Automation of AlphaLISA Immunodetection Assays: JANUS Family of Automated Liquid Handling Workstations

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1 Introduction
The need for immunoassays assays at low cost, high throughput and quality, and simplified method exists in a variety of fields, including drug discovery, HTS, and basic research. ELISA is a method that has historically been used for these assays but it has a number of significant limitations. PerkinElmer developed the AlphaLISA™ chemistry to assay a number of immunooanalytes. AlphaLISA allows for the ability to run large numbers of samples with a small sample volume, excellent sensitivity, and an expanded dynamic range relative to ELISA, all at room temperature and without the need for plate washing or shaking. Plate densities of 96-, 384-, and 1536-well are accommodated. These characteristics make AlphaLISA ideal for high throughput screening, and JANUS® automated liquid handling workstations can be used to fully realize the power of AlphaLISA.

Here we present several solutions for the automation of the AlphaLISA assay as well as performance data that have been generated using JANUS automated liquid handling workstations.

2 AlphaLISA and Its Advantages
AlphaLISA is a homogeneous proximity assay that can be designed as a sandwich immunoassay, or using the competitive technique.

AlphaLISA technology has been used to successfully assay a variety of analyte types: small molecules, polypeptides, proteins, chunky proteins, and even particulates, in matrices such as serum and cell culture media. AlphaLISA is also scalable: assays can be converted to different plate densities (96-, 384-, and 1536 well plates) without loss of assay sensitivity. Miniaturization, or the use of smaller reagent volumes in higher density plates – is an excellent strategy for achieving high throughput and costs savings.

Why Automate?
Manual assay performance of small volume, high-density tests, however, can be cumbersome and error-prone. PerkinElmer’s JANUS automated liquid handling systems are used to easily realize the power of the AlphaLISA platform.

3 AlphaLISA is versatile and scalable
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4 JANUS Mini
- Occupies less than 28” bench space
- Equipped with one pipetting arm: Varispan (4 or 8 channels) or MDT (96- or 384-well format)
- Shares many features with larger JANUS units
- Deck capacity enhanced by addition of PlateStak®
- The JANUS Mini cannot be fully integrated to the EnVision® Plate Reader

5 JANUS Standard Deck/Integrator
Enables AlphaLISA application automation in a fully integrated "walk-away" mode when the EnVision plate reader, PlateStak® and FlexDrop™ non-contact reagent dispenser are added
- Gripper arm capability is available as an optional second arm, designed as a Gripper Integrated Platform (right), as the third arm of the system.
- One/two pipetting arms (Varispan, MDT, or both) and a Gripper arm
- Allows for plate bar code reading
- Can lid and de-lid plates
- Can shuttle plates and disposable tips to and from the PlateStak(s)

6 JANUS –EnVision Integration
The Gripper Arm’s rotational ability is used to deliver the OptiPlate™ or AlphaPlate to the EnVision Alpha reader in a JANUS-EnVision integrated system.
- AlphaLISA chemistry is easily adapted to JANUS automated liquid handling workstations, and favorable comparison with data from the manual runs is demonstrated in terms of standard curves, precision, and interpolated analyte recovery. Automation resulted in reduced assay runtime, reduced error, and significantly increased throughput. Automation of AlphaLISA immuno-detection applications on JANUS Automated Workstations offers robust, cost-effective assay performance, improved productivity, and a complete assay setup (reagents, consumables, hardware, and software) supplied by PerkinElmer.

7 AlphaLISA Assay WinPREP® Setup Test

8 Automated vs. Manual Sample Preparation Pipetting:

9 Comparison Between the Manual and Automated Runs

10 AlphaLISA Standard Curves

11 Conclusions