FORMULATRIX®

MANTIS®

Precise Liquid Dispenser

More Than a Reagent Dispenser

While traditional handheld pipettes or larger automated liquid dispensers greatly deteriorate in accuracy and precision below 2 µL volumes, the Mantis automated liquid dispenser excels at low-volume dispensing in a wide variety of scientific workflows.

The system is an easy and affordable solution to quickly increase the reproducibility and quality of your research as well as the throughput and efficiency of your laboratory. The diaphragm-based chip design is liquid class compatible, easily dispensing aqueous and organic solutions. Additionally, the Mantis will dispense in any SBS template from 6 to 1536 well plates and can be easily programmed to dispense to custom designs as needed.

Volume Range

Min: 0.1 µL

Max: ∞

Technology

Micro-Diaphragm Pumps

+ Continuous Flow

Precision

CV <2%

@ 0.1 µL

Reduce Costs

Save on Reagents and Consumables

Miniaturize reactions with tipless dispensing

Reproducible and Accurate

Enhanced Precision & Accuracy

Dispense volumes down to 100 nL at CV < 2%

Versatile and Flexible

Dispense and Normalize with Ease

Reagent dispensing for a broad range of applications

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Benefits

- **High Precision and Reproducibility:** Dispense volumes as low as 100 nL with exceptional consistency (CV < 2%), enabled by the new High-Fidelity Chips that ensure even tighter control over dispense accuracy and precision
- **Efficient:** Miniaturize reactions, scale up throughput, save on reagents, and remove pipette tip cost, saving time and resources across the board
- **Tackle High-Viscosity and Diverse Reagents:** The continuous flow chips enable accurate dispensing of thick fluids like 70% glycerol, DMSO, beads, and mastermix—ensuring broad reagent compatibility for various workflows
- **Reliability and Traceability with Every Dispense:** The Mantis ensures reliable dispensing with droplet verification, real-time LED status, automated breach detection, and RFID tracking for accurate, traceable results and enhanced uptime across your workflows
- **Fast, Error-Free Setup with CSV Templates:** Seamlessly import CSV templates for quick and error-free experiment setup, streamlining workflows and reagent normalization

- **Fast Labware Setup with Intuitive Control:** Define labware in seconds with the Interactive Labware Teaching module, and enjoy a streamlined setup process through an intuitive user interface
- **Compatible with a Broader Range of Plates:** The Adaptable Plate Clamp is gentle enough to accommodate even thin-bottomed plates
- **Biosafety Cabinet Compatible:** With its compact dimensions (350 mm x 232 mm x 212 mm), the Mantis can be used in various biosafety cabinets to accommodate workflows that require this level of safety
- **Automation Friendly:** Integrate effortlessly with external systems, fostering connectivity and data synchronization
- **Seamless Operation in Regulatory Environments:** The system features optional 21 CFR Part 11 Capable Software
- **Small Footprint:** All these new features are packed within the same small footprint

Broad Range of Applications

- Assay Development and Design of Experiment (DoE)
- Next Generation Sequencing (NGS) - Library Preparation
- Polymerase Chain-reaction (PCR) Workflows Real-time and Digital
- Enzyme-Linked Immunosorbent Assays (ELISA)
- Cell Culture and Bead-Based Assays
- Scaling Up Organoid Cultures
- 3D Cell Culture

Mantis performs precise low volume dispensing

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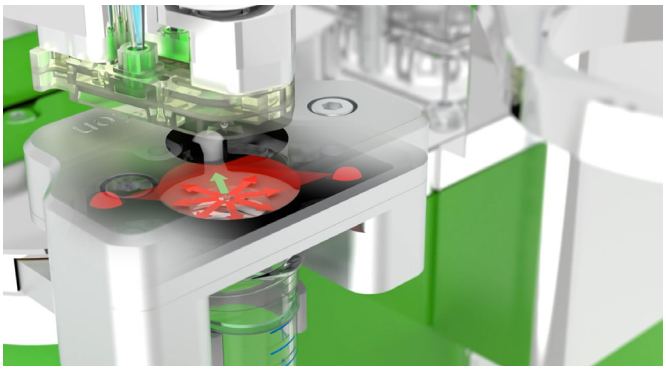
"Automated liquid dispensing is normally associated with big expensive equipment. Not so the Mantis. It combines speed and accuracy with an extremely small footprint and a relatively decent price tag. For us it has become an integral part of single cell processing and NGS applications. Handling is straight forward and intuitive and even my automation averse lab colleagues love to use it."

