AssayMark™
Programmable Assay System

The AssayMark™ Programmable Assay System is the next generation platform that empowers life-scientists with maximum flexibility to configure assays without the need for time-consuming fabrication of specialized Lab-on-a-Chip (LoC) designs. Developing new microfluidic assays or scaling existing assays to microfluidic scale represents a significant challenge for life scientists in terms of cost, time and expertise required. The AssayMark System is designed with the life scientists in mind to accelerate this process from months of trial-and-error to mere days. The system provides scientists with a flexible platform to develop new assays by programming them using the AssayMark Aqua™ Software, plugging a Programmable Lab on a Chip, pipetting in the reagents and letting the controller run the assay. The chip is intentionally decoupled from the system to allow the scientist to utilize their preferred optical detection method thereby enabling scientists to focus on the assay, not on the chip. The programmable chips can include integrated sensors for added functionality. The applications for Microfluidic Innovations systems are wide-ranging, including genomics, proteomics, immunoassays, molecular detection, chemical synthesis, cell-based assays and basic biochemistry.

System Overview

The AssayMark System includes a patent-pending runtime system, instruction sequencing table, contamination control, variable volume mixing and automatic fluidic management for programmable microfluidic devices. These patents are integrated with a powerful high-level language that empowers life scientists to write a few simple lines of code that result in complex processes.

The AssayMark solution offers superior performance and flexibility for lab use in pharmaceutical, contract research organizations and research institutions – all while providing industry-leading investment protection through continuing innovations in software.

Key Benefits

The AssayMark System provides superior service integration and agility. Designed for multiple uses, the modular architecture of this platform enables you to evolve and adapt to your growing assay needs. The system requires lower sample and reagent volumes and results in higher sensitivity and specificity for the assays.

Benefits	Description
Fully automated control	• Mitigates need for manual processes
Powerful software language	• Eliminates need for custom hardware assays • Significant shorter test cycles
Programmable LoCs	• Multilayered, highly integrated microfluidic device • Eliminates time-consuming, design and fabrication cycles • Multi-layered, highly integrated microfluidic device • Available in plastic (PMMA) and PDMS • Channel sizes of 300 μm width x 20 μm depth • 8 input/output reservoirs • 3 on-chip peristaltic pumps • Mixer, incubator and optical sensing window • Fits into plug and play manifold • Versions with fluid sensors and heating element
Multiuse controller	• Provides platform for disparate assays
Investment protection	• Additional capability is distributed through software upgrades

Platform Architecture and Modularity

The AssayMark System is architecture to meet the testing demands of today's labs with design flexibility for future applications. The modular architecture is designed to support additional testing capabilities as new drug target emerge.

Architectural Features	Benefit
Multipurpose controller	• Controls up to 36 microfluidic valves • Reduces contamination, dead volume and external pump costs • Configure sets of 3 valves as on-chip peristaltic pumps • Simple plug-in manifolds connects to controller • Supports five voltage sensors (0-5V) • PMW voltage control for heating • Software-intensive with ease of upgrades
Powerful software language	• Eliminates need for time-consuming, expensive design and fabrication cycles • Easy to use programming script language • Automatic volume management support • Contamination mitigation support • Uses the Microfluidic Innovations Instruction Set (MIST) • Automatic execution with real-time monitoring • Debug mode allows assay pause, resume and manual step advance • Speed and flow rate control • Failsafe runtime will automatically disconnect pumps and heaters on failure • Manual mode allows individual valve, pump and sensor control • Manual authoring tool allows quick programming for short protocols
Ease of use	• Using USB thumb drive • Direct connection from s personal computer via USB cable

AssayMark System Specifications*

AssayMark Controller	
Dimensions (W x L x H)	32cm x 32cm x 21cm (12.5” x 12.5” x 8”)
Weight	10 kg
USB connections	2
Power	110V
Temperature range	0 to 100C
Relative humidity	90-100%
Pneumatic inputs	Pressure 35 kPa–130 kPa; Vacuum -50kPa–-80 kPa
Pneumatic outputs	36 pressure/vacuum
Digital inputs	5
Digital input range/resolution	0-5V, 11-bits
Temperature control	0-100^{o}C PWM
National Instruments® compatible Digital I/O	Yes

AssayMark Programmable Lab on a Chip	
Dimensions (W x L x H)	76mm x 50mm x 4 mm (3” x 2” x 1/8””)
Chip technology	PMMA and PDMS
Storage temperature range	4^{o}C – 60^{o}C
Peristaltic pumps	2 flow, 1 mixing
Vacuum pumps	2
Main channels	1, 300um x 20um
Valves	20
Mixers	1 – 100nL
Incubator/ reaction region	1 – 500nL
Fluid input/output ports	8 – 2uL
Resistivity sensors	4
Temperature control	Room temperature to 60^{o}C
Automatic degassing	Yes
Metering resolution	12 nL
Optical transparency	UV-Vis
Flow rate	15 nL/s
Electrochemical detection	3-electrode configuration (external potentiostat, detection required)

Ordering Information

Product	Product Description
AM1000-PD50	Includes AssayMark Controller, manifold and 50 PDMS Programmable LoCs
AM1000-PM50	Includes AssayMark Controller, manifold and 50 PMMA Programmable LoCs
PD50	50 PDMS Programmable LoCs
PM50	50 PMMA Programmable LoCs
PM50S	50 PMMA Chips with electronic sensors

For more information about the AssayMark System, visit www.microfluidicinnovations.com or contact the Company at sales@microfluidicinnovations.com.

**Subject to change without notice.*