SmartArrayer™ Series Microarray Spotters

— A High-throughput, Multifunctional Platform

Now Plate-Ready!

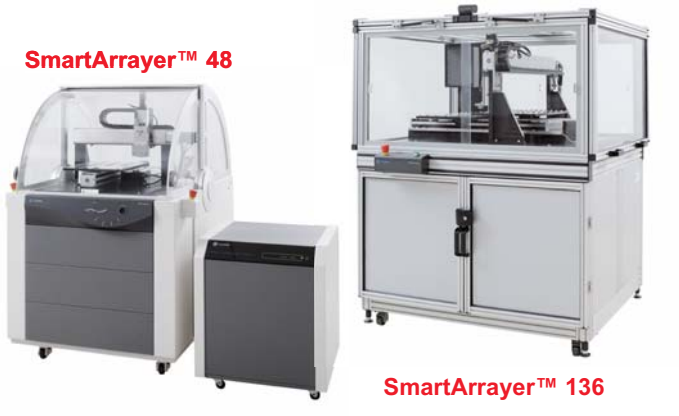
How many slides can I print?
How many spots can I put on a microarray slide?
What kinds of substrates can I use for microarraying?
The how & why of microarraying into 96-well plates?
What can I put on a slide microarray?
How can I reduce residual contamination of the pins and dispensers?
How can I salvage accidentally missing spots?
Where can I print my microarrays?

—SmartArrayer™ has the ANSWER

CapitalBio

Introduction

CapitalBio SmartArrayer™ 48 and 136 spotters are equipped with dual printing systems: the classic contact pin spotting module and our proprietary non-contact Microdispense™ module. These versatile microarray spotters have many practical easy-to-use features capable of printing nano-liter liquid samples onto substrates such as glass, silicon or membranes, with high precision and maximum flexibility. From pilot phase tests to industrial scale manufacturing, the SmartArrayer™ spotters provide a seamless pipeline for the production of your molecular assays.



Key Features

- Dual printing: Exchangeable contact spotting module and non-contact Microdispense™ module.
- Substrate versatility: Standard decks applicable to glass slides, silicon substrates and microplates.
- High capacity: Competent for large-scale microarray production of batch of 48 or 136 slides, or 16 microplates.
- High speed: Precise X, Y spotting motion up to 300 mm/sec velocity and 3,000 mm/sec² acceleration.
- Highly efficient cleaning: Selectable combinations of sonication, active washing and vacuum drying.

Pneumatic Non-contact Microdispense™ technology: Ensures no direct contact with slide substrates for less contamination and higher sample utilization rates.

Application flexibility: Microdispense™ volumes adjustable from 10 nl to 50 µl.

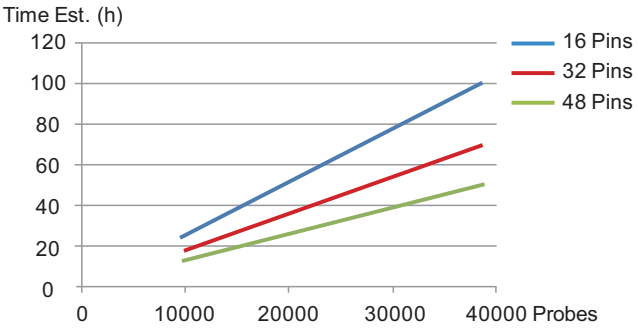
User-friendly software: Flexible array design tools and representative graphical previews of slides/plates/arrays/ samples

Controlled printing environment: HEPA filter, humidity control.

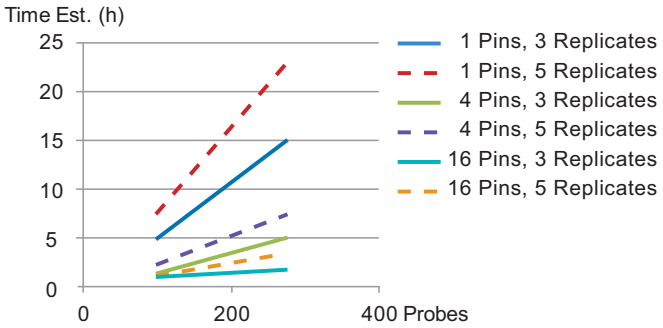
Productivity: How many slides can I print?

