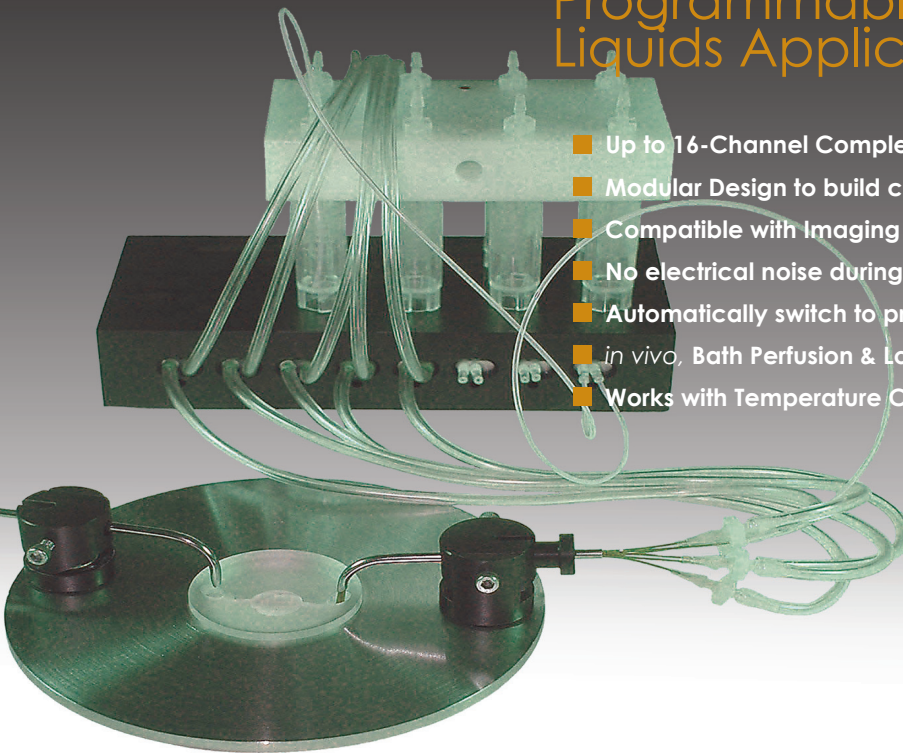


Perfusion Systems

Programmable Systems for Liquids Application & Switching



- Up to 16-Channel Complete Systems with programmable timers
- Modular Design to build custom configurations
- Compatible with Imaging & Data Acquisition systems
- No electrical noise during switching
- Automatically switch to preset solutions for easy manual operation
- *in vivo*, Bath Perfusion & Local Application
- Works with Temperature Controlled Systems

Multi-Channel	16 Independent Channels
Controls	Manual
	Wireless Remote Control
	TTL Signals (+5V)
	Binary Encoding
	Analog Input
AUTO Memory	Automatically switches to preset channels for uninterrupted perfusion using programmable timers
SET Outputs	For channel monitoring or automatic outflow control
INHIBIT Mode	Manual and external (+5V) to switch solutions OFF at once
RS232/USB	RS232/USB port for software control

- **Number of channels:** up to 16 channels;
- **Remote control:** wireless
- **Manifolds:** 8-channel, can be reduced down to 1-channel
- **Height:** up to 3ft. adjustable, for gravity driven solution flow
- **Solution cylinders:** 60ml syringes
- **Pressure cylinders:** 10ml x8, 50ml x8
- **Gas adapter/Pressure manifold:** to saturate solutions with gas mixture, or pressurize solutions
- Pressurized **Small volume delivery system:** 8-channel, PTFE connecting tubing 2ft. per channel
- **Tubing:** 100ft. polyethylene tubing, fits valves and perfusion manifold directly; 50ft. Tygon tubing, fits provided barbed luer-locks to connect to syringes
- **Fitting:** barbed luer-locks and ferrule-type to connect to solution cylinders and between Tygon & polyethylene tubing
- **Anti-vibration mounting:**
 - a. 1x1 ft. stand,
 - b. magnetic stand,
 - c. M8 threaded surfaces
- **Digital control, optically isolated:** x16 inputs through BNC connectors; x8 through DB-9 connector; CODE mode to control 16 channels through 4 digital inputs (binary encoding)
- **Analog input:** from 0 to 9V - controls 16 channels;
- **SET output:** to switch outflow/suction unit;
- **Programmable Timers:** for precise manual control and to generate sequences up to 16 steps (continuous loops are also possible)
- **Software control:** through RS232 input, or USB adapter

