

## Frequently Asked Questions



[www.innovadyne.com](http://www.innovadyne.com)

*leading the way in high-precision dispensing*

### 1. How does your technology work?

Using modified HPLC valve switching technology (Innovadyne's hybrid valve technology), we have created a system that isolates microsolenoid "ink-jet" dispense valves from the samples and reagents that are actually dispensed. Traditional syringe drive technology, with the hybrid valve in a position that keeps the dispense solenoids free of contamination, is used to aspirate samples and reagents. When the subsequent dispense is performed, the hybrid valve switches all channels to a position placing the dispense solenoids in line with the previously aspirated samples or reagent. Timed pressure pulses then eject the samples or reagent from high-accuracy machined tips onto the substrate of choice.

### 2. What is the typical dispense range of an Innovadyne device?

The dispense range varies from as low as 50 nl to as high as 500  $\mu$ l or more. For systems that target plate replication or reformatting, a typical range is from 25 nl to 5  $\mu$ l. For systems that target bulk dispense, the typical range is from 100 nl to 40  $\mu$ l.

### 3. What level of accuracy and precision can I expect of your instruments?

Typically, you can expect precision and accuracy to be at or below the levels listed in the table below. With experience you may be able to achieve much better results.

Dispense Volume, nL	Overall % CV/Accuracy
100	10
200	7
1000	5

### 4. How can I customize an Innovadyne system to meet my needs?

Innovadyne's platforms can be configured to optimize results within a desired volume range by simply changing the length of the tube harnesses that connect the microsolenoid dispense path (hybrid valve) to the tips. A longer harness allows larger volumes to be dispensed while a shorter length makes it possible to dispense smaller volumes.

### 5. How do you measure the small volumes you dispense?

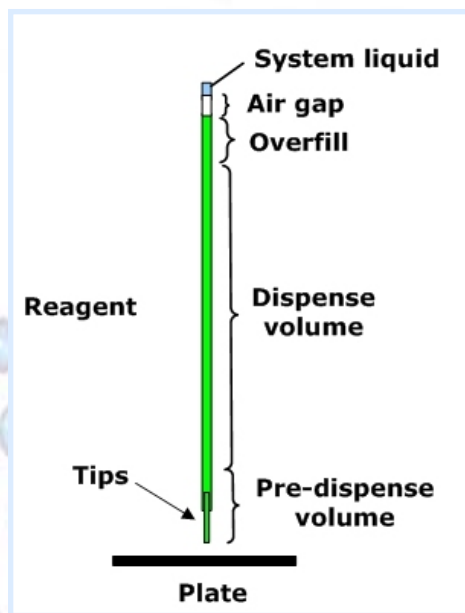
To measure precision, we use fluorescence readers and dyes. To establish accuracy, we use gravimetric measurements.

### 6. What is the dead volume of your system?

The dead volume, or the amount of reagent lost per plate during normal operation, is the amount of overfill left in the tubing after dispensing is complete. This overfill takes into account overall system variability.

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**Dispensing Volumes**

Typical dead volumes for Innovadyne's standard 8-channel broadcast-dispense configuration are shown in the table below:

Dispense Volume, nl	Total Volume Dispensed (384-well plate), $\mu$ l	Dead Volume, $\mu$ l	Dead Volume % of Total Volume Dispensed
100	38	3	8
200	77	4	5
1000	384	12	3