CANCER RESEARCH UK

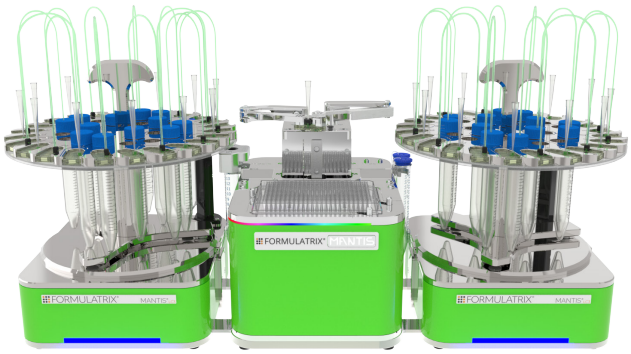
Wolfgang Breitwieser
Head of Molecular Biology

Enjoy Peace of Mind that Your Dispenses were Precise and Accurate

Optimize your workflow and ensure reliable results with the new Quality Control (QC) Droplet Detection Station. The QC station uses LEDs and optical sensors to confirm proper chip function by detecting the presence of dispensed drops. This technology allows the Mantis to automatically verify if drops are dispensed at the beginning and end of each run, providing both further confidence in dispense quality and traceability. This feature also eliminates the need for manual priming, saving you time and minimizing the risk of errors. With the QC station, you can have complete confidence that your Mantis chips are functioning properly throughout the dispensing process, delivering trustworthy results.



Drop detection with the QC station



Up to 48 reagents can automatically be dispensed with the LC3 option

Large Capacity Chip Changer (LC3) Upgrade

The LC3 enhances the Mantis system by allowing storage for up to 24 chips with a single LC3, or up to 48 chips when using a dual LC3 configuration. This upgrade is fully integrated into the Mantis software, enabling seamless operation. It also incorporates RFID technology to automatically identify all chips stored on the LC3. The LC3 is available as an option with new Mantis instruments or can be added as an upgrade to existing units.

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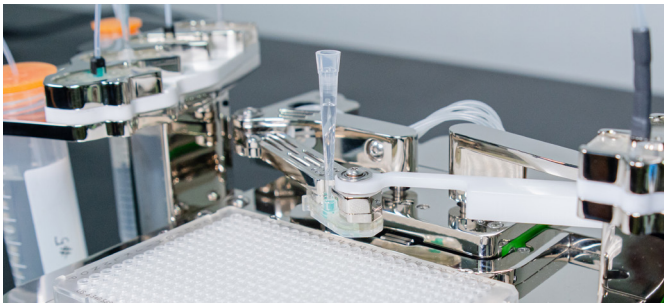
Enhance Laboratory Efficiency

Efficient research means that reagent dead volumes, tip consumption, and reaction volumes are minimized.

The Mantis liquid dispenser dispenses volumes from 100 nL to 100s of mL, allowing researchers to commonly run 2-5 µL reaction volumes in genomics and screening workflows.

To minimize dead volume, reagents plug directly into the microfluidic chip. Dead volumes are further reduced to just 6 µL by using pipette tips as reagent reservoirs, making the Mantis ideal for dispensing even the most precious reagents.



Direct pipette tip dispenses reduce dead volumes to just 6 µL

The Mantis can dispense volumes from 5 µL -> 1000s of µL in a continuous stream, perfect for deep well blocks

Normalize Your Assay Plate, Quickly and Easily

Streamline your assay plate preparation with precision and speed. The Mantis liquid dispenser simplifies normalization by combining intelligent software with our high-performance chip technology:

- The Mantis software automatically calculates the normalization values for you
- The Continuous Flow (CF) chip bulk dispenses at >600 µL/sec, quickly normalizing each sample tube, well, and plate
- Dispense high viscous solvents such as 100% glycerol using High Viscosity CF chip

"Using Mantis, I recently performed a high-throughput qPCR-based drug screen in stem cell derived retinal cells and acquired reliable data with homogeneity, precision, and faster dispensing. The instrument is user-friendly and has easily paid for itself in the savings associated with both expensive reagents and tip consumption in our lab. The Mantis is an essential tool for any lab that wishes to perform the most efficient and reproducible genetic analysis."