Valve Controller with 0-15PSI pressure output, Programmable



PC-16 valve controller is included with every 8- or 16-channel perfusion systems. Ships with wireless remote control. Modifications for N. O. valves are also available. Can be used with any custom solenoids or even motors. Can be programmed to deliver up to 16 step sequences (up to 32 steps, if automatic wash between solution applications is used). Compatible with data acquisition and imaging systems: LabView, MatLab, pClamp, IPlab, PatchMaster, Metamorph, MetaFluor and others.

AUTO Memory

To program individual channel timers and sequences. Allows to switch “wash” solution automatically between channels in sequence.

CODE Mode

The controller has an options for valves control by channel encoding using only 2-4 digital inputs, in case if a limited number of digital outputs is available in your system.

Analog Input

You can also use analog signal input to switch the channels by changing the voltage (0.5V increment).

USB/RS232 Input

The RS232 port allows automation of solution switching and integration with imaging systems.

SET Out 5V TTL output to switch outflow automatically.

INHIBIT Mode

Inhibit mode, input and output.

DIMENSIONS

Size: 5 x 12 x 9in. Includes 120/220VAC internal power supply.

OUTPUT

12V (4A max/channel, 10A total); other outputs for custom devices are available on request;

0-15PSI pressure output (for PC-16P model only)

power supply: 100/240VAC

Item#: PC-16



Pinch Valves

In the pinch valve a soft 1/8in. I.D. tubing is pinched closed by the valve, and opens when the channel is ON. The results are simple tubing replacement and easy system cleanup after experiments. Recommended for strong solvents and reagents, and for hard to wash/clean solutions. Includes shielded connecting cable. The system comes with a manifold that fits to perfusion chambers for cultured cells/tissue slices, petri dish and oocytes. Includes easy disconnect fitting for tubing and syringes. Since valves are inside the metal box and are connected to the controller through shielded cables, there is no electrical noise during switching.

Item#: PS-V8

Complete 8-Channel Pinch Valves Perfusion System, PS-8H

Designed for animal physiology and cell research applications. The valves are mounted inside a metal box to shield your system from electrical noise. The system comes with manifold that fits to perfusion chambers for cultured cells/tissue slices, petri dish and oocytes. Includes soft Tygon, polyethylene tubing and fitting to connect to pinch tubing. Includes 60ml syringes/reservoirs. Includes easy disconnect luer fitting for tubing and included syringes. Comes with gas adapter to saturate solutions with gas mixtures, CO₂ and O₂ for example, or to pressurize optional PC-10/50 cylinders. Compatible with data acquisition and imaging systems. Since valves are inside the metal box and are connected to the controller through

shielded cables, there is no electrical noise during switching.

The included unique flexible stand provides vibration-free operation and includes both a stand and a small magnetic base. The magnetic base does not take a lot of space from your set-up, but allows to position perfusion solutions near your sample. The post consists of 0.5 in. O.D., 1 foot long aluminum parts and can be extended to 3 feet high. An 1.5 in. flowerette head screw will fix the syringes on the post, making a traditional syringe holder. Comes with 60ml syringes, stop-cocks, and fitting. The holder can be also mounted on threaded M8 surfaces. **Item# PS-8H**

Complete 16-Channel Pinch Valves Perfusion System, PS-16H

To form a 16-channel setup, this system includes two sets of the above parts, included with the 8-channel system, which can be operated by the same 16-channel controller.. **Item#: PS-16H**