### 7. What level of throughput can I expect from an Innovadyne instrument?

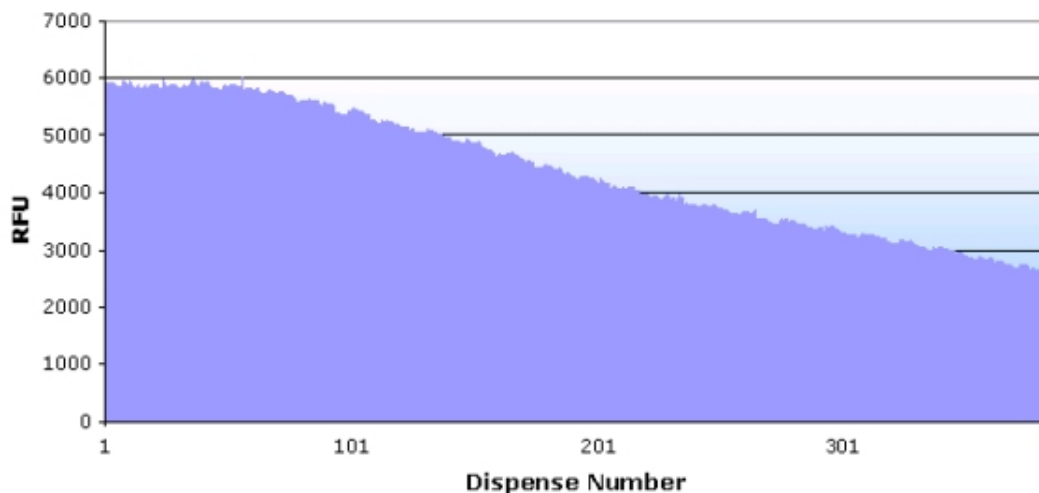
For Innovadyne's standard, 8-channel broadcast-dispense configuration, a 1  $\mu$ L dispense in a 96-, 384-, and 1536-well plate can be achieved in 5, 10 and 15 seconds, respectively.

### 8. Why are air gaps important?

Air gaps separate system liquid from reagent and have been used extensively for contact dispense systems. Using air gaps can significantly reduce overfill requirements and reagent loss. Innovadyne has pioneered the use of micro air gaps for non-contact dispensing. Our software allows users to input air gap size, enabling control of system liquid-reagent separation under a variety of conditions such as assays that use surfactants and detergents. In the case where air gaps are not possible, standard overfill volumes may be used instead.

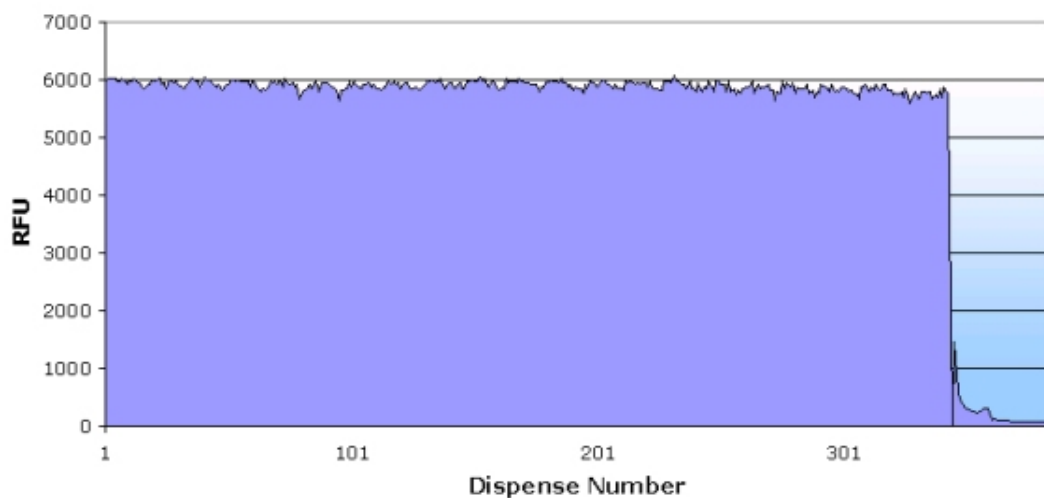
In a study comparing system performance with and without an air gap, 35  $\mu$ l of reagent was aspirated into a single channel and 100 nl was dispensed into a 384-well plate. One case utilized an air gap while the other did not. Compare the RFU vs. dispense number graphs without and with an air gap.

**Dispersion Effects without an Air Gap**  
Dispense Volume 100 nL



Without Air Gap

**Dispersion Effects with an Air Gap**  
Dispense Volume 100 nL



With Air Gap

Some nominal air gap parameters are shown in the following table:

Dispense Volume	Air Gap Volume
< 200 nl	400 nl
> 200 nl and < 2 µl	600 nl
> 2 µl and < 10 µl	1 µl
> 10 µl	2 µl

**9. Do I have to calibrate the system?**

Our systems come factory calibrated. If, after installation and performance qualification, the instrument requires calibration, simply follow the step-by-step instructions to perform a calibration. Our calibration routine takes about 20 minutes per volume range.

