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Simplifying Liquid Handling Workflows with Automation

Learn about the legacy of liquid handling in molecular breakthroughs and how effortless automation enables more accurate and precise research processes.

The Scientist's Creative Services Team and Eppendorf
Aug 21, 2023

What Is Liquid Handling?

Liquid handling is the essential process of collecting and dispensing solutions. Researchers across life science disciplines depend on precise measurements to move liquid samples and reagents between tubes, microwells, and substrates, enabling breakthroughs in proteomics, genomics, and beyond.[1] Emerging innovations improve this process, transitioning seamlessly from manual pipetting to automated liquid handling workstations that perform the most labor-intensive aspects of sample preparation accurately and reliably. These tools remove human hands from repetitive and time-consuming liquid handling steps and increase the precision and reproducibility of experiments involving large sample numbers and small volumes.[2]

Scientists turn to emerging technologies for easier, faster, and more precise liquid handling.
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The Legacy of Liquid Handling

Manual liquid handling

In the past century, scientists discovered the biological basis for life and developed many medical advances that overcome disease.[3] The ability to collect and manipulate samples with the first microliter system developed in 1961 was at the heart of such life science breakthroughs. The first piston-stroke pipette from Eppendorf enabled researchers to manually measure and move samples precisely and rapidly, with a fraction of the previously required sample volume. In the years that followed, Eppendorf developed a complete microliter system for liquid handling, encompassing reaction tubes, mixers, centrifuges, electronic dispensing tools, and multi-channel pipettes.[4]

Automated liquid handling stations

Eppendorf's legacy in liquid handling has allowed scientists to reliably uncover molecular discoveries with detail and accuracy and laid the groundwork for an expansion to effortless automation.[4] Today, researchers take the ease and speed of liquid handling to yet greater heights. They employ laboratory automation technologies, such as the ep*Motion*® liquid handler, for greater experimental flexibility, accuracy, and precision.[5] There are many aspects of life science research that benefit from new automated liquid handling.[3] For example, automated solution transport and specimen loading into sample preparation workstations eliminate tedious tasks such as uncapping and recapping tubes and error prone steps such as repeatedly pipetting microliter- and nanoliter-scale

volumes.[2]

How to Use Automated Liquid Handling

Automated liquid handlers range from simple to complex, all of which use equipment to perform tasks on their own, based on preprogrammed instructions. The level of automation variably relates to the number of tasks a single piece of equipment performs, the information it records, and its flexibility for use in different experiments and applications.[1] For instance, researchers working with nucleic acids may benefit from automated liquid handlers that aliquot and maintain samples for PCR, quantitative PCR (qPCR), nucleic acid extraction and purification, normalization assays, and next-generation sequencing (NGS) library preparation. Meanwhile, scientists working on proteomic analyses may seek platforms for immunoassays, such as enzyme-linked immunosorbent assays (ELISAs), or protein quantification and normalization assays.[5]

Because each sample journey is unique, researchers may find the range of automated possibilities daunting. The new generation of the ep*Motion*® 5073 and 5075 liquid handlers from Eppendorf make automation easy, providing full flexibility in just a few clicks.[5] For instance, researchers can decide which consumables they use and whether shaking or heating is required in their experiment. The user-friendly software is easy to program, allowing scientists to adjust sample numbers, pipetting volumes, and incubation times quickly and intuitively before the start of every protocol, with no programming experience required. The ease of use of the ep*Motion*® makes it simple to create methods for everyday liquid handling tasks such as normalization, serial dilutions, and PCR set-up, and facilitates more complex workflows such as library preparation and nucleic acid purification. Regardless of the application, researchers moving toward automation can rely on Eppendorf as trusted partners with a legacy in liquid handling.

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