Perfusion systems and Valve Controllers

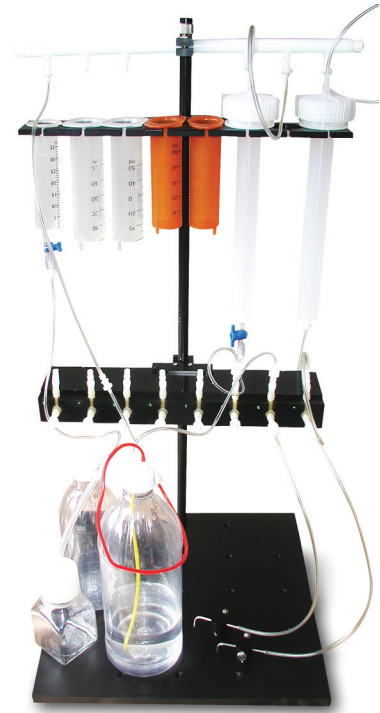
Catalog No.	Description	Price
PS-V8	Pinch Valves, Shielded, Box of 8, for use with PC-16 controller	\$845
PS-V8S	Solenoid valves, set of 8, mounted inside an aluminum box	\$195
PS-8SE	Economy 8-Channel Perfusion System. Includes programmable 16-channel controller and solenoid valves (without SH-1A syringe holder, manifold, tubing and fitting).	\$1,995
PS-8S	Complete 8-Channel Perfusion System. Includes programmable 16-channel controller, solenoid valves, SH-1A syringe holder, manifold, tubing and fitting.	\$2,695
PS-16S	Complete 16-Channel Perfusion System. Includes programmable 16-channel controller, solenoid valves, SH-1A syringe holders, manifold, tubing and fitting.	\$3,395
PC-16	16-Channel Valve Controller, programmable	\$1,895
PC-16P	16-Channel Valve Controller with 15PSI pump, programmable	\$2,995

Pinch Valve Perfusion Systems

Catalog No.	Description	Price
PS-8H	Complete 8-Channel Pinch Valve Perfusion System with controller, Syringe Holder on Magnetic Base	\$2,995
PS-16H	Complete 16-Channel Pinch Valves Perfusion System. Includes programmable 16-channel controller, pinch valves, SH-1A syringe holders, manifold, tubing and fitting.	\$4,395

Accessories

Catalog No.	Description	Price
DB9-C	Connecting Cable for PC-16 controller and valves	\$95
CFPS-USB	Adapter USB to RS232	\$95
DB9-IMG	Connecting Cable from PC-16 controller to Imaging Systems	\$195



Solenoid Valves

Complete 8-Channel Pinch Valves Perfusion System, PS-8S

Designed for animal physiology and cell research applications. Easy to use solenoid valves with luer fitting. Wide orifices will maintain high flow rates. The system comes with manifold that fits to perfusion chambers for cultured cells/tissue slices, Petri dish and oocytes. Includes soft Tygon, polyethylene tubing and fitting to connect to pinch tubing. Includes 60ml syringes/reservoirs. Includes easy disconnect luer fitting for tubing and included syringes. Compatible with data acquisition and imaging systems.

The included unique flexible stand provides vibration-free operation and includes both a stand and a small magnetic base. The magnetic base does not take a lot of space from your set-up, but allows to position perfusion solutions near your sample. The post consists of 0.5 in. O.D., 1 foot long aluminum parts and can be extended to 3 feet high. An 1.5 in. flowerette head screw will fix the syringes on the post, making a traditional syringe holder. Comes with 60ml syringes, stop-cocks, and fitting. The holder can be also mounted on threaded M8 surfaces.. **Item#: PS-8S**

Complete 16-Channel Pinch Valves Perfusion System, PS-16S

To form a 16-channel setup, this system includes two sets of the above parts, included with the 8-channel system, which can be operated by the same 16-channel controller. **Item#: PS-16S**

