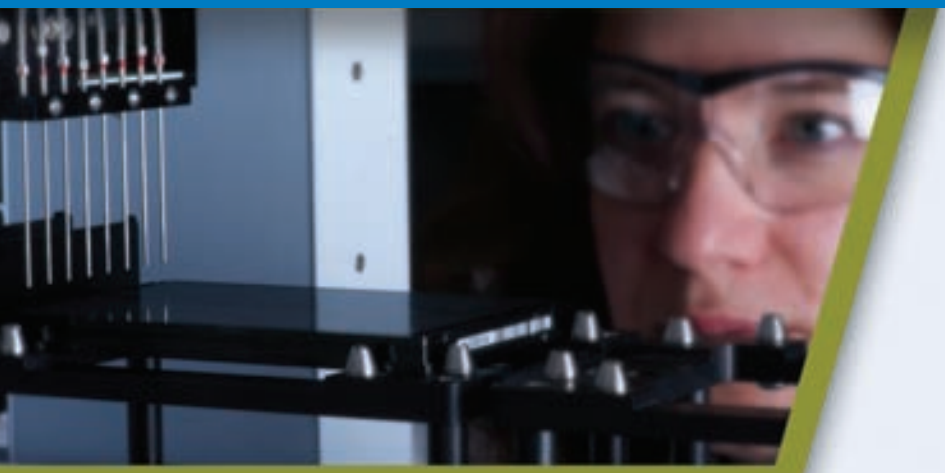
# Automated Dispensing



*Viewing the dispensing precision of a customer-supplied reagent into a 1536-well microplate on an Innovadyne™ Nanodrop™ II in Rohnert Park, CA.*

NEW!

*Nanoliter dispensing solutions for laboratories*

## Innovadyne™ Dispensing Instruments

### Nanodrop™ II

The Nanodrop II is a complete solution for low volume, high-precision pipetting. The system can be configured with one or two plate positions to enable applications such as assay miniaturization, method development, PCR reaction setup, and protein crystallography. In this model, four of the tips can individually access any well of a standard SBS plate, enabling complex method development and design.

### Nanodrop Express

The 16-channel Nanodrop Express is our fastest benchtop system — a complete high-throughput solution for low volume, high-precision pipetting. The Nanodrop Express doubles the dispense capacity and halves the aspiration time of a Nanodrop II. The Nanodrop Express has two plate positions and interchangeable 1X16 or 2X8 tip heads. This allows for flexible configurations for reagent dispensing and sample transfers.

### Screenmaker 96+8™

The Screenmaker 96+8 incorporates the company's non-contact dispense technology, coupled with traditional syringe dispensing. The unique combination of a 96-channel, non-contact dispense head coupled to an 8-channel head makes the instrument ideally suited for protein crystallography and for plate replication.

