

## Bead Dispensing Application Overview

Short-term and long-term instrument reliability and robustness are critical issues in bead dispensing. Beads have the potential to become lodged in valves, thus reducing the lifetime and increasing the downtime of many traditional liquid handlers. Innovadyne's proven technology isolates the syringes and solenoid valves so that they remain in a pristine system fluid environment (degassed, de-ionized water) and so the beads never come in contact with these parts.

Bead suspension is addressed by employing a paddle-wheel stirrer in the reagent tray or an orbital shaker beneath the source plate, and a protocol that optimizes aspiration rate and dispenses beads rapidly (~10 seconds for a 384-well plate and 15 seconds for a 1536-well plate) before they have a chance to settle in the dispense tubing.

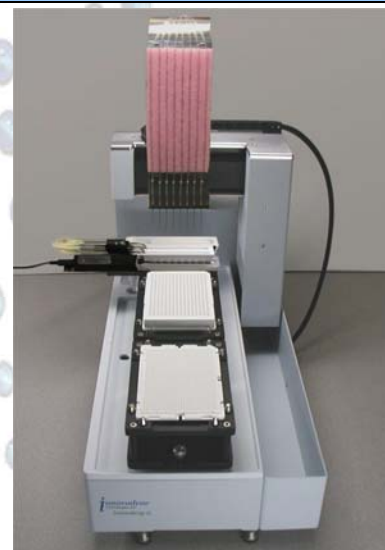
In the application note "Solving the Challenges of Automated SPA YOx Bead Dispensing", developed in collaboration with GE Healthcare (Whitchurch, UK), GE Healthcare used a Nanodrop II with bead dispensing accessories to dispense 1.25  $\mu$ L of 80 mg/mL Streptavidin-coated YO<sub>x</sub> beads into all wells of twelve Greiner 1536-well plates. These beads were then reacted with 3H-biotin and their fluorescence measured. Whole plate Cv's ran between 3.9% and 5.4% with no overall trends seen in the dispensing. Signal-to-noise values in excess of 10:1 were observed. Also, no tips or solenoids showed signs of clogging during this period, and no degradation of system performance was observed in the course of this study.

It should be noted that previous publications with other technologies have not demonstrated the ability to successfully automate the dispense of YO<sub>x</sub> beads at high concentrations to all wells of a 1536-well plate.

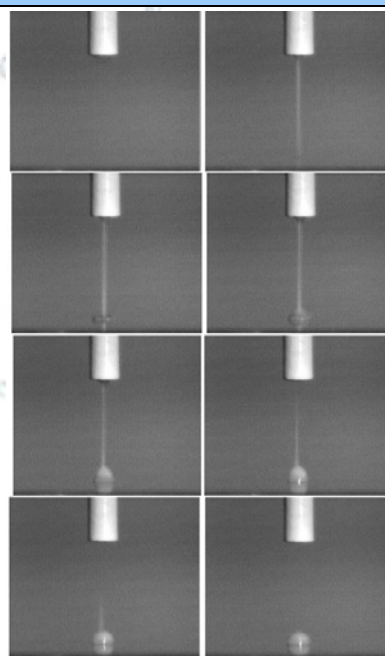
### YOx Bead Dispense to Twelve 1536-Well Plates

<b>Whole Plate Cv's</b>	3.9% to 5.4%
<b>Signal-to-Noise Ratio</b>	10:1
<b>Bead Concentration</b>	80 mg/mL

### Nanodrop II Configured for Bead Dispense



### YOx Bead Dispense, 250 nL, 80 mg/mL



## Application Notes

- **Solving the Challenges of Automated SPA YOx Bead Dispensing (M063)**
- **High Precision Bead Dispensing using the Nanodrop (M028)**

## Technology Briefings

- **High Precision, Non-Contact Dispensing (M002)**
- **Low-Volume Dispensing with the Nanodrop (M021)**

## Features (all platforms)

- Valve-free fluid path -- beads cannot contaminate valves
- Fast delivery minimizes bead settling and aggregation
- Flexible aspirate and dispense settings
- User defined syringe speeds and pressure set points
- Ability to clean nozzles between runs
- Online bead mixing
- Easy to maintain
- Low-dead volumes
- Large dynamic volume range: 100 nL-40  $\mu$ L
- 96, 384, 1536, 3456 plates
- 96/384/1536 low profile, Xtal, and deep well
- User-friendly software
- Simple to integrate with drivers available from most integrators

## Platforms

Item	Description	Plate Positions	8-Tip Head	16-Tip Head	96-Tip Head	Syringe Channels	1,4, or 8-Tip Additions to all Wells
11638	Nanodrop II stage and fluidics	2	Yes	-	-	8	Yes
11164	Screenmaker 96+8	5	Yes	-	Yes	16	Yes
12027	Platemaker HTS	5	Yes	-	Yes	104	Yes

## Software

Item	Description
11727	Nanobuilder
10591	Nanodrop GUI (for Nanodrop only)

## Accessories

Item	Description
11675	Paddle-wheel stirrer (Nanodrop)
11731	Orbital shaker (all platforms)
	Wide-bore tip set (200 $\mu$ m) (all platforms)
	Bead dispense harness frame (Nanodrop)

## Specifications (all platforms)

<b>Return-To-Spot Accuracy</b>	0.1 mm
<b>Aspiration Range, 8-Tip Head</b>	0.1-500 $\mu$ L
<b>Dispensing Range (8-Tip Non-Contact)</b>	0.1-40 $\mu$ L
<b>Dispensing Range (96-Tip)</b>	Screenmaker: 0.1-125 $\mu$ L Platemaker: 0.1-80 $\mu$ L
<b>Dispensing Precision, 8-Tip Head</b>	CV<10% at 100nL, CV<7% at 200nL, CV<5% at 1 $\mu$ L
<b>Dispensing Precision, 96-Tip Head</b>	CV<15% at 100nL, CV<10% at 200nL, CV<5% at 1 $\mu$ L
<b>Dispensing Accuracy, 8-Tip Head</b>	$\pm$ 10% at 100nL, $\pm$ 7% at 200nL, $\pm$ 5% at >1 $\mu$ L
<b>Dispensing Accuracy, 96-Tip Head</b>	Screenmaker: $\pm$ 10% at 100-500nL, $\pm$ 5% at >1 500nL Platemaker: $\pm$ 10% at 100nL, $\pm$ 7% at 200nL, $\pm$ 5% at >1 $\mu$ L
<b>Dead Volume, 8-Tip head</b>	1.5 $\mu$ L/channel at 1 $\mu$ L across 384-well plate
<b>Dead Volume, 96-Tip head</b>	<1 $\mu$ L/channel
<b>Syringe Capacity</b>	500, 1000 $\mu$ L