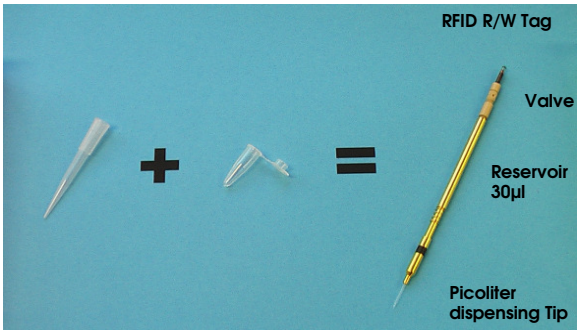
Introducing the sciSWIFT Dispensing Pen: An intregrated storage and dispensing device or applications in HTS, HCS, microarray production and nano-PCR

Christian Wurzel, Benno Voigt, Dr. Michael Edler, Oliver Krispin, Dr. Holger Eickhoff

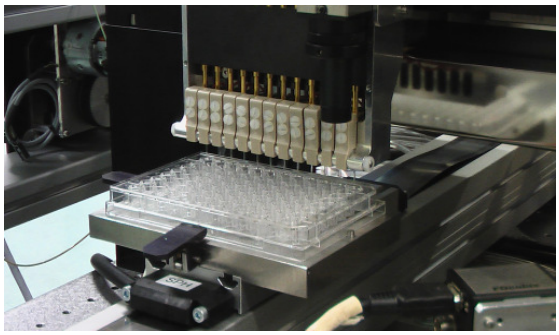
Scienion AG, Otto-Hahn-Str. 15, 44227 Dortmund, Germany

Introduction

The sciSWIFT dispensing pen is a re-sealable picoliter dispensing device with an integrated reservoir equipped with a read and write RFID Tag. The sciSWIFT can be used multiple times for dispensing with intermediate storage of the whole unit. sciSWIFT offers dispensing from picoliter to microliter volumes with high dispensing accuracies. The reservoir size ranges from 20µl to 20 ml. Every dispensing step is logged on the integrated RFID Tag with date, time, user and volume dispensed. The sciSWIFT technology can be integrated in every standard automation application. The sciSWIFT dispensing pen is designed for applications in HTS and HCS for integrated storage and dispensing as well as for diagnostic production purposes.

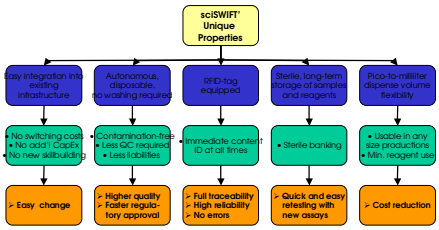


sciSWIFT - tube and tip becomes one



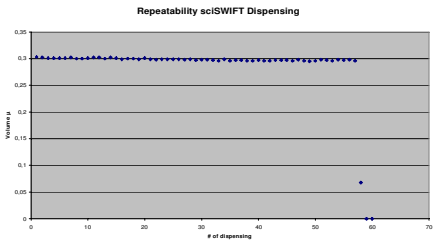
sciSWIFT in sciFLEXARRAYER S100 production line

sciSWIFT features



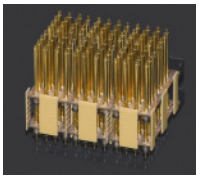
Outstanding dispensing accuracy

Repetitions: 60
Drops: 1000
Volume (min/max): 296nl / 304nl
Standard deviation 2nl
Liquid: PBS Buffer



Compound libraries and hts

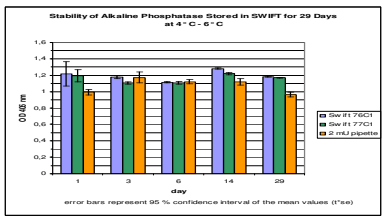
The sciSWIFT picoliter dispensing technology allows storage and dispensing of water based solutions as well as organic solutions like DMSO used in compound libraries.
First an assay with all the compounds is performed. Subsequent dose response test can be performed from the identical compound using the same sciSWIFT cartridge "cherrie picked" from the 96er dispense head.
No dilution steps necessary - No plate reformatting necessary - 4 decades of concentration from one cartridge in one assay



No dilution steps necessary - No plate reformatting necessary - 4 decades of concentration from one cartridge in one assay

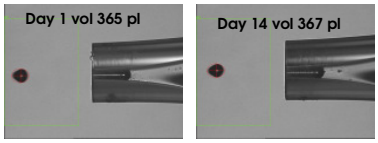
Alkaline phosphatase assay: Storage and Spotting performance

The sciSWIFT dispensers are intended to be used in low and high throughput assay applications.
As an example we performed a standard alkaline phosphatase assay. For this assay 49,5µl of substrate buffer were pipetted into each well of an 384 MTP. The sciSWIFT dispensers were filled with alkaline phosphatase and stored in the fridge. In the assay 2mU alkaline phosphatase either in 200nl with the sciSWIFT or in 0.5µl pipetted with a 2µl pipette were added to the buffer. The absorption was read out at 405 nm in a plate reader. The sciSWIFT were closed and re-stored at 4°C.
The assay was repeated after 3,6, 14 and 29 days.

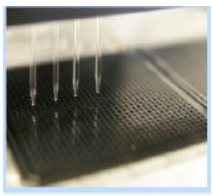


The diagram shows an excellent stability of the alkaline phosphatase stored in the sciSWIFT dispensers. Compared to classical pipetting techniques the variation is much lower.

Dispensing with the sciSWIFT was controlled with the autodrop feature of the sciFLEXARRAYER. Below two pictures are shown.

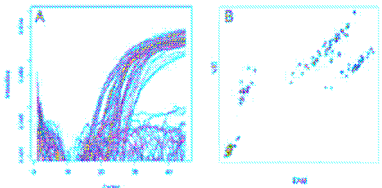


Application: Nano PCR with sciSWIFT*



Parallel loading of nano PCR plates with sciSWIFT dispensers the holder is cooled down to 4°C ommitting evaporation

The sciSWIFT dispenser technology was used to perform a nano PCR. For this approach a new type of PCR – MTPs was used (Dahl et. Al., Biomed Microdevices. 2007 Jun;9(3):307-14). The nano PCR plates are made of molded PE with a vessel volume of 300 nl. PCR Mastermix, Primer and templates were dispensed with an online controlled accuracy below 2.5% to a total volume of 200nl. The droplet velocity of 2.5 m/s guarantees a homogeneous mixing of the components. During the dispensing the nano MTP is cooled down to 4°C ommitting evaporation of the components. Subsequently the plate is closed with a transparent foil and the PCR is performed. Due to the small volume and the high surface to volume ration efficient and fast PCR can be performed. A complete PCR is done below 10 min additionally using only 1/10th of reagents. The fluorescent intensity is read out with a CCD camera. The whole nano PCR plate is imaged and intensities for every well are calculated and compared to standards. The system can be used for conventional PCR, rt-PCR, SNP detection or any other PCR protocol.



*** All nano PCRexperiments were done together with A. Dahl MPI for Molecular Genetics, Berlin**

sciSWIFT 1 ml

The sciSWIFT is available with reservoirs of 20µl, 1 ml and 20 ml. Serving the needs of different applications.