**10. How much tweaking will I have to do to achieve optimal dispense performance?**

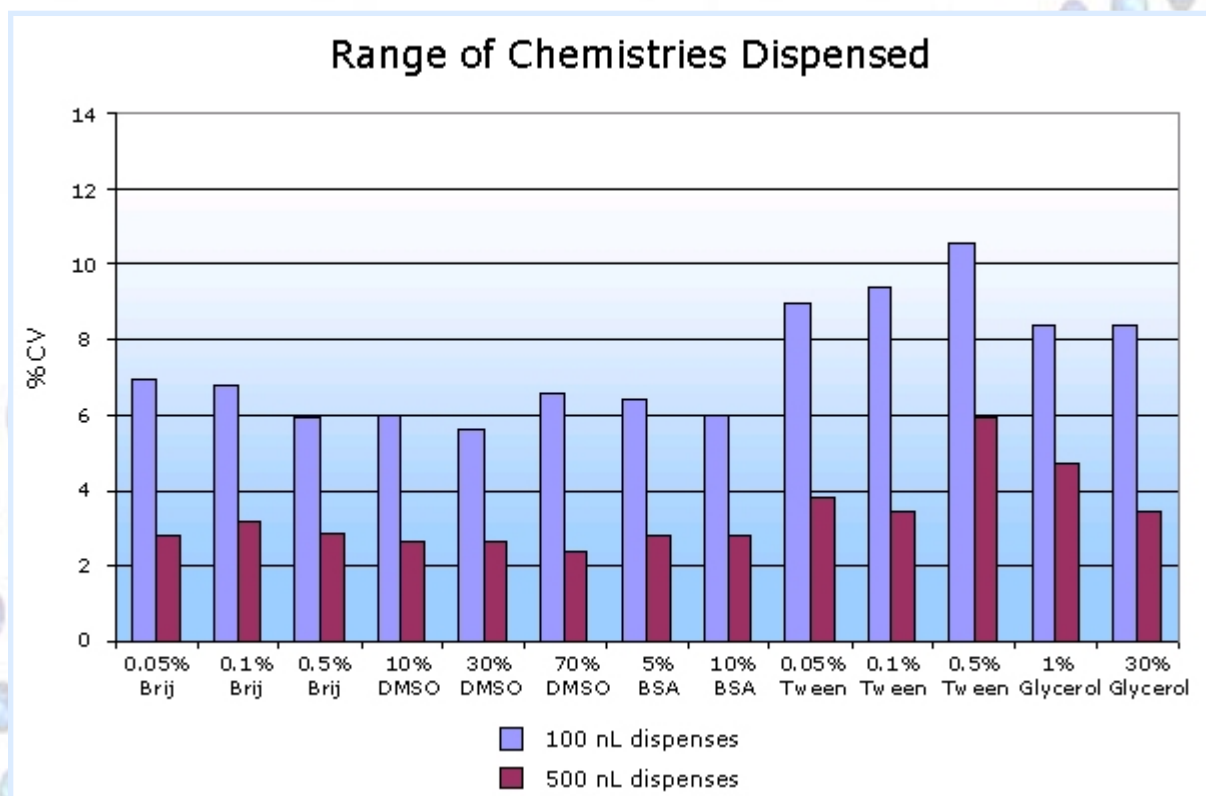
For most applications, normal settings are sufficient to achieve excellent results with minimal method development. User interface parameters are extremely easy to change and tasks ranging from full dispense cycles to system primes and purges can be developed in minutes. Innovadyne also offers expert users a variety of low-level tools such as .NET interfaces that allow optimization at the device level. Please call for more information.

**11. Do you have interfaces available for integration of your system into automated HTS systems?**

Yes. Innovadyne has ActiveX and .NET interfaces that can link and run developed methods. A generally skilled automation group will find it easy to integrate the system.

