

The Eppendorf Xplorer® Electronic Pipette Family – Better Reproducibility

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Abstract

Electronic pipettes are designed for versatile and flexible use in laboratory applications. Moreover, they can significantly reduce the stress on the user's thumbs and arms. The Eppendorf Xplorer electronic pipette family* features innovative technical solutions including a constant piston speed as well as spring-loaded tip cones developed specifically to enable precise liquid dispensing operations in

the laboratory. The effect of these technical solutions on overall reproducibility was examined by performing measurements with subsequent demonstration of the advantages concerning dispensing precision and accuracy.

* includes Eppendorf Xplorer, Xplorer plus and Xplorer plus Move It® adjustable tip spacing pipettes

Introduction

For lab scientists, the most important criterion regarding electronic pipettes, besides ergonomics and ease of use, is high reproducibility of results in daily routines. Precise results reduce costs and optimize the amount of time required because they eliminate the need to repeat analyses and experiments. The electronic Eppendorf Xplorer pipette

supports users in achieving maximum result reproducibility by featuring eight aspiration and dispensing speeds as well as an innovative spring-loaded tip cone [1]. The effect that these technical features have on the precision of pipetting results has been examined and will be discussed on the following pages.

[1] in all single- and multi-channel models with fixed tip spacing up to 1 mL.

Constant piston speed

The speed of aspiration and dispensing strongly influences accuracy as well as reproducibility of pipetting due to individual liquid properties. In electronic pipettes a motor controls the movement of the piston, allowing a precisely defined pipetting speed. Xplorer pipettes provide eight aspiration and dispensing speeds, which enables users to determine the optimal piston speed for the respective application and liquid.

Since each pipetting step in a series is performed to constant speed, a much higher, user-independent reproducibility can be achieved in comparison to mechanical pipettes (fig. 1).

Especially for viscous or foaming liquids slow aspiration and dispensing can be helpful to avoid inaccurate pipetting results due to air bubbles or foam formation and liquid residues in the tip. A constant and low speed is also relevant when it comes to the effect of shear forces on functional units such as DNA, proteins or cultured cells. An uncontrolled, fast liquid transfer can seriously affect cells and disrupt experiments.

The low speed levels available with Xplorer pipettes enable a low flow velocity, reducing shear stress for these functional units.

To take reproducibility to the next level, Eppendorf offers the VisioNize® pipette manager (sold separately), which can be used to connect the Xplorer family pipettes and remotely define their settings. It is a standalone touch server that interacts in real-time with Xplorer pipettes via WiFi technology, allowing remote feature setting and ensuring precise and reproducible pipetting results, regardless of user, liquid or experimental setup.

Overall, the above-mentioned features make the Eppendorf Xplorer electronic pipettes suitable for a wide variety of applications in molecular biology, microbiology, cell culture assays and analytical chemistry.

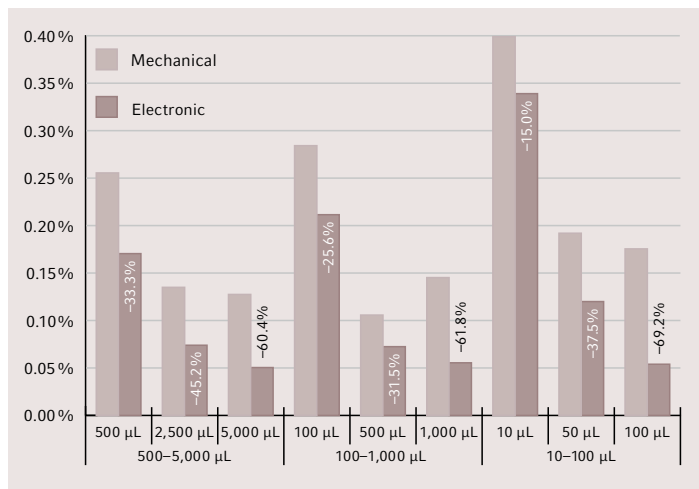


Fig 1: Comparison of random errors, mechanical vs. electronic pipette

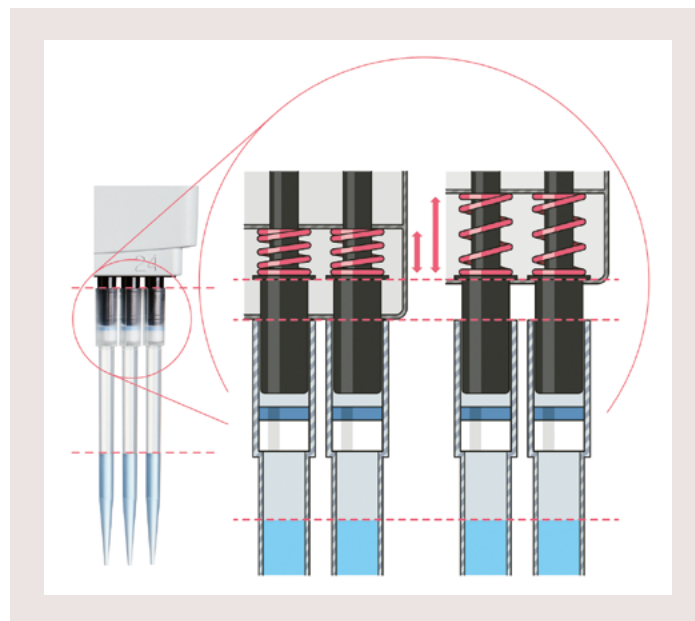


Fig. 2: Spring-loaded tip cones

Uniform tip attachment

The accuracy of dispensing operations is, among other things, dependent on the air cushion in the pipette. If the pipette tip is pushed further up the pipette cone by applying a high attachment force, this changes the air cushion and thus the volume of the aspirated liquid. Differences in the level at which the pipette tips are attached therefore result in different pipetting volumes. This, in turn, reduces the reproducibility of dispensing results.

Eppendorf Xplorer electronic pipettes offer a high level of result reproducibility, since their spring-loaded tip cones ensure the tip is always uniformly fitted at the same position on the cone (fig. 2). This guarantees a consistent air cushion volume resulting in accurate pipetting results.

Summary

The consistent implementation of technical features (e.g., electronic speed control of the piston and spring-loaded tip cones) not only minimizes physical strain, but also significantly improves the reproducibility of pipetting results. In this way, electronic pipettes increase productivity

In addition, the spring-loaded tip cone automatically compensates for the additional force used to attach the pipette tip. This means that only minimal effort is required to achieve an optimal tip fit – and subsequent tip ejection becomes much easier. Both factors are especially important for multi-channel pipettes as volume differences between tips are avoided and the ejection of several tips at once is facilitated.

and enhance everyday laboratory routines. Eppendorf Xplorer electronic pipettes combine optimum ease of use with high precision. This enables users to carry out sample processing with maximum reproducibility.

For more information, technical specifications and ordering information for Eppendorf Xplorer electronic pipettes, visit www.eppendorf.com/xplorer.

Software updates for Eppendorf Xplorer electronic pipettes are available at www.eppendorf.com/software-downloads.

Examples for how your research will benefit from Eppendorf Xplorer pipettes at: www.eppendorf.com/DiscoverXplorer



Learn more about the VisioNize pipette manager at: www.eppendorf.com/visionize-pipette-manager



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