an extensive support network, with sales, applications and service teams throughout the world. Our approach is hands-on and collaborative, and we are happy to help solve your greatest liquid handling challenges.

The Echo 500 Series Liquid Handler Advantages

Fast and Flexible

- Transfer aqueous-based and DMSO-based solutions
- Pre-calibrated and ready to use out of the box
- Transfer up to 750,000 samples/day
- Compatible with most ANSI/SBS-standard destination microplates

Better Quality Transfers

- CVs <8% for 2.5 nL transfers and up
- Accuracy within 10% at 2.5 nL
- No cross-contamination
- Measures DMSO source well fluid depth
- Measures DMSO hydration \pm 8% accuracy, <5% CV (555 and 550 models)

Economical and Environmentally-Friendly

- No disposable tips
- No wash fluid
- No hazardous liquid waste
- Reduced requirement for intermediate or dilution plates

For research purposes only; not for use in diagnostics.

The Echo liquid handler is covered by one or more of the following patents:

United States: 6,416,164; 6,548,308; 6,596,206; 6,603,118; 6,610,223; 6,612,686; 6,642,061; 6,666,541; 6,707,038; 6,710,335; 6,746,104; 6,802,593; 6,806,051; 6,808,934; 6,809,315; 6,849,423; 6,855,925; 6,869,551; 6,893,836; 6,893,115; 6,916,083; 6,932,097; 6,938,987; 6,938,995; 6,991,917; 7,070,260; 7,090,333; 7,185,969; 7,270,986; 7,354,141; 7,405,072; 7,405,395; 7,439,048; 7,454,958; 7,481,511; 7,717,544.

European Patent EP 1322430; 1324823; 1337325; 1352112; 1366356; 1614451.

Japanese Patent: 4189964; 4309131

Chinese Patent: CN 101035681B

Additional patents pending in the United States and other countries.

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