## Specifications

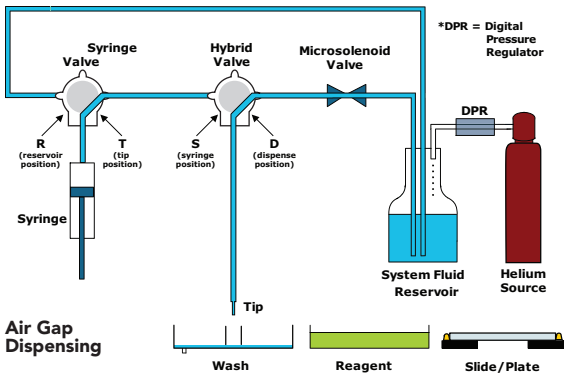
| | Nanodrop II | Nanodrop Express | Screenmaker 96+8 |
|---|---|---|---|
| **Plate Positions** | 2 | 2 | 5 |
| **8-Tip Head** | Yes | — | Yes |
| **16-Tip Head** | — | Yes | — |
| **96-Tip Head** | — | — | Yes |
| **Syringe Channels** | 8 | 16 | 16 |
| **1, 4 or 8-Tip Bulk Reagent Additions To All Positions** | Yes | Yes | Yes |
| **Plate Formats** | 96/384/1536 std, low profile, Xtal, and deep well | 384/1536 std, low profile, Xtal, and deep well | 96/384/1536 std, low profile, Xtal, and deep well |
| **Return-To-Spot Accuracy** | 0.1 mm | 0.1 mm | 0.1 mm |
| **Aspiration Range,** 8-Tip Hd | 0.1 – 500 µL | 0.1 – 500 µL | 0.1 – 500 µL |
| **Aspiration Range** 96-Tip Hd | — | — | 0.1-125 µL |
| **Disp Range,** 8-Tip Non-Contact | 0.1 – 40 µL | 0.1 – 80 µL | 0.1 – 40 µL |
| **Disp Range, 8-Tip Contact** | 25 – 500 µL | 25 – 500 µL | 25 – 500 µL |
| **Disp Range** (96-Tip Non-Contact) | — | — | 0.1-125 µL |
| **Dispensing Precision,** 8-Tip Head | CV<10% at 100 nL<br>CV<7% at 200 nL<br>CV<5% at 1 µL | CV<10% at 100 nL<br>CV<7% at 200 nL<br>CV<5% at 1 µL | CV<10% at 100 nL<br>CV<7% at 200 nL<br>CV<5% at 1 µL |
| **Dispensing Precision,** 96-Tip Head | — | — | CV<15% at 100 nL<br>CV<10% at 200 nL<br>CV<5% at 1 µL |
| **Dispensing Accuracy,** 8-Tip Head | ±10% at 100 nL<br>±7% at 200 nL<br>±5% at >1 µL | ±10% at 100 nL<br>±7% at 200 nL<br>±5% at >1 µL | ±10% at 100 nL<br>±7% at 200 nL<br>±5% at >1 µL |
| **Dispensing Accuracy,** 96-Tip Head | — | — | ±10% at 100 – 00 nL<br>±5% at >1 500 nL |
| **Dead Volume,** 8-Tip Head | 1.5 µL/channel at 1 µL across 384-well plate | 1.5 µL/channel at 1 µL across 384-well plate | 1.5 µL/channel at 1 µL across 384-well plate |
| **Dead Volume,** 96-Tip Head | — | — | <1 µL/channel |
| **Syringe Capacity** | 500, 1000 µL | 500, 1000 µL | 500, 1000 µL |
| **Cycle Time,** 8-Tip Head | 20s/transfer<br><60s 1 µL reagent addition (1tip/96-well plate)<br><17s 1 µL reagent addition (8 tips /1536-well plate) | 10s/transfer<br><60s 1 µL reagent addition (1tip/96-well plate)<br><8s 1 µL reagent addition (8 tips /1536-well plate) | 20s/transfer<br><60s 1 µL reagent addition (1tip/96-well plate)<br><17s 1 µL reagent addition (8 tips /1536-well plate) |
| **Cycle Time,** 96-Tip Head | — | — | 180 s/transfer (includes wash) |

## Related Products

Improve your sample transfer accuracy with online degassing using the Systec® line of degassing products, see pages 174 – 178 for more information.

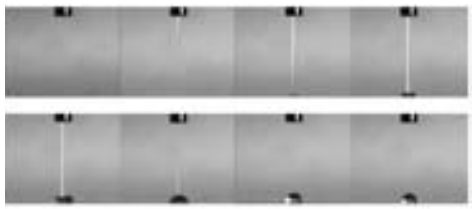
## Simple Flow Path Increases Reliability

Flow path – A schematic of the Innovadyne™ flow path where no sample or reagents come in contact with moving parts.



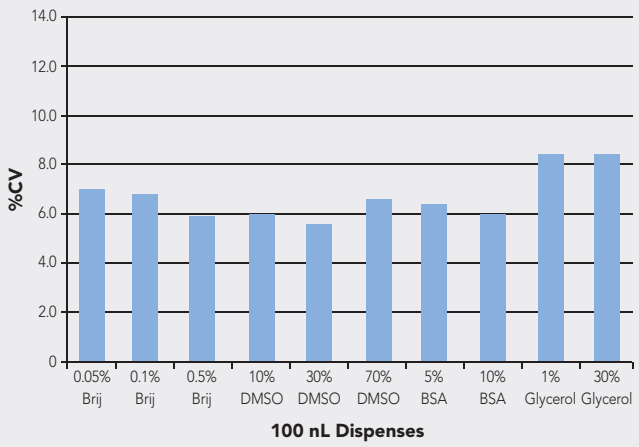

## Technology in Action

High-speed photography of a typical dispense. Note the precise initiation and termination of the dispense stream.



