



Technical Note

Microfluidic Hydrodynamic Focusing Set-up

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Cellix's microfluidic hydrodynamic focusing set-up combines the patented, precision, microfluidic ExiGo pump together with UniGo/4U pump resulting in a cost-effective solution for hydrodynamic focusing.

The ExiGo pump includes a high-resolution stepper motor drive mechanism and patented pulse damping method; while the UniGo/4U pump component is based on high speed air injection. Combining these pumps with active feedback controlled via flow sensors results in accurate and stable flow rates. The set-up may be controlled via an iPad mini or LabVIEW-based software.

SmartFlo application executed on the iPad mini communicates with up to 4 ExiGo microfluidic pumps racked together allowing simultaneous control and independent programming of each pump's flow profile.

Additionally, the LabVIEW-based software is available to control ExiGo and UniGo/4U pumps via RS-232 communication.



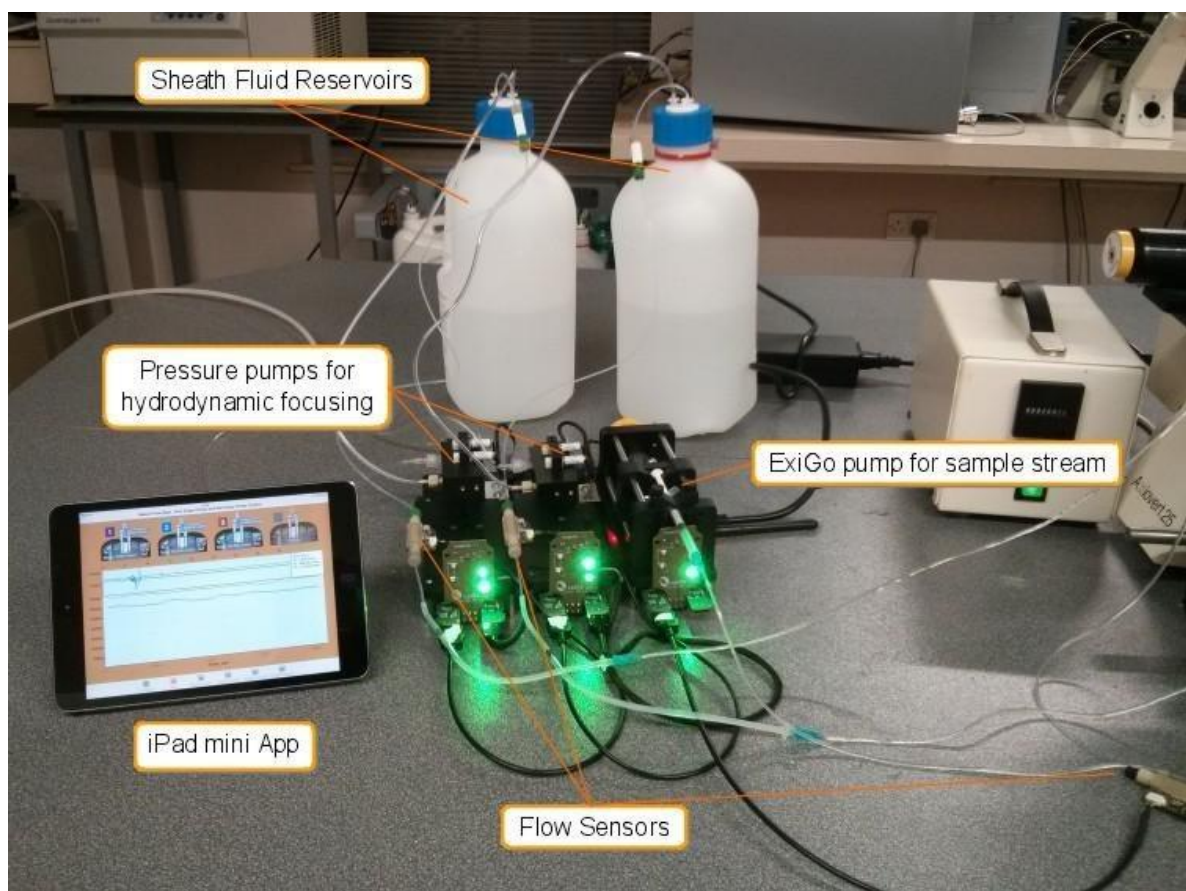
UniGo microfluidic pump: up to 4 pumps may be controlled independently via Apple iPad mini or LabVIEW



UniGo and ExiGo microfluidic pumps docked together: up to 4 pumps (interchangeable) may be controlled independently via Apple iPad mini or LabVIEW

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IMPORTANT: Please note that hot-plugging UniGo/ExiGo pumps is extremely damaging to the equipment. This means any installation or removal of pumps to a set-up must be done when the system is off. Removing the pumps while the system is running can cause electrostatic discharge which can severely damage the electrical components of the pump including the PCB and will likely result in your pump requiring repair at Cellix. When docking or un-docking two pumps together the system must be off, and the residual electrostatic discharge cleared by pressing the power button in one short movement. Only then can pumps be docked. If you are buying a two or more UniGos/ExiGos, you must purchase a clamp base made of aluminium. This holds the pumps in place and reduces risk of damage to electrical components by ensuring they do not separate.



