compound screening and validation

reduce assay costs without compromising performance

mosquito®

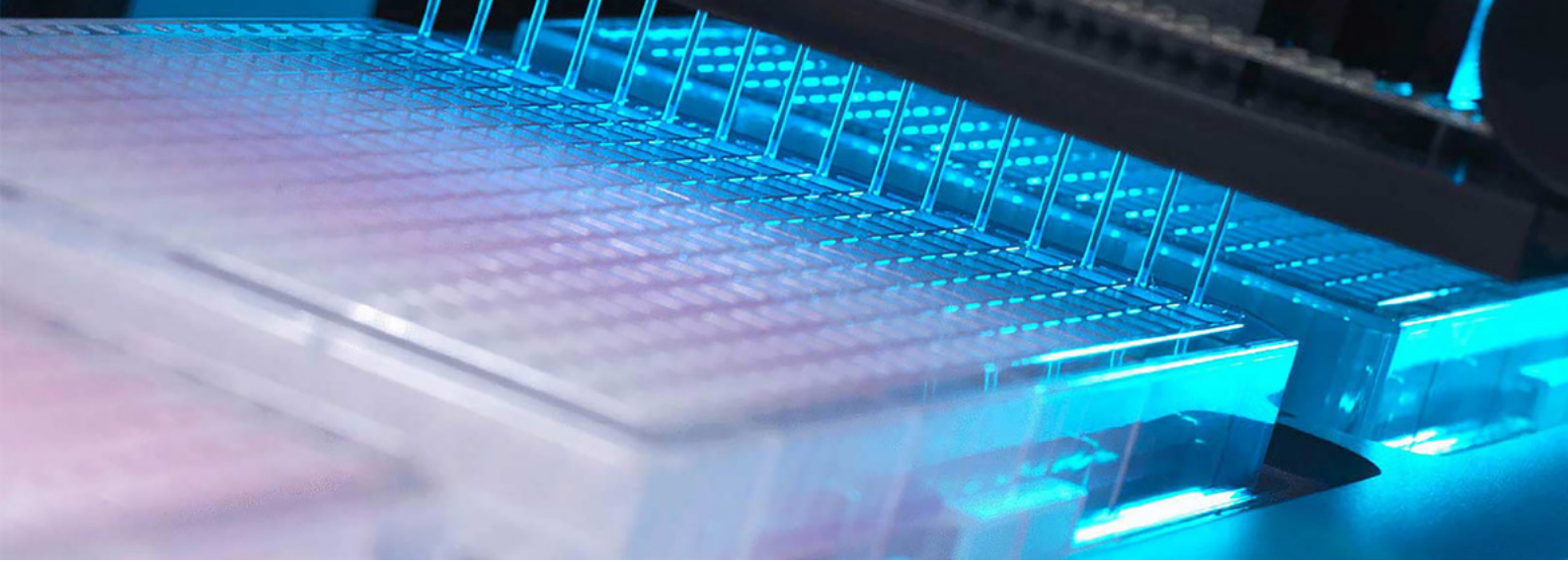
sptlabtech

Low-volume liquid handling
for compound management, screening, and validation workflows

As research shifts towards more physiological models (e.g., 3D cell cultures) and employs new technologies to explore disease biology (e.g., CRISPR-Cas9 gene editing, next-generation sequencing), assay reagent costs have significantly increased. Assay miniaturization is a crucial approach to reducing reagent costs. Transitioning an assay from 96- to 384-well plates typically results in over four-fold savings in reagents, while transitioning from 96- to 1,536-well plates can reduce reagent costs by approximately ten-fold. These cost efficiencies can be instrumental in enabling higher-value research, increasing project output, and improving return on investment for laboratories. Low-volume positive displacement instruments such as the mosquito® liquid handlers are ideal for the accurate and precise setup of miniaturized assays. This technology allows researchers to maximize the value of expensive reagents without compromising on the quality or number of assays.