## Range of Chemistries Dispensed

Third party precision results of a wide range of challenging reagents




## Application Note

### High Precision Non-Contact Dispensing

From drug screening to crystallography, researchers seek to increase throughput while lowering the use of costly or hard-to-produce samples and reagents. Innovadyne's approach to liquid handling—high-precision, non-contact dispensing (based on advances in solenoid valves and flow path technology)—offers a robust and low-maintenance means of achieving assay volume reduction without compromising precision or accuracy. Precision is improved at all points in the dynamic range (from 100 nanoliters to 500 microliters).

### Limitations of Current Approaches

The limiting factor of traditional liquid handling techniques is the fact that they rely on low energy displacement. To perform a reproducible and accurate dispense, the last task of any pipetting action relies on a touch off. Classical displacement techniques do not have enough energy to break the surface tension of the last droplet. So a dragging action — touch off — is employed, either against the solid surface of a vessel or a liquid surface. Consequently, this technique is variable — it varies with liquid properties, temperature, humidity, surface adhesion, and other factors. At larger volumes the variation is small enough to have little impact on the end result. However, when the total volume pipetted is small, this variation has a significant negative impact on precision. The lower the volume, the larger is the contribution of the variation.

### Advantages of Non-Contact Dispensing

Non-contact liquid handling relies on the combined use of rapidly actuated solenoid dispense valves, a controlled pressurized liquid source, and flow path control via hybrid valves. The speed and energy of the fluid displacement enables the surface tension of the liquid to break as it leaves the orifice, eliminating the need for a touch-off.

The lack of a touch-off eliminates variability issues. The following bar graph provides a typical example of the precision achieved with Innovadyne dispensing instruments at 100 nL:

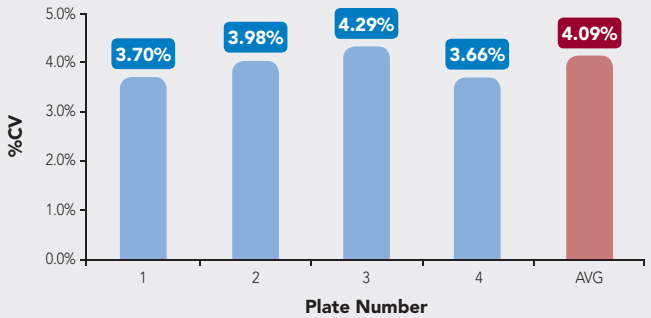
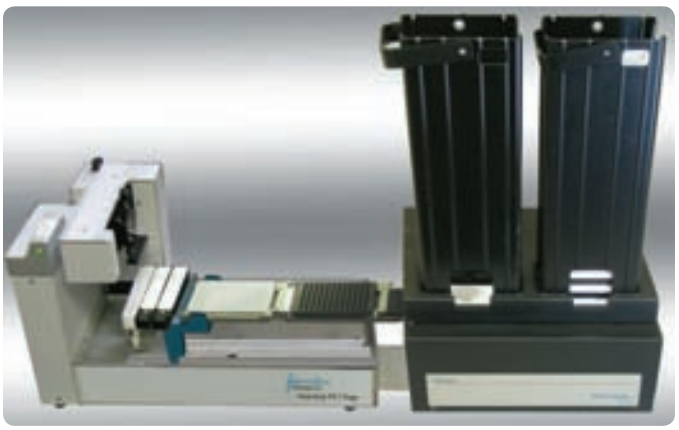



Plate CVs – Typical multiple plate precision performance at 100 nL

Another important benefit of non-contact dispensing is speed. The non-contact technique allows the delivery nozzle to accurately deliver the droplet above the target well, and to rapidly move to the next well. With the non-contact technique, dispensing becomes independent of the plate type or substrate, eliminating many of the reproducibility problems associated with motion control. Plate processing times fall dramatically. Using non-contact dispensing it is possible to deliver to all wells of a 96 well plate in approximately 5 seconds, 384 wells in approximately 7 seconds, and 1536 wells in approximately 14 seconds.