- wireless remote control; manual control, digital or TTL signals generated by a computer or other equipment
- analog signal control
- RS232 port (or USB connection) for software control
- **Manifold:** 8-channel, each can be reduced down to 1-channel
- **Height:** up to 3ft. adjustable, for gravity driven solution flow
- **Solution cylinders:** 60ml x16
- **Tubing:** 100ft. polyethylene tubing, fits valves and perfusion manifold directly; 50ft. Tygon tubing, fits provided barbed luer-locks
- **Fitting:** barbed luer-locks and ferrule-type to connect to solution cylinders and between Tygon & polyethylene tubing
- **Anti-vibration mounting:**
 - a. 1x1 ft. stand,
 - b. magnetic stand,
 - c. M8 threaded surfaces

Accessories

Adapter USB to RS232 Allows you to connect through a computer USB port. Creates a virtual RS232 (COMn) port, so that you can program the controller using your standard software. **Item#: CFPS-USB**

Cable to Connect Perfusion Systems to Imaging Systems A custom cable to fit your imaging system. Used with imaging software to control perfusion systems for automatic liquid handling and test solution applications. Specify imaging package used or define required connectors. **Item#: DB9-IMG**

Digital Pressure Controllers - pumps, with RS232 port

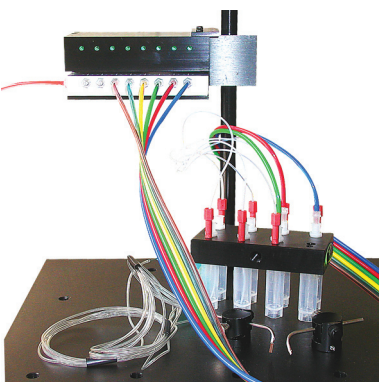
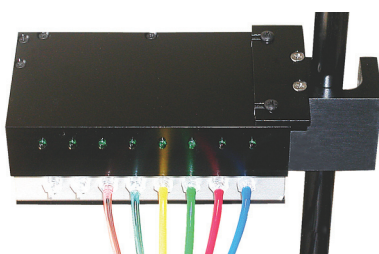
For use with small volume delivery systems, pressure cylinders and solution switches. Generates pressure up to 15PSI (does not require an external source of pressure). The controller regulates output pressure (0.5mmHg stability) to provide defined smooth solution flow through sample chambers, microfluidics chips for example. Prevents flow blockage by bubbles inside solutions. Simple to use. This is an advanced alternative to syringe pumps (easy solution refill and unlimited volume). **PC-R15/10 model provides a source of pressure for smooth flow control in sensitive fluidics devices with 0.5mmHg stability, and RS232 port to monitor and SET pressure. Item#: PC-R15/10**

- **Output:** max pressure 7.5 / 15 PSI (385 / 775 mm Hg)
- **Stability:** 0.5mm Hg
- **Connectors:** Easy-connect, 1/8in. O.D. tubing
- **Indicators:** PRESSURE digital display
- **Controls:** START/STOP, output CLOSE/OPEN, touch screen SET pressure output
- **Dimensions:** 6 x 13 x 9in.
- **Power:** internal 100/240VAC power supply



Pressure regulator For use with small volume delivery SVDS1 and pressure cylinders PC. Connects to a cylinder with a compressed gas mixture (max. input 300PSI). The controller regulates output pressure to provide consistent defined solution flow through sample chambers and microfluidics chips (prevents flow blockage by bubbles inside solutions for example). Simple to use. **Item#: PC-100-25**

- **Input:** max 300PSI
- **Output:** max 30PSI
- **Connectors:** Easy-connect, 5/32in. (4mm) O.D. tubing
- **Indicators:** PRESSURE digital indicator, output LOW, output CLOSE
- **Controls:** INPUT PRESSURE regulator 0-100PSI, CLOSE manual switch,
- CLOSE TTL input (+5V to start), OUTPUT PRESSURE settings, MANUAL dial to SET pressure, EXTERNAL input to SET pressure, MONITOR pressure - analog output
- **Dimensions:** 6 x 2.5 x 9in.
- **Power:** Includes external 120/230VAC power supply