JOHNS HOPKINS UNIVERSITY

Srinivas R. Sripathi

Wilmer Eye Institute at Johns Hopkins School of Medicine

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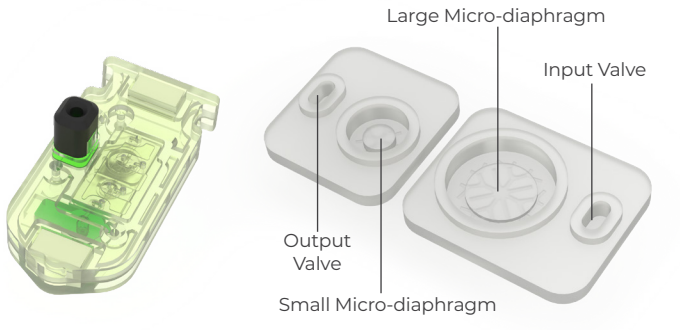
Dispense Beads and Cells with Ease

Magnetic beads are an efficient means for extracting and purifying nucleic acids. Conventional pipetting may result in the non-uniform dispensing of mag beads, leading to a lack of reproducibility. The ability of the Mantis to precisely dispense high viscosity liquids allows uniform dosing of beads, reducing operating costs and plastic waste.

Cells can be extremely sensitive, requiring additional care during handling, making the scalability of assays very challenging. The dispensing action of the Mantis liquid dispenser is gentle enough to dispense even the most delicate cells, such as primary neurons, while maintaining cell viability.

Third-party shaker combines with the Mantis to ensure homogeneity of beads



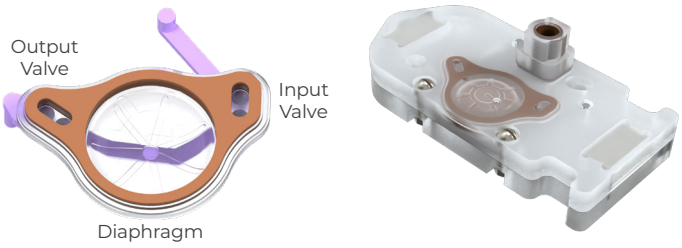
Mantis chip and micro-diaphragm technology

Use of Microfluidic Technology in Mantis

At the core of our dispensers is patented microdiaphragm pump that meters and dispenses discrete volumes of liquid. This valve cluster can fill and dispense as fast as 10 times per second (exact speed depends on specific product). This proven technology is both incredibly precise and viscosity independent.

Automated Dispensing, Now for Harsh Chemicals

The Mantis XL Chip is our largest-volume diaphragm chip, enabling accurate 50 µL dispensing in a single actuation. Designed with a perfluoroelastomer (PFE) diaphragm and fluorinated ethylene propylene (FEP) body, it delivers exceptional chemical compatibility for aggressive solvents and corrosive reagents. With CV < 2%, dead volume as low as 70 µL, and no calibration required, the XL PFE Chip brings new levels of robustness, scalability, and precision to demanding chemistry workflows.



The Mantis XL PFE-FEP chip

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"The Mantis microdispenser is a valuable addition to our proteomics laboratory. By enabling rapid dispensing of reagents and standards with high accuracy and low dead volumes, Mantis greatly facilitates and improves the reproducibility of sample preparation. The ease of operation and setting up new workflows facilitates the implementation of new sample preparation protocols."

UNIVERSITY OF GOTHENBURG

Johan Gobom

Associate Professor
Institute of Neuroscience and Physiology

Highly Reproducible Data

Since liquid handling imprecision impacts experimental reproducibility, researchers consider CVs to be a vital factor when considering the automation of their research.

At the core of the Mantis' microfluidic dispensing chip is a valve cluster that measures and dispenses discrete volumes of liquid. This valve cluster has two micro-diaphragms (select either 100 nL and 500 nL or 1 µL and 5 µL) that can fill and dispense as rapidly as 10 times per second.

Low Volume Chip	CV*
0.1 µL	1.4%
0.5 µL	0.5%
1 µL	0.4%

High Volume Chip	CV*
1 µL	0.8%
5 µL	1.1%
10 µL	0.5%
25 µL	0.4%

Continuous Flow Chip	CV*
25 µL	0.3%
50 µL	0.4%
100 µL	0.3%
200 µL	0.2%

"...[The Mantis liquid dispenser] helps us minimize variation in sample prep. It is the most economical way to for us to reliably dispense sub-microliter volumes to each of our wells and help minimize our volumes..."