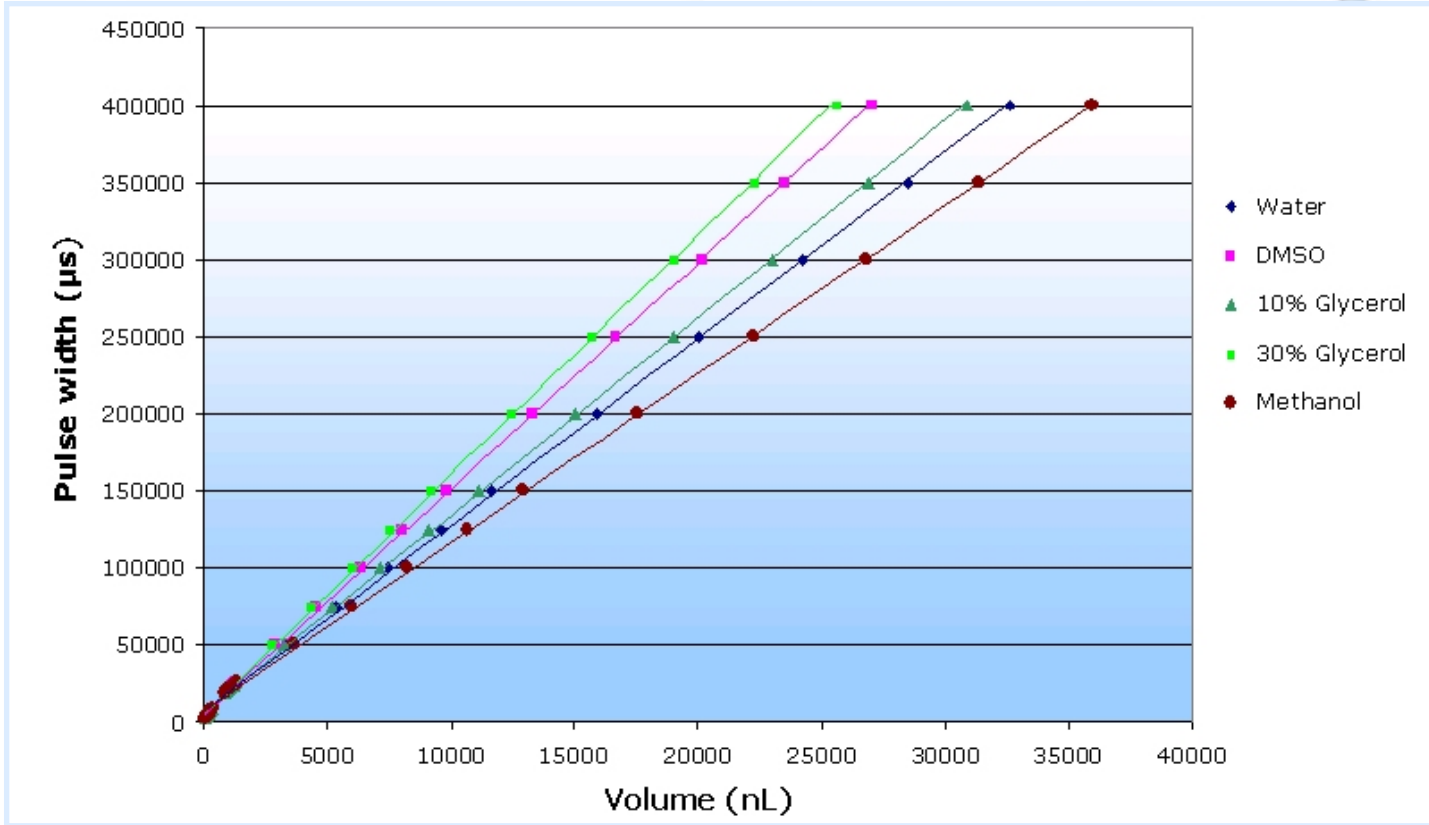
**12. Is your system inert to commonly used solvents?**

Yes. Innovadyne's patented design greatly simplifies the wetted fluid path. Inert fluoro-polymer tubing, PEEK, and stainless steel tips with synthetic sapphire orifices are the only materials that come in contact with reagents and samples. A range of chemistries has been dispensed. Call for information on our ongoing efforts toward development of alternative tip materials and designs.