8-Channel pressure switch, PS-V8P This small manifold can deliver pressure to eight independent outputs - channels. If connected to sealed containers, small volume manifolds or cylinders, the pressure switch can deliver solutions to any custom chamber or fluidics device (no syringe pump or gravity driven perfusion is required). Can be used with any volume containers, including transfer bottles. Can be also used with zero-dead volume manifolds to deliver solutions into small chambers and dishes. Requires a pressure pump and the valve controller. The controller can be programmed to deliver solution sequences and for continuous periodic solution replenishment. The switch is rated up to 150 PSI input pressure. It has a secondary threaded input port for the balance pressure to prevent back-flow. Dimensions: 5x2x2in. If purchased together with PC-16 valve controller, the switch will ship with free SVDS1 small volume manifold. **Item#: PS-V8P**

Programmable 8-Channel liquid delivery system, PS-8P In addition to 8-channel pressure switch PS-V8P, this setup includes 16-channel programmable valve controller PC-16P, with incorporated 0-15PSI pressure controller-pump, adjustable stand SH-1A, small volume manifolds SVDS1 and SVDS2, and sets of pressure cylinders PC-10 and PC-50 (x8 each), connecting tubing and fitting. Can deliver solutions to any custom chamber or fluidics device (no syringe pump or gravity driven perfusion is required). Can be also used with zero-dead volume manifolds to deliver solutions into small

chambers and dishes. **Item#: PS-8P**

Small Volume Delivery System SVDS2 For use with standard 15ml tubes from Sarstedt. This system utilizes eight small plastic tubes with conical bottom and 1/16in. O.D. PTFE tubing to connect to your setup for liquid delivery. Tubes with solutions are simply threaded into the holder. Solutions are easy to refill during the experiment. Requires pressurized gas to deliver the solutions. Can be used with miniature manifolds ZMM, perfusion systems, and pressure controllers. Solutions can be also withdrawn using controlled flow or vacuum systems. Can be used to collect samples by aspiration.

The system comes with all necessary tubing and fitting to connect to a single pressure source. The small size of 200x25x25mm (without tubes attached) allows to position solutions near your sample. Can be attached to a 1 ft. rod (included). Comes with X-block to attach onto a standard 0.5 in. stand. Includes replaceable plastic tubes 15ml, PTFE tubing, fitting and tubing to connect to a pressure source.

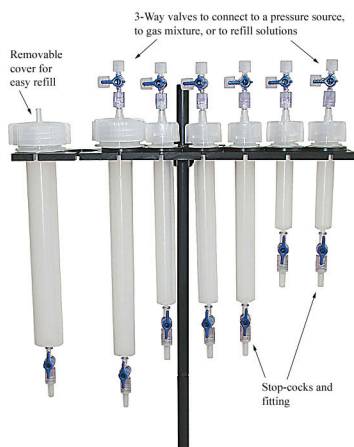
Provided fitting allows you to connect tubes directly to the valves of perfusion systems, and the output from valves directly to the manifolds or custom tubing and chambers. All our manifolds can be connected, including zero-dead volume, luer-lock, and miniature manifold for single cell perfusion. Shown on the picture, is SVDS2 system connected to the pinch valves of PS-8H setup. Output from SVDS2 then goes to ZMM manifold to provide liquid delivery and solution switching inside a Petri dish with PDI insert inside. The outflow is provided through a suction tubing of MTH-S holder. **Item#: SVDS2**

Small Volume Delivery System with pressure switch, SVDS2-P This is the same SVDS2 manifold for 15ml tubes with incorporated pressure switch, which is controlled by PC-16 controller. It allows you to connect tubes directly to the manifolds without using valves. Ideal for use with custom fluidics devices and zero-dead volume manifolds that do not have back-flow, although the system has an input port for the secondary balance pressure. The valve controller can be programmed using built-in timers to generate solution sequences. Requires pressurized gas to deliver the solutions.