The CapitalBio SmartArrayer™ 136 can achieve precise X, Y motion velocity of 300 mm/sec and acceleration of 3,000 mm/sec². A capacity of 136 slides or 16 plates also contributes to productivity on the SmartArrayer™ 136. Efficient cleaning sequences can also minimize the time between different sample runs. All these factors add up to confer a competitive microarray productivity to CapitalBio SmartArrayer™ spotters.

Time Estimates of High Density Microarray Spotting (100 Slides)



Time Estimates of Dx Microarray Spotting (100 Slides)



The CapitalBio SmartArrayer™ 136 can print up to 200 high content microarray slides with 30,000 + spots per week, or up to 200 diagnostic microarray slides with 300 assays in a day.

Spot Density: How many spots can I put on a microarray slide?

The actual spot density is influenced by many factors, including the repeatability of the spotter, the surface properties of the substrates and the properties of the sample*. It is better to consider the average spot density and the maximum spot number per slide under quality control restraints (See the table below).

The repeatability of CapitalBio SmartArrayer™ 48 and 136 can be as high as ±3μm. Together with the proper manufacturing environment, substrates and sample buffer, the spot density can be well balanced with the slide pass rate.

*Contact CapitalBio Corporation for professional advice on the choice of printing substrates and pins.

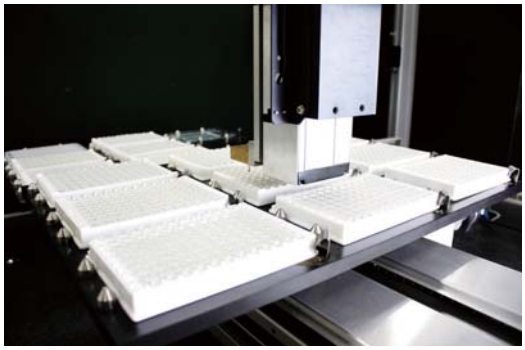
Spot Diameter [1](μm)	Spot Distance[2]	Spot Density per mm[2]	Max # of Spots[3]	Avg. # of Misplaced Spots per Slide	Pass Rate[4]
62.5	125	64	91,520	0.052468704	94.75%
62.5	135	55	78,464	0.000154823	99.98%
85	145	48	68,014	0.038992794	96.10%
85	155	42	59,521	0.000117446	99.99%
100	160	39	55,859	0.032024355	96.80%
100	170	35	49,481	9.76346E-05	99.99%

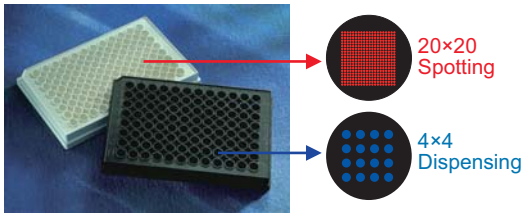
1. The spot diameter is largely determined by the size of the pins.
2. More stringent quality control can be imposed to increase the pass rate of spotted slides by increasing the spot to spot distance,avoiding overlapping spots and other misplacement events.
3. On a printable area of 22 × 65 mm per slide.
4. The pass rate is a calculated estimate which indicates the percentage of the slides without a single defective spot due to misplacement.

The above table shows that CapitalBio SmartArrayer™ spotters are capable of commercial microarray spotting uses. The likelihood of one defective slide, with one or more defective spots per 100 slides is lower than 1% when the maximum number of spots per slide is more than 59,000.

Substrates: What kinds of substrates can I use for microarraying?

CapitalBio SmartArrayer™ 136 spotter provides you with options for a 136-slide deck or a 16-plate deck. CapitalBio can also customize your spotter to print onto membranes.





The how & why of microarraying in 96-well plates?

Microplates can be used for many multiplex assays and fit well with automated liquid handling.