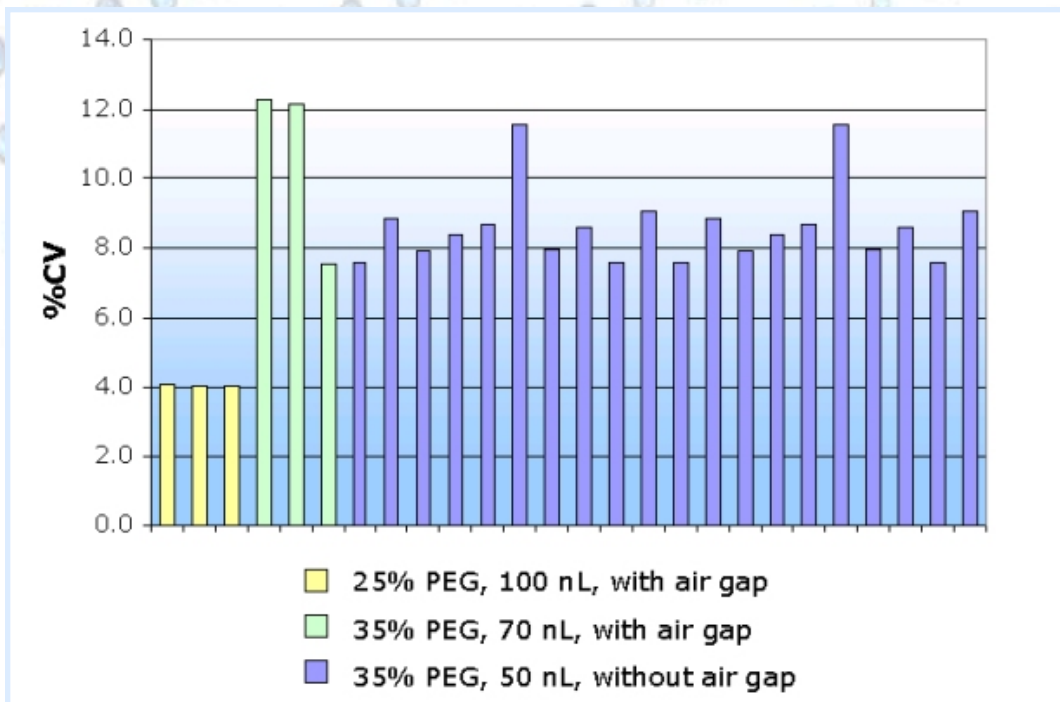


### 13. How does viscosity affect the dispense performance?

Viscosity is an important factor in non-contact dispense systems. Innovadyne's digital pressure system allows the user to adjust pressure, facilitating the dispensing of reagents with varying viscosity. We have been successful in dispensing as low as 50 nl of 35% PEG8000. Innovadyne's control architecture supports independent control of tips as needed to account for variability in well-to-well sample viscosity.