The system comes with all necessary tubing and fitting to connect to a single pressure source. The small size allows to position solutions near your sample. Comes with X-block to attach onto a standard 0.5 in. stand. Includes replaceable plastic tubes x8 15ml, PTFE tubing, fitting and tubing to connect to a pressure source, and cable to connect to the valve controller. **Item#: SVDS2-P**

Cylinder to Pressurize/Oxygenate Solutions, Set of 8 A set of autoclavable cylinders to pressurize your solutions. Can be used to drive solutions through 100 micron tip of MM manifold, for example. Can be also used to saturate solutions with gases (bubbling) by feeding a thin tubing inside the cylinder. Comes with stop-cocks and fitting for 1/16 in. I.D. tubing. Includes a 1-way valves to connect to a pressure source, to release the pressure, to refill the cylinder, or to connect to a source of gas mixture (oxygenation, for example). Comes with threaded cover for easy refill. Material: polypropylene. Specify volume when ordering. Large 650ml volumes are available upon request. Cylinders with built-in 10, 25 or 40 micron filters are also available (specify when ordering). Volumes up to 100ml fit to our SH syringe holders. **Item#: PC**



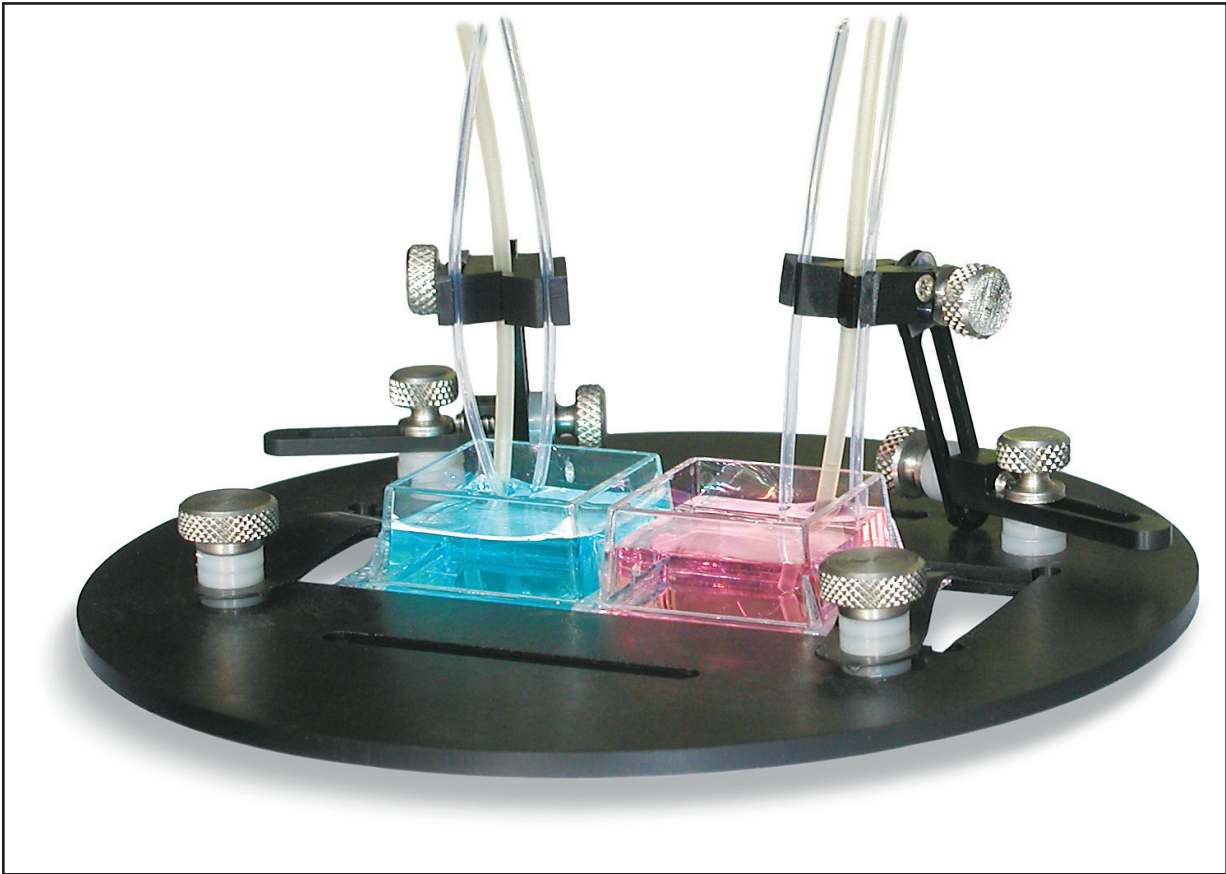


Gas Mixture Delivery Adapter - Pressure manifold

Adapter for syringe holders to connect to a gas source to saturate/bubble eight solutions during experiments (CO₂ saturation or oxygenation, or pressurizing the solution.) Comes with X-block to fit 0.5 in. posts. Includes 9 stop-cocks and plugs to close unused channels or the common inlet. It also comes with tubing and fitting to connect to output barbs and thin tubing to form bubbles inside the solutions. Can be used with stones, or any other diffuser, to bubble larger volumes. Can be also used to pressurize solutions by connecting to pressure cylinders PC. Can be connected to another adapter to use the same source of gas mixture/pressure.. **Item#: SH-A**