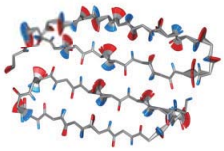
For 96-well plate arrays, a maximum of 12 pins (6 × 2 configuration) or microdispenser (1 × 1 configuration) can be used on the new, plate-ready SmartArrayers. The printable areas for the pins and the microdispenser differ because of their different specifications, and the number of printable spots also differ. Within a 96-well plate well the maximum for pin spotting is 400 spots with 150 μm of center to center spot distance; while for dispensing, the maximum is 16 spots with 1000 μm of center to center spot distance.

Content: What can I put on a slide microarray?

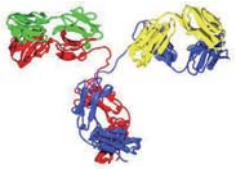
CapitalBio SmartArrayer™ spotters provide you with the options for contact spotting or non-contact dispensing. This enables you to dispose nucleic acid probes, peptide fragments, protein complexes, or even cells with different dimensions.

Oligonucleotides,cDNAs

Peptides

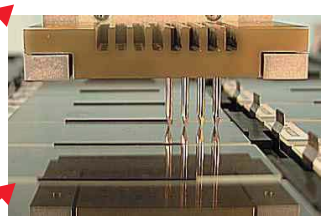


Antibodies

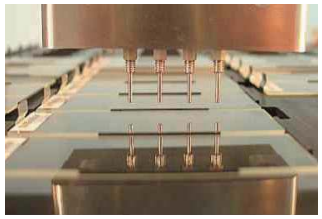


Cells

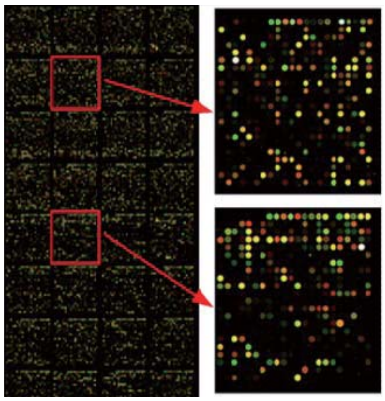
100 pl
500 pl
1 nl
10 nl
100 nl
1 µl
10 µl
50 µl
100 µl