NORTHEASTERN UNIVERSITY

Ed Emmott

Research Associate

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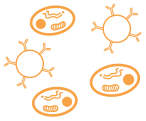
Versatility for Any and All Labs

The Mantis dispenses any reagent efficiently and reproducibly regardless of volume, viscosity, temperature, concentration, and research experience. It is no wonder that every year, more and more researchers discover and obtain the Mantis for dispensing reagents as a part of their diverse set of scientific workflows.

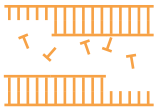
Sequencing Technologies

Miniaturize your cDNA synthesis and library preparation reactions, even with limited starting material



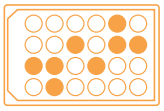
Cell & Bead-Based Assays

Gentle and even distribution of suspension, adherent and 3D cell cultures



PCR Technologies

Enhance the cost-effectiveness of any qPCR plate preparation workflow



Assay Development & Screening

Simplify the evolution from assay design to drug discovery

Nucleic Acid Workflows

Automate your nucleic acid extraction, recombination, and synthesis while avoiding cross-contamination and ensuring precision with the tipless technology of the Mantis

"FORMULATRIX is providing products that are state of the art in terms of fluidic and nanofluidic liquid handling. The technological excellence of these liquid handlers allows us to develop tailored scientific solutions that are extremely relevant for our collaborators' applications and workflows."

BIOASTER
MICROBIOLOGY TECHNOLOGY INSTITUTE

Marion Helsmoortel
Development Engineer

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User Account Management System

The Mantis software allows seamless operation in regulatory environments including controlling user access and tracking user history. Our user management system will help you run your Mantis liquid dispenser in GLP, 21 CFR Part 11, or other regulatory environments by controlling user permissions and storing an official audit trail for your records.

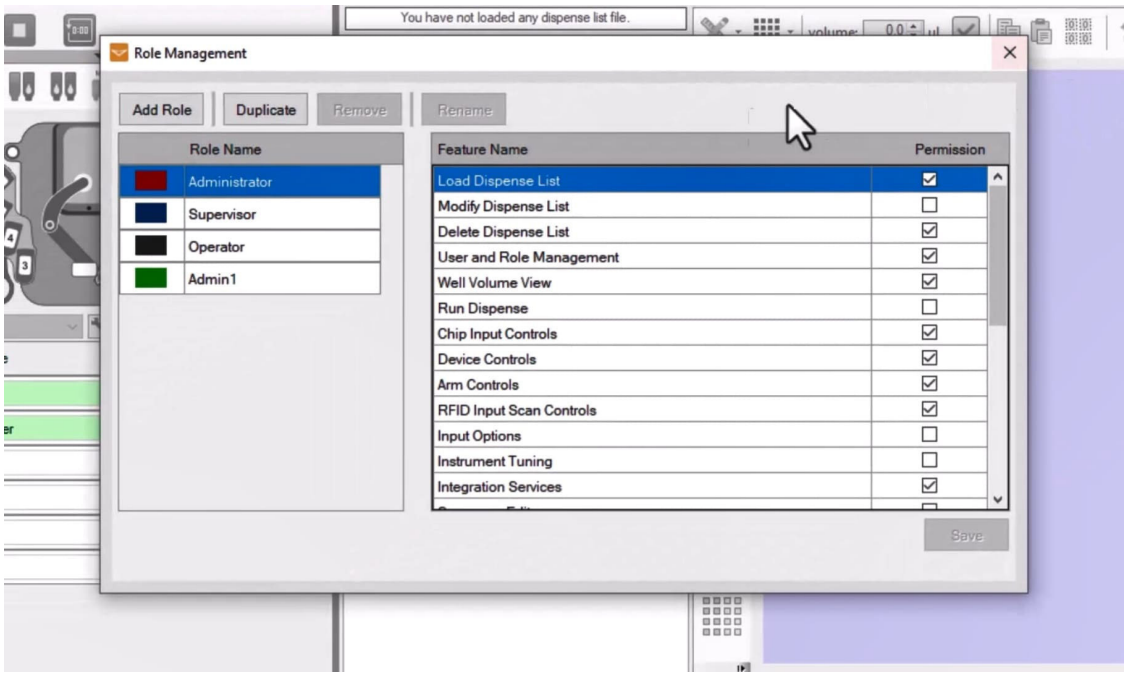
Here are some key benefits of the Mantis 21 CFR Part 11 “capable” software:

User Account Management

- Restrict user access and instrument control by locally defined permission levels
- Lock users after failed login attempts
- Set and manage password requirements
- Archive old users, keep all user records

Secure Audit Trail Logging

- Date and time-stamped user-action and instrument action records
- Full instrument and user-action electronic records are stored in a secure database
- Export log files to password-protected PDFs
- Selectively manage log elements included in your audit trails
- Audit trails maintained for the lifetime of the instrument



User account management system

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Specifications and Requirements

Computer Specifications

- Windows Vista 32-bit; Windows 7/8/10 32-bit or 64-bit, or Windows 11
- Dual Core x86 or x64 1.5 GHz processor
- 1 built-in USB port (USB 2.0 recommended, USB 3.0 supported)
- 4 GB RAM
- 1 GB Hard Drive space
- 768 pixels vertical minimum screen resolution (900+ pixels recommended)

Electrical Specifications

- 110 V - 240 V, 50 Hz - 60 Hz, 50 W typical, 150 W max. Standard or European outlet.

Environmental Requirements

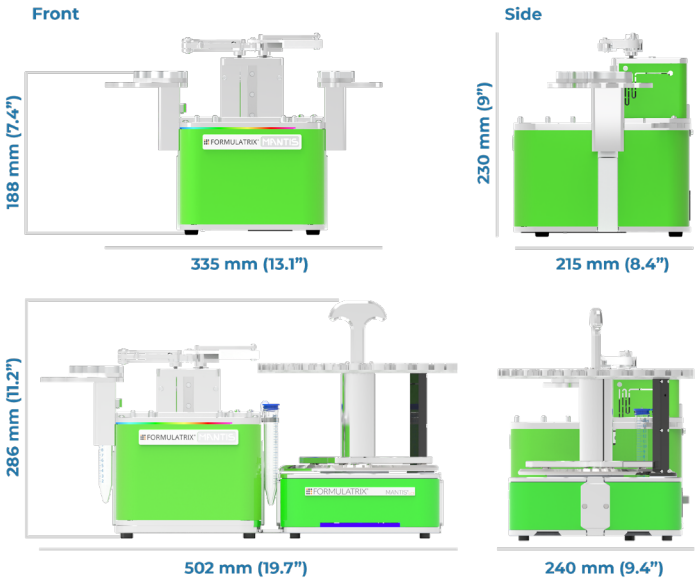
- 4-40 °C ambient temperature
- 85% or less relative humidity
- 4,000 m maximum altitude

Mantis Physical Dimensions

- Height: 230 mm (9”) (Full Extension, not including pipette tip input)
- Height: 188 mm (7.4”) (No Extension, not including pipette tip input)
- Width: 335 mm (13.1”) (smaller without ACC or reagent holders)
- Depth: 215 mm (8.4”)
- Weight: 5.2 kg (11.5 lbs)

Mantis with LC3 Dimensions

- Height: 286 mm (11.2”) (Full Extension)
- Width: 502 mm (19.7”)
- Depth: 240 mm (9.4”)
- Weight: 10.4 kg (23 lbs)



Microfluidic Chip Options

A variety of dispensing chips are available including certified molecular biology grade chips and chips that are compatible with harsh solvents.

Chip Type	Diaphragm Vol.	Min Vol.	Max Vol.	Pulses per Second	Dead Vol.	CVs
Low Volume	0.1 µL + 0.5 µL	0.1 µL	∞	At 0.1 µL: 10; at 0.5 µL: 7	6 µL	<2% at 0.1 µL
High Volume	1 µL + 5 µL	1 µL	∞	At 1 µL: 10; at 5 µL: 4	15 µL	<2% at 1 µL
Continuous Flow	N/A	5 µL	∞	Dispenses up to 600 µL / sec	150 µL	<3% at 5 µL
XL PFE	50 µL	50 µL	∞	At 50 µL / 735 sec	70 µL	<2% at 50 µL

For more information about the **Mantis**, visit **www.formulatrix.com** or email us at **info@formulatrix.com**.

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