SPT Labtech's mosquito system, with its innovative positive displacement pipetting technology, complements liquid handling infrastructure by providing:

- **Accurate transfer** of low and high viscosity liquids, including 100% DMSO, without the need for liquid class adjustments.
- **Serial or semi-direct dilutions** for dose-response experiments, consuming as little as 0.5 µL of stock compound.
- **Rapid plate reformatting** across 96-, 384-, and 1,536-well plate formats.
- **Low-volume plate stamping** to create assay-ready plate replicates.
- **Acoustic source** plate creation.
- **Fast cherry-picking** to re-array relevant compounds from library source plates or tubes.
- **Reduced chemical and single-use plastic waste** associated with high-throughput experiments.
- **Flexible design** of compound screening experiments with the Serial Dilution Wizard and CSV worklists.
- **An open platform** that integrates seamlessly with plate hotels, other liquid handlers, and LIMS.



Compound dilution series and assay-ready plate in a single instrument

	mosquito®	Acoustic dispensers	Positive-pressure dispensers	Traditional liquid handling systems
Liquid handling	positive-displacement agnostic to liquid viscosity	non-contact	non-contact	air-displacement; require liquid classes
Assay miniaturization	✓	✓	✓	limited
Dilutions	serial and semi-direct	direct	direct	serial and semi-direct
100% DMSO	✓	✓	✓	✗
Unlimited dynamic range	✓	✗	✗	✓
Mixing	✓	✗	✗	✓
Dead volumes	low	medium	low	high
Carryover	disposable tips	none	none	disposable or fixed tips
Speed	fast	fast*	fast	slow
Data robustness	high	high	medium	medium
Plate replication	✓	✗	✗	✓
Reagent and plastic waste	low	medium	medium	high
Instrument complexity	low	low	low	high

* Gets slower with larger volumes

product benefits

Volumetric accuracy and precision, every time
irrespective of liquid viscosity or environmental conditions

Preservation of your compound stock and prolonged use of reagents
with nanoliter pipetting and dead volumes as low as 0.3 µL

Faster result generation
rapid assay setup and sample spotting in 96-, 384- and 1,536-well formats