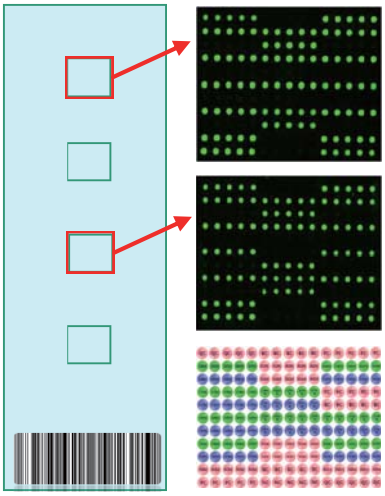
Contact spotting on slides



Non-contact dispensing on slides

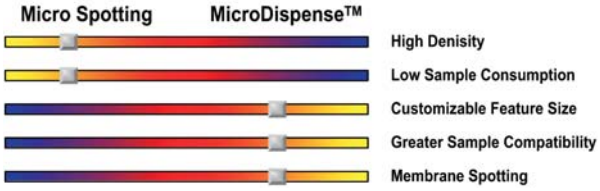


Contact spotted arrays



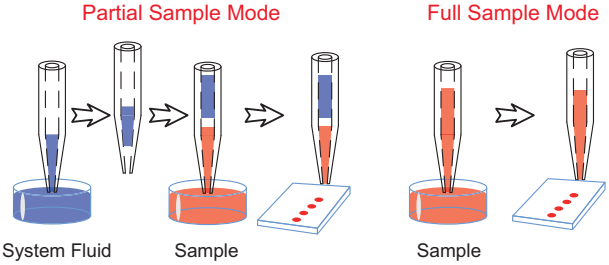
Dispensed arrays

Hints: how to select between spotting and dispensing module



Choose full or partial dispenser uptake to conserve precious samples

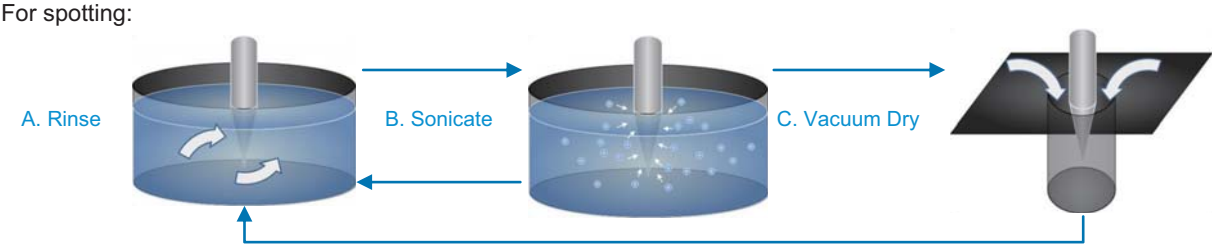
Mode	Partial Sample	Full Sample
Uptake sequence	System liquid-Air-Sample	Sample only
Sample uptake	>3 µl	>35 µl
Sample reutilization	No	Yes
Maximum spots per uptake	>150	>5000



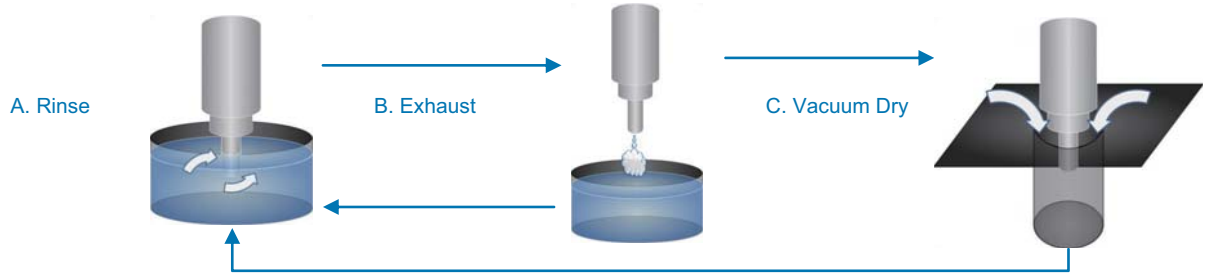
Flexible Wash Combinations: How can I reduce residual contamination of the pins and dispensers?

Create, save and load your own combinations of cleaning steps and choose the number of repeated cleaning cycles.

For spotting:

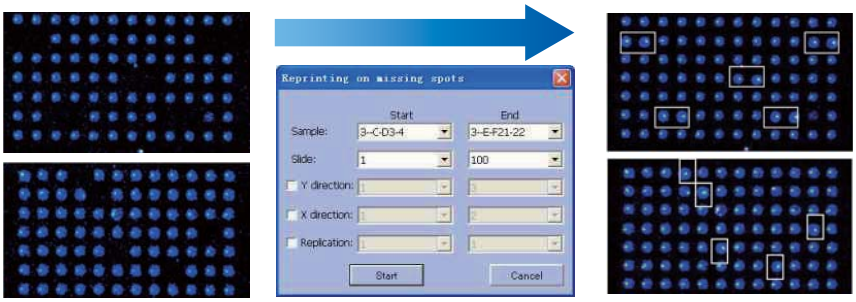


For dispensing:



Reprinting on Spotted Microarray Slides: How can I salvage accidentally missing spots?

*In commercial production, the spotted microarray is immediately inspected after each batch. Sometimes, one or more spots are missing. In this situation, the REPRINTING function can be used to fill in the missing spots, on just some of slides, or on many slides. It is easy to setup a REPRINT program using SmartArrayer software.



Effective Environment Control: Where can I print my microarrays?