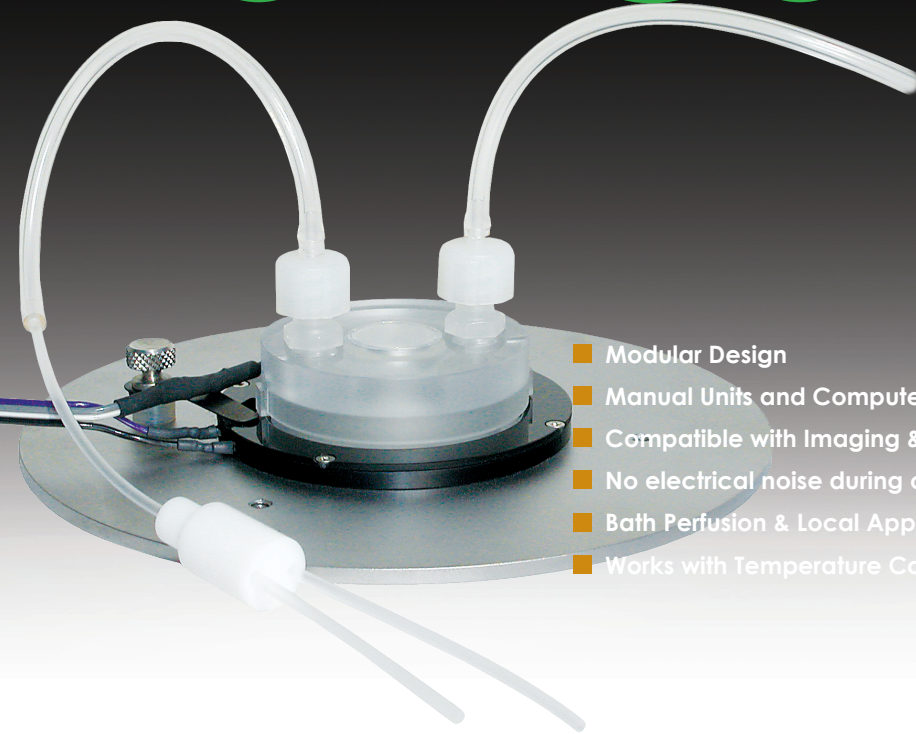
Pressure Controllers

Catalog No.	Description	Price
PC-R10	Pressure controller, adjustable up to 7.5PSI - 385 mm Hg - output.	\$2,995
PC-R15	Pressure controller, adjustable up to 15PSI - 775 mm Hg - output, unregulated vacuum	\$2,995
PC-100-25	Pressure regulator, adjustable up to 30PSI output	\$2,995
PS-V8P	8-Channel pressure manifold-switch	\$295
PS-8P	Programmable 8-channel liquid delivery system	\$3,595
SVDS2	Small Volume Perfusion System	\$195
SVDS2-P	Small Volume Perfusion System SVDS2 with pressure switch	\$495
PC-10	Cylinder to pressurize/oxygenate solutions, 10 ml, set of 8	\$195
PC-50	Cylinder to pressurize/oxygenate solutions, 50ml, set of 8	\$195
SH-A	Gas Mixture Delivery Adapter	\$195



Flow Control

Programmable pumps for Dosing and Liquid Delivery



- Modular Design
- Manual Units and Computerized Systems
- Compatible with Imaging & Data Acquisition systems
- No electrical noise during operation
- Bath Perfusion & Local Application
- Works with Temperature Controlled Systems

Precision Miniature Dosing Pump, CFPS-1U, 8 μ l/min to 7.3 ml/min

This unit provides precise linear flow rate control in selectable ranges from 8 μ l/min to 7.3 ml/min. The range is defined by tubing I.D. Precision design and miniature size minimize pulsations to provide smooth liquid delivery. Designed for stable solution delivery, perfusion, infusion or substance application during microscope imaging, recording, calcium and other ions measurement, and biochemical assays. The miniature size allows to mount the pump next to the sample to minimize the connecting tubing length. Can be used for suction to prevent solution overflow during perfusion. Can be used with coverslip chambers, lab-on-chips, miniature incubators, small organs and animals perfusion setups.