**Dispensing Various Viscosities**



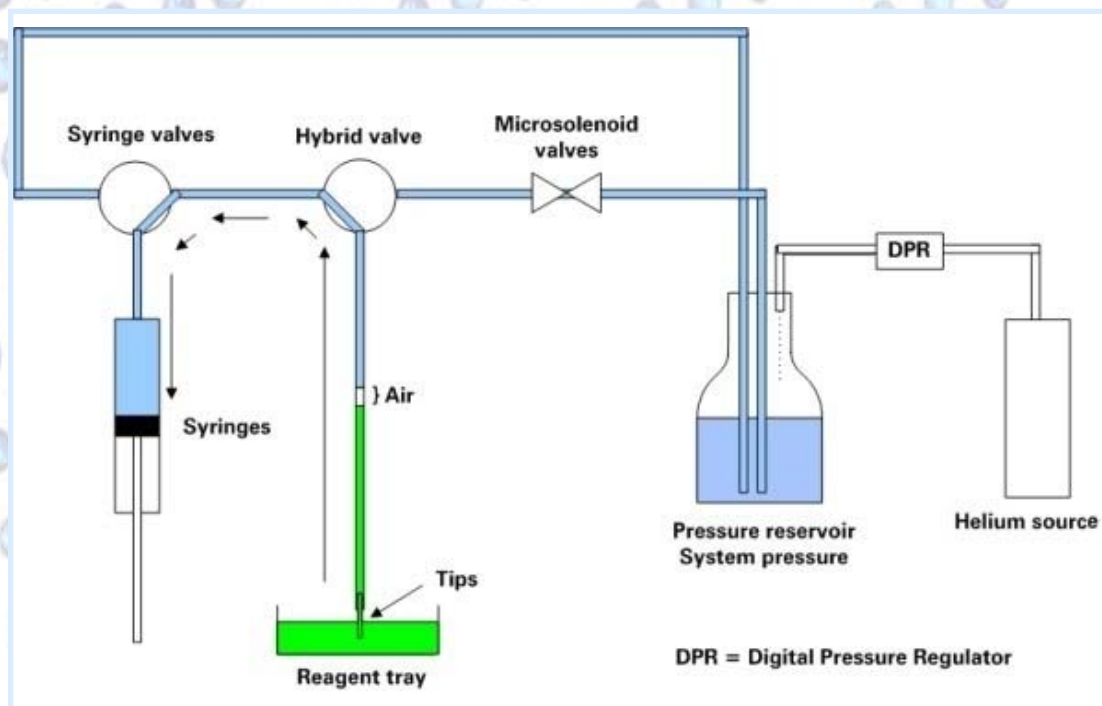
**Dispensing PEG 8000**

#### 14. What makes your system better than other low-volume systems?

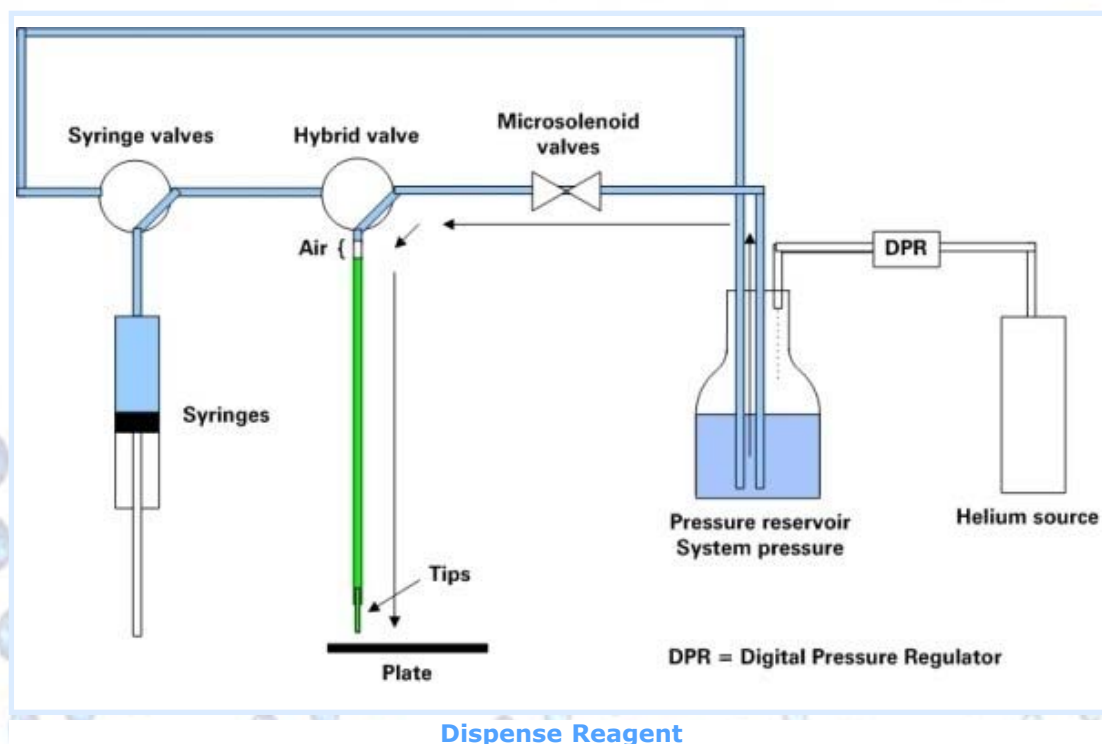
Innovadyne's patented technology isolates all moving parts from the sample path. The design greatly simplifies maintenance and improves both performance and reliability. In general, solenoid-based technology has shown excellent performance over a wide dynamic range and has demonstrated flexibility to address a broad spectrum of applications. Innovadyne's design simply elevates this low-volume dispense technology to a new industrial standard.

#### 15. How hard is it to clean the system?

Daily cleaning routines are included in the software. As with all low-volume devices, it is essential to keep the tips clean. A feature of our technology is the ability to both aspirate and dispense. This allows users to aspirate a cleaning agent, followed by a wash, as a part of a dispense method or at intervals during the run such as after every tenth plate.



Aspirate Reagent



**16. Can I flow reagents through the system instead of aspirating and then dispensing the reagents?**

Although not recommended, it is possible to use the Innovadyne system as a flow-through system. Cleaning the system after such a use is difficult and may be impossible in many cases, severely impacting future performance. Such use voids our one-year guarantee of the microsolonoid valves. A common complaint of users with flow-through, solenoid-based systems is deteriorating performance with time.