The enclosure together with the inbuilt humidifier, sensor, circulation fan and HEPA filter provide an isolated, stable and controlled surrounding fully compliant with GMP and GLP directives*.The humidifying unit and HEPA filter help to improve the fabrication quality of the microarrays.

*Despite these environmental aids, the SmartArrayers must be placed in a clean work space for high quality microarray manufacture.

Humidifier

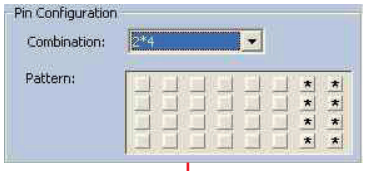
Fan

HEPA Filter

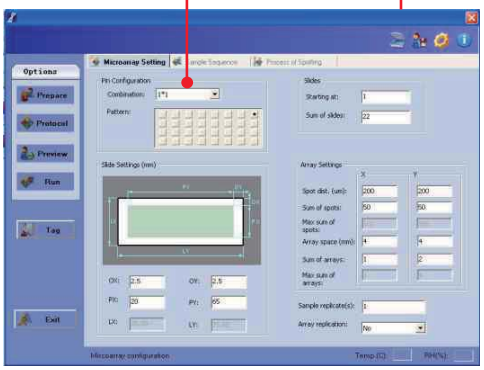
Sensor

Compact Application Software: Mouse click control

User Management with different privilege configurations provides effective data security and operational security

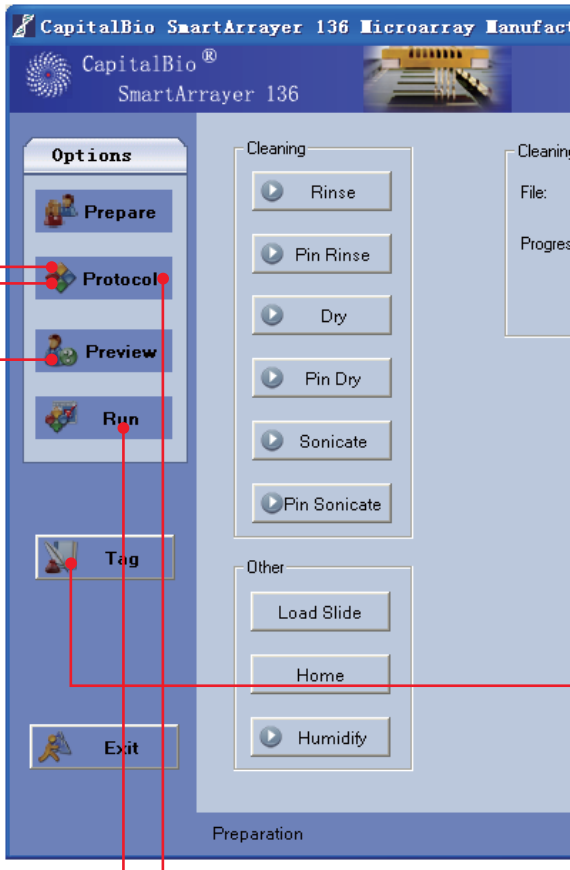


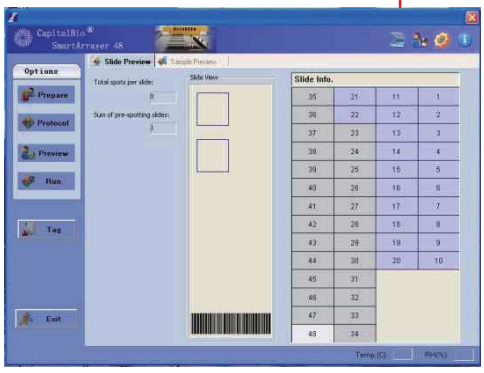
Spot with from 1 to 48 (4 × 12) pins simultaneously according to your throughput requirements