## Titertek Titan Plate Stacker

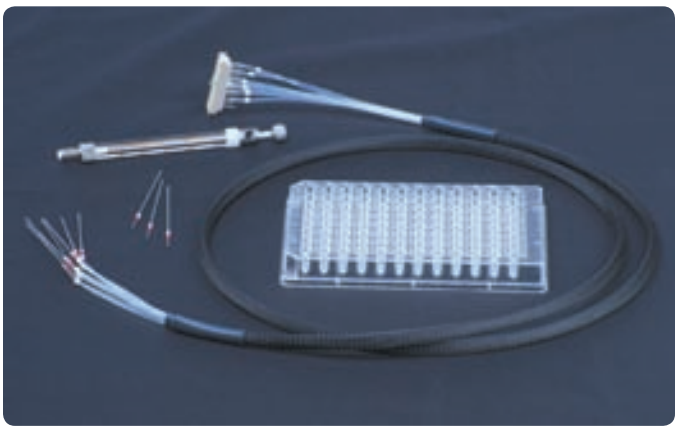
The Titertek Titan Plate Stacker is an integrated benchtop peripheral for use with all Nanodrop™ systems for unattended high-throughput operations.



*Titertek Titan with Nanodrop II Stage*

## Replacement Parts

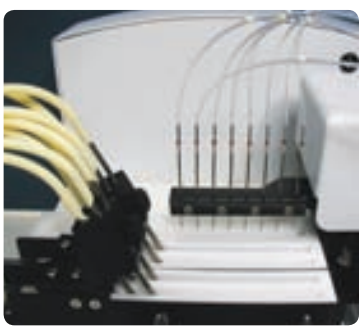
Innovadyne offers an extensive list of replacement parts for our systems, many of which can also be purchased on our website.



*For ordering information for all replacement parts see table below.*

## Paddle Wheel Stirrer/Reservoir for the Nanodrop

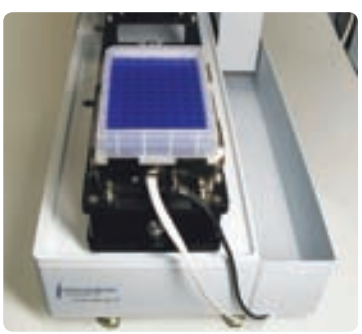
The Paddle Wheel Stirrer/ Reservoir is a variable-speed stirring accessory for the Innovadyne™ Nanodrop series instruments that keeps beads, cells, and other particulates in suspension.



*Paddle Wheel Stirrer*

## Orbital Plate Shakers

The Orbital Plate Shaker is a precision electronic shaker peripheral that provides a tight 1 mm orbital shaking pattern for all SBS footprint plates, reagent trays and micro tube holders. The Model 1 shaker, shown opposite, can be placed on any plate nest on any Innovadyne instrument. It is software-controllable from within Nanobuilder sequences or from a control window.



*Orbital Plate Shaker*

## Note

Accessories such as the Paddle Wheel Stirrer and the Orbital Plate Shaker may be ordered by calling IDEX Health & Science.

| Part No. | Description | Qty. |
|---|---|---|
| **AUTOMATED DISPENSING REPLACEMENT PARTS** | | |
| **12406** | Harness with 125 µM Tips, Non-conditioned | ea. |
| **12407** | Harness with 200 µM Tips, Non-conditioned | ea. |
| **11436IN** | Tip assembly, 125 micron, red, 2.5" L | ea. |
| **11978-1IN** | Innovaplate SD-2 | 100-pk |
| **10545-004IN** | Syringe, 500 µL | ea. |