Overview of a microfluidic hydrodynamic focusing set-up with control via iPad mini

Performance and Technical Specifications:

Performance specifications	
General specifications (for both ExiGo and UniGo/4U pumps)	2 modes of pumping: manual flow rate set or pre-programmed flow rate operation
	Pre-programmed mode includes: constant, ramp, step, sine functions
	Wi-Fi communication with iPad mini software
	USB communication with LabVIEW based PC control software
	Tactile power switch
	LEDs for power / status information

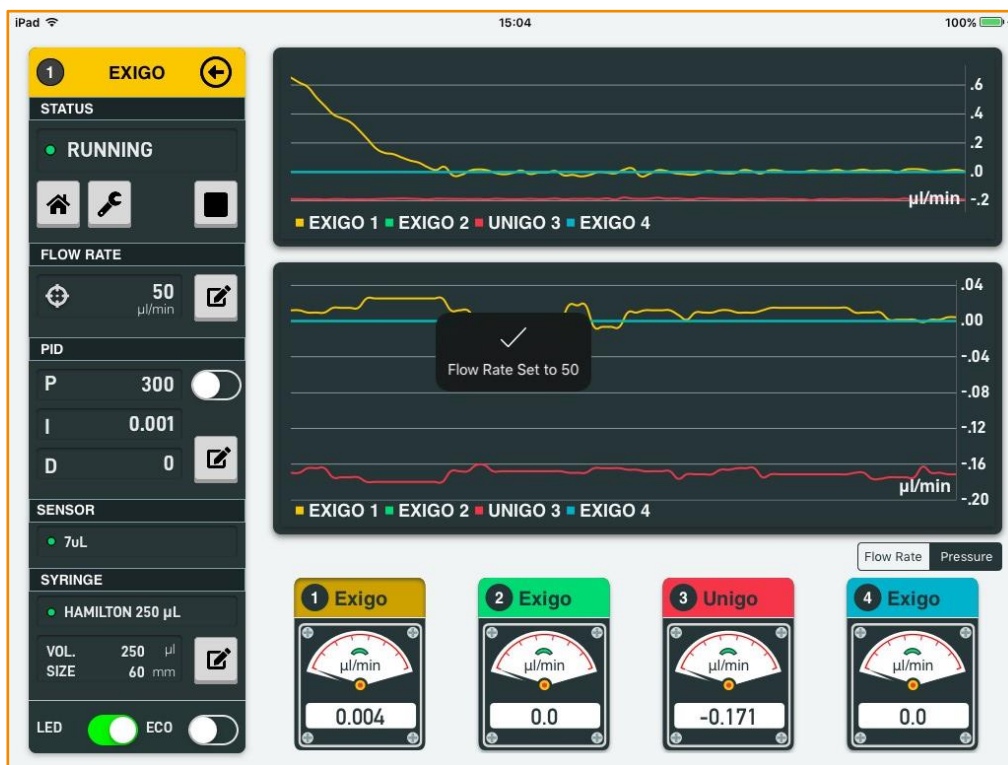
	ExiGo	UniGo/4U
Volumetric flow rates	0.0725 μ L/min–20 mL/min	50 μ L/min–5 mL/min
Flow direction	Reversible – push/pull	Unidirectional (push)
Flow rate stability for microfluidic applications*	\pm 0.4% of full scale @ 1 mL syringe and 50 μ L/min flow sensor	\pm 0.4% of full scale using 1000 μ L/min flow sensor
Dynamic response	50 ms max (recorded at flow rate change from 0 to 10,000 nL/min)	To be evaluated, depends on fluidic resistance
Compatible syringes**	0.5 μ L–1 μ L (glass syringes); 1 mL–5 mL (plastic syringes)	Not applicable
Working pressure	30 psi–2 bars maximum	Up to 145 psi or 10 bars
External trigger	2 inputs and 2 outputs of external trigger for operation with external units and software	
Pulse-free flow rate for microfluidic applications*	10 nL/min–1 mL/min \pm 20 nL/min @ 250 μ L glass syringe 100 nL/min–20 mL/min \pm 40 nL/min @ 5 mL plastic syringe	

Technical specifications	
Software control	SmartFlow app running on iPad mini
	LabVIEW based PC software
Dimensions	225 mm (L) x 69 mm (W) x 122 mm (H)
Weight	~1.3 kg
Power requirements	110 / 220 V – 50 / 60 Hz – 60 W

Technical specifications of flow sensors		
Operation	Plug and play connection to the ExiGo microfluidic pump	
Features	Allows monitoring of ExiGo and UniGo/4U pump flow rates and active PID (proportional, integral, differential) feedback of pump flow rate	
Dimension	60 mm (L) x 51 mm (W) x 21 mm (H)	
Weight	<0.1 kg	
Power requirements	Via cable to ExiGo microfluidic pump	
	ExiGo	UniGo/4U
Dead volume	<10 μ L	<100 μ L
Measured flow rate ranges	\pm 50 μ L/min	\pm 1000 μ L/min
Max pressure	30 psi–2 bars maximum	30 psi–2 bars maximum

* Measured with flow sensor and active PID feedback.

** Only applicable to ExiGo pumps.



SmartFlo app running three ExiGo and a UniGo microfluidic pumps on an iPad mini