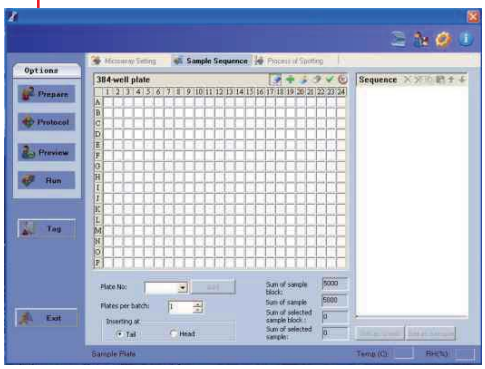
Quickly define slide dimensions and plan a spotting sequence

Start Screen: Provides both direct control and wizard access

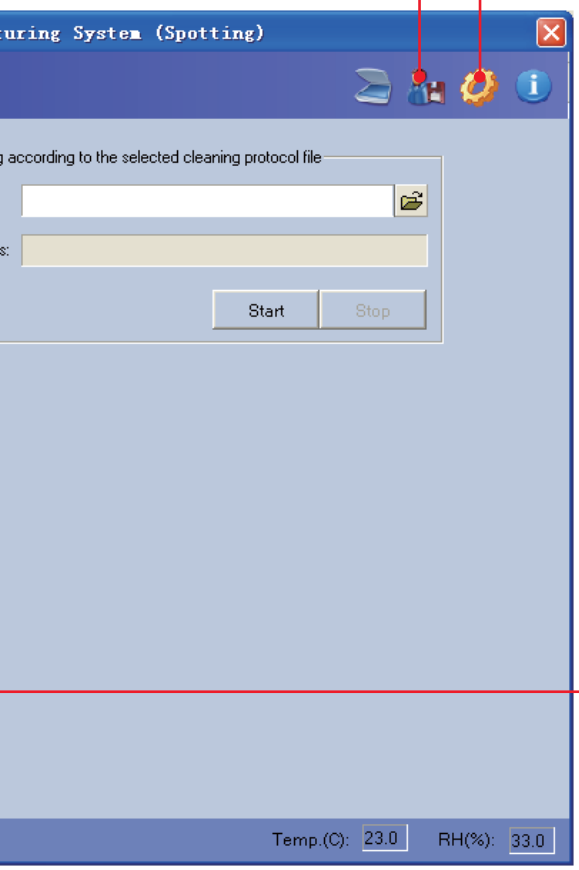


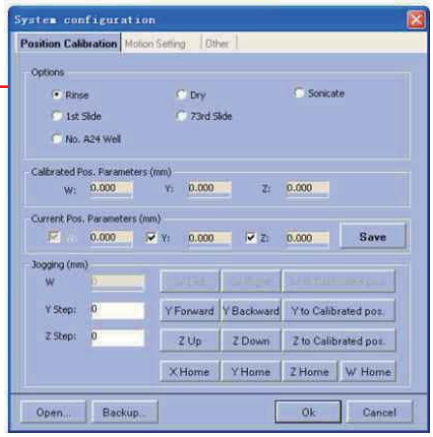


Use the preview screen to check the microarray layout design before actual printing

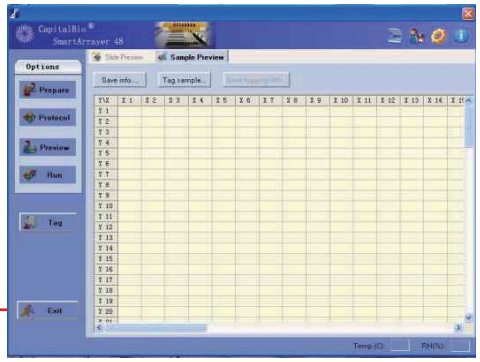


Define the sample sources compatible with 96– or 384–well plate and set up reprogrammable sequences for taking samples