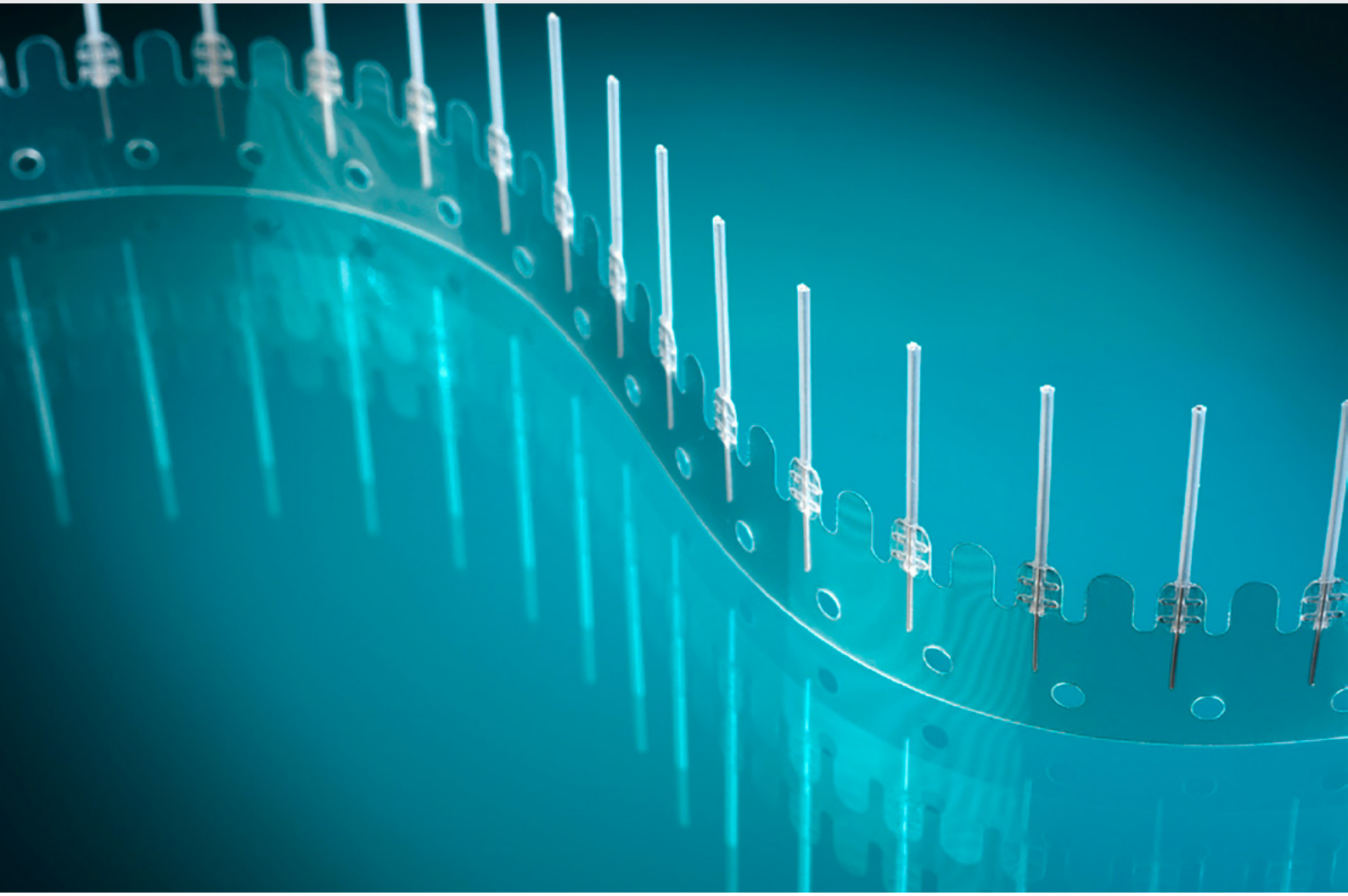
Sample and assay integrity
with low-cost disposable tips guarding against cross-contamination

Ease-of-use
proven intuitive software for established protocols and development of new methods

Seamless integration for 24/7 operation
robotic plate handlers, stackers, bulk liquid handlers and LIMS

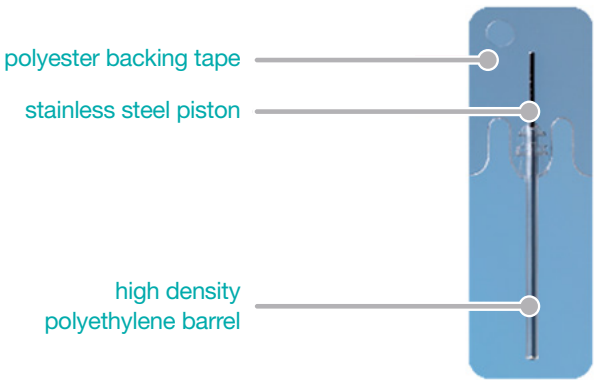
Reduced single-use plastic and chemical waste
with patented tip technology and cardboard packaging

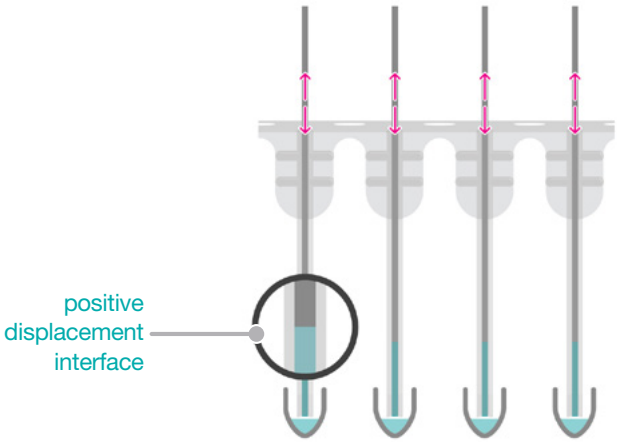
No tip boxes
save laboratory space with densely packed spool with up to 36,000 pipettes



Positive displacement pipetting:
The accurate way to handle liquids

As a scientist, you need confidence that the wide range of viscosities regularly encountered is handled and dispensed accurately and consistently every time, without the need for liquid classification.





