Automation of Nanoliter Volume Transfers: Doing More With Less.

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ABSTRACT

Effective management of limited quantities of valuable compounds is an important part of drug discovery productivity. High throughput screening (HTS) for biological assays can often require nanoliter volumes of test compounds for direct sample transfers, and accurate low volume liquid handling instruments are required. TTP LabTech’s mosquito™ and the Labcyte® Echo™ 555, two nanoliter liquid handlers, were evaluated with the Multichannel Verification System (MVS®) into our processes. The ability to integrate robust automated processes is a requirement to upgrade the efficiency of our screening procedures. The mosquito™ integrated with Hamilton MICROLAB® SWAP can be used to evaluate the liquid handling performance of these nanoliter liquid handling instruments.

INTRODUCTION

Effective management of limited quantities of valuable compounds is an important part of drug discovery productivity. High throughput screening (HTS) for biological assays can often require nanoliter volumes of test compounds for direct sample transfers, and accurate low volume liquid handling instruments are required. TTP LabTech’s mosquito™ and the Labcyte® Echo™ 555, two nanoliter liquid handlers, were evaluated with the Multichannel Verification System (MVS®) into our processes. The ability to integrate robust automated processes is a requirement to upgrade the efficiency of our screening procedures. The mosquito™ integrated with Hamilton MICROLAB® SWAP can be used to evaluate the liquid handling performance of these nanoliter liquid handling instruments.

METHOD

To evaluate the liquid handling liquid handling performance of "TPP LabTech's mosquito" and the Labcyte® Echo™ 555, we compared their precision, accuracy, and integration with our automated systems. Transfer volume accuracy and precision was evaluated using a 75% DMSO based assay solution prepared with the 75% DMSO solution and spiked with an unknown compound. A range of concentrations were used to evaluate the liquid handling performance of these nanoliter liquid handling instruments. The transfer inaccuracy was less than 10% average deviation from all target volume evaluated.

FLPP METHOD (200 nl compound transfer, 384-well format)

1. A 2X DMSO (dissolved in water) was stored in 384 well plates overnight in 100 uL of medium.

2. Plates were maintained with 10% (vol/vol) ethanol supplementation and all reagents were thawed in ice and assayed at 4°C for 60 minutes.

3. A 1X DMSO was prepared at 100 uL per plate using 75% DMSO.

4. All liquid transfers were repeated on all concentrations are prepared.

5. DMSO was used to disrupt equilibration at 37°C for 60 minutes

6. All reagents are coupled with DMSO to maintain the fluorometric signal and shift in their equivalent format.

Comparison between mosquito™ vs. Echo™ 555

mosquito™ integrated with Velocity11 PlateMate™, V6Spin™ and Access2

mosquito™ integrated with Hamilton MICROLAB® SWAP

SUMMARY

Nanoliter plate replication and refilling into high density plates is an important feature of our HTS facility. With over 120 plates replicated on our HTS laboratory apparatus, the ability to replicate known linear (mm) and quadratic (mm) functions was an important function of our HTS facility. We evaluated the Multichannel Verification System (MVS®) into our processes. To ensure that the liquid transfer liquid handling performance of "TPP LabTech's mosquito" and the Labcyte® Echo™ 555, we compared their precision, accuracy, and integration with our automated systems. Transfer volume accuracy and precision was evaluated using a 75% DMSO based assay solution prepared with the 75% DMSO solution and spiked with an unknown compound. A range of concentrations were used to evaluate the liquid handling performance of these nanoliter liquid handling instruments. The transfer inaccuracy was less than 10% average deviation from all target volume evaluated.

Transitions

TTP LabTech's mosquito™

• Highly accurate low volume liquid handling
• Reliable fluid handling performance in 384 well format
• High volume liquid handling performance in 96 well format

Laboratory Automation System (LMS®)

• Automatic fluid handling
• Reliable fluid handling performance in 384 well format
• High volume liquid handling performance in 96 well format

Plate Shaker

• Automatic fluid handling
• Reliable fluid handling performance in 384 well format
• High volume liquid handling performance in 96 well format

Microtiter Plate Reader

• Automatic fluid handling
• Reliable fluid handling performance in 384 well format
• High volume liquid handling performance in 96 well format

Notebook Computer w/ Excel

• Automatic fluid handling
• Reliable fluid handling performance in 384 well format
• High volume liquid handling performance in 96 well format


data analysis software

• Automatic fluid handling
• Reliable fluid handling performance in 384 well format
• High volume liquid handling performance in 96 well format


cell based assay were also measured with the MVS® and Echo™ 555. The results showed that the Labcyte® Echo™ 555 was less than 1% and liquid transfer inaccuracy was less than 1% average deviation from all target volumes.


data analysis software

• Automatic fluid handling
• Reliable fluid handling performance in 384 well format
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