**17. How can I keep my reagent containers full for "walk-away" automation?**

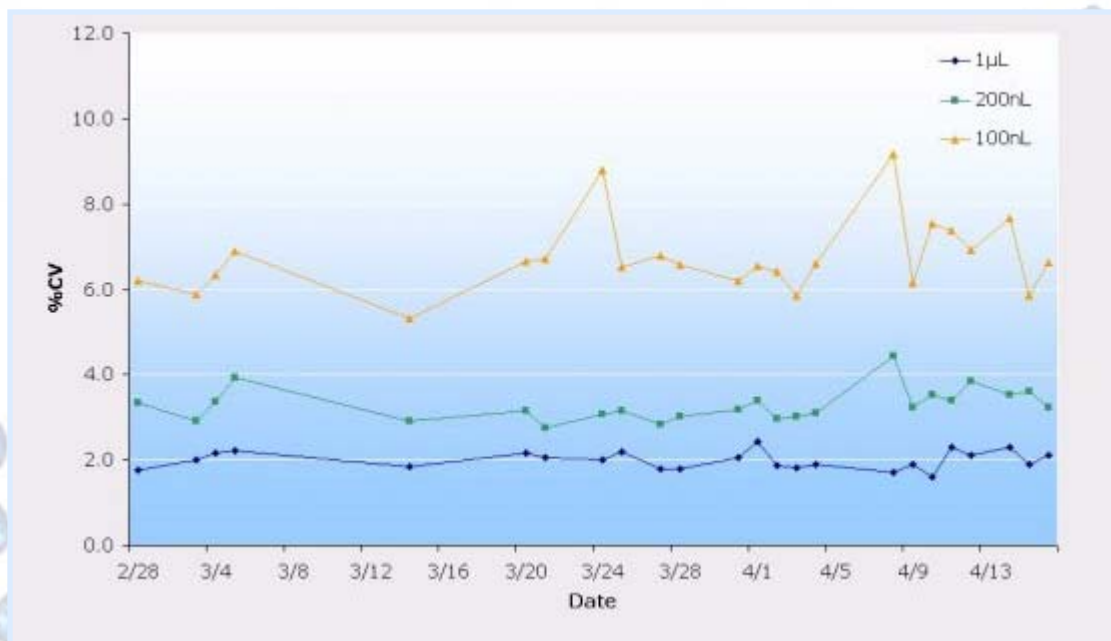
Innovadyne has a variety of options available for automated reagent refill. Please call for information on these exciting products.

**18. What applications does your technology address?**

Applications our customers use our instruments for include HTS broadcast dispense, assay development and IC50's cell and bead dispensing (difficult media), genomic applications including sequencing and QPCR, protein crystallography (coarse and fine screen creation and performance), MALDI spotting, low-density arrays, and spotting of compounds onto uneven substrates such as tissue and diagnostic strips. The independent tip capability also enables all forms of normalization routines such as DNA or compound-concentration normalization routines.

**19. Have you demonstrated day-to-day performance stability on your systems?**

Yes. The graph below contains data that was produced over a six-week period.



**Nanodrop Performance over a 6-Week Period**

#### 20. How long does it take to install a system?

Installation takes no longer than a day, provided the site requirements are met prior to the arrival of a service engineer.

#### 21. Why do you use helium to pressurize the system liquid?

Helium is well-known as a degassing agent for HPLC. Innovadyne uses helium to provide a pressurizing agent that minimizes bubble formation. Overcoming bubble formation as well as purging trapped air in solenoid dispense systems is crucial to sub-microliter dispense performance. We have developed proprietary methods throughout the development of our products specifically targeting the elimination of air from the system.

#### 22. Do you sell directly to end users?

Yes. Innovadyne sells product directly to end users as well as through our industrial OEM partners. This allows us to accommodate your particular needs as a customer and keeps us informed on what tools you need us to develop. If you have a requirement for a low-volume dispense product, please give us a call to discuss your application. Custom solutions are also available.

#### 23. What configurations of the technology are available?

Innovadyne offers 1-, 8-, 12-, and 96-channel configurations. The design architecture supports these as well as other configurations such as 16-, 24-, or 48-channel architectures. Tip spacing can be in alternative geometries to traditional 9 mm microplate spacing.

#### 24. How can I purchase an instrument?

For purchase and availability information on Innovadyne products please click the "request a quote" link at the bottom of the page, send an email to sales@innovadyne.com or call us at our Santa Rosa office.