The difficulties of accurate pipetting at low volumes are well known, as are the issues associated with handling viscous liquids. mosquito liquid handlers use patented positive displacement disposable pipettes, where the piston is in direct contact with the liquid, allowing the aspiration and dispense force to remain constant. The transferred volume depends solely on the dimensions of the tip cylinder and the movement distance of the piston. This makes the mosquito agnostic to physical properties of liquid, including viscosity, volatility, temperature, and the presence of detergents, allowing repeatable dispensing down to 25 nL. Moreover, unlike the air-displacement pipettes, which have an air cushion between the liquid and pipette shaft, mosquito volumetric accuracy and precision are not affected by laboratory conditions, such as temperature, pressure, or relative humidity.

technical specifications

	Pipetting range	Pipetting channels	Volumetric performance	Supported plate format	Dead volumes	Throughput
mosquito® LV	25 nL – 1.2 µL	8 or 16 channels	accuracy within 5% of target volume; precision with an average of 3% CVs throughout the volume range	96-, 384- and 1,536-well skirted plates	as low as 0.3 µL	2 minutes/96-well plate copy 3 minutes/384-well copy 5 minutes/4 x 384-well plate stamp out
mosquito® HV	500 nL – 5 µL					
mosquito® X1	25 nL – 1.2 µL (LV) or 500 nL – 5 µL (HV)	single channel		any type, including slides		6 seconds average cycle time (aspirate, move, dispense, change tip)

consumables

SPT Labtech consumables are developed and manufactured to the same high standard of design and engineering as our instruments – quality that we also demand from our suppliers. The combination of cutting-edge innovation and precision manufacturing ensures accurate results in the lab, every time.

support

Stay connected and protected with best-in-class service and support. Our reliance® engineers and field application scientists partner with you throughout the lifetime of your instrument to minimize downtime, maintain optimal performance, and secure the longevity of your investment.

selection of papers:

Pethe K, Sequeira PC, Agarwalla S, *et al.* A chemical genetic screen in *Mycobacterium tuberculosis* identifies carbon-source-dependent growth inhibitors devoid of *in vivo* efficacy. Nat Commun. 2010; 1 (5): 57.

Lakshminarayana SB, Huat TB, Ho PC, *et al.* Comprehensive physicochemical, pharmacokinetic and activity profiling of anti-TB agents. J Antimicrob Chemother. 2015; 70 (3): 857-867.

Ganser LR, Lee J, Rangadurai A, *et al.* High-performance virtual screening by targeting a high-resolution RNA dynamic ensemble. Nat Struct Mol Biol. 2018; 25 (5): 425-434.

Rectenwald JM, Hardy PB, Norris-Drouin JL, *et al.* A General TR-FRET Assay Platform for High-Throughput Screening and Characterizing Inhibitors of Methyl-Lysine Reader Proteins. SLAS Discov. 2019; 24 (6): 693-700.

De Cesare V, Moran J, Traynor R, *et al.* High-throughput matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry-based deubiquitylating enzyme assay for drug discovery. Nat Protoc. 2020; 15 (12): 4034-4057.

Potjewyd F, Turner AW, Beri J, *et al.* Degradation of Polycomb Repressive Complex 2 with an EED-Targeted Bivalent Chemical Degrader. Cell Chem Biol. 2020; 27 (1): 47-56.e15.

Huang X, Kamadurai H, Siuti P, *et al.* Oligomeric Remodeling by Molecular Glues Revealed Using Native Mass Spectrometry and Mass Photometry. J Am Chem Soc. 2023; 145 (27): 14716-14726.

An Y, Lim J, Glavatskikh M, *et al.* In silico fragment-based discovery of CIB1-directed anti-tumor agents by FRASE-bot. Nat Commun. 2024; 15 (1): 5564.