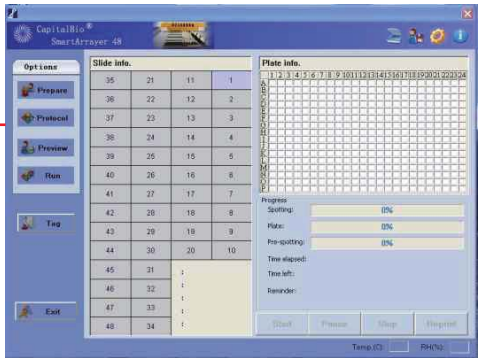




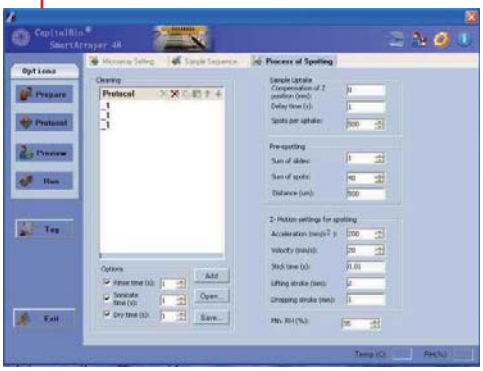
Access configurations to fully control and finesse the instruments and apply selectable options



Sample annotation provides tracking history for subsequent analysis of biological samples



Multiple views depict run time information, allowing you to identify possible accidents as early as possible



Define the sequence and duration of rinse, sonication and vacuum steps to create effective cleaning procedures

Specifications

	SmartArrayer™ 48		SmartArrayer™ 136	
	Contact Printing	Non-contact Dispensing	Contact Printing	Non-contact Dispensing
Capacity	48 slides		136 slides / 16 96-well plates	
Motion Repeatability	±3 μm			
Positioning Resolution	1.2 μm (X and Y axis); 0.6 μm (Z axis)		1.2 μm (X, Y and W axis); 0.6 μm (Z axis)	
Number of Pins	1, 2, 4 (8, 16, 32, 48, optional)	1 (2, 4, optional)	4 (8, 16, 32, 48, optional)	1 (2, 4, optional)
Single Round Completion Time (including pinhead wash)	< 90 s	< 100 s	< 140 s	< 160 s
Minimum Sample Delivery Volume*	0.5 nl	10 nl	0.5 nl	10 nl
Minimum Sample Loading Volume*	0.25 μl	3 μl	0.25 μl	3 μl
Spot Diameter	≥62.5 μm	~ 400 μm	≥62.5 μm	~ 400 μm
Voltage	AC 110 V/AC 220 V			
Power	1,100 Watts	1,100 + 400 Watts	1,500 Watts	1,500 + 400 Watts

* Subject to the type of contact pin or non-contact dispenser used.

Ordering Information

Cat. No.	Product Name	Product Description
110010	CapitalBio SmartArrayer™ 48 Microarray Dual Spotter	Dual systems for contact spotting and non-contact dispensing on slides
110020	CapitalBio SmartArrayer™ 48 Microarray Contact Spotter	Contact spotting on slides
110030	CapitalBio SmartArrayer™ 48 Microarray Dispense Spotter	Non-contact dispensing on slides
110040	CapitalBio SmartArrayer™ 136 Microarray Dual Spotter	Dual systems for contact spotting and non-contact dispensing on slides
110050	CapitalBio SmartArrayer™ 136 Microarray Contact Spotter	Contact spotting on slides
110060	CapitalBio SmartArrayer™ 136 Microarray Dispense Spotter	Non-contact dispensing on slides
110041	CapitalBio SmartArrayer™ 136 Microplate Dual Spotter	Dual systems for contact spotting and non-contact dispensing on 96-well microplates
110051	CapitalBio SmartArrayer™ 136 Microplate Contact Spotter	Contact spotting on 96-well microplates
110061	CapitalBio SmartArrayer™ 136 Microplate Dispense Spotter	Non-contact dispensing on 96-well microplates
440010	CapitalBio DNA Spotting Buffer	5/25 ml Package
440015	CapitalBio Protein Spotting Buffer A	5 ml Package
440016	CapitalBio Protein Spotting Buffer B	5 ml Package

We recommend OPAminoSlide™, OPAldehydeSlide™, OPEpoxySlide™, PolymerSlide™ G, PolymerSlide™ A, PolymerSlide™ D as substrates for microarray printing. Please contact CapitalBio to learn more about them.

201009

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