The pump can be controlled manually, using wireless remote, analog input, digital input, and by software through RS232 port. The unit can be programmed using built-in timers to provide precise dosing at certain period. Can reverse direction of liquid flow. Can be used to apply multiple solutions, if linked to automated perfusion systems, which can be programmed to deliver sequences of different solutions.

Includes a 100-240VAC power supply, and an X-block to mount on a standard 0.5" posts. All metal body design eliminates electrical noise. Multiple units can be controlled by the same remote control, up to sixteen units. Comes with 0.093" I.D. tubing -370-7300 μ l/min. Optional tubing for different flow ranges: 0.015" I.D. - 8-170 μ l/min; 0.020" I.D. - 20-340 μ l/min; 0.031" I.D. - 50-920 μ l/min; 0.062" I.D. - 170-3400 μ l/min.

Item#: CFPS-1U

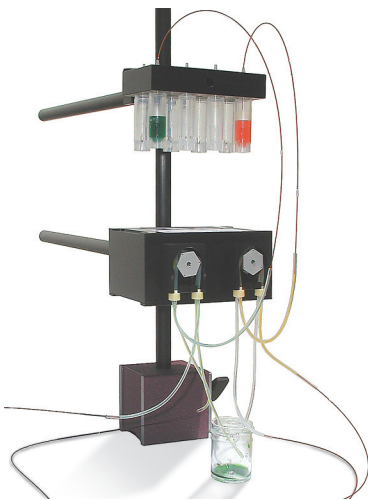
- **Flow control:** manual dial, RS232 port, analog signal (0 - +10V), reverse direction port, reverse direction
- **Remote control:** wireless ON/OFF and to start programmed sequences
- **Timers:** 1sec resolution; both delivery time and period can be programmed;
- **Programmable Volume:** Can be programmed to deliver volumes, up to 999.9ml
- **Continuous Delivery:** Can be programmed to deliver liquid continuously with set volume/ time and period
- **Dimensions:** 4W x 3.5H x 3.5D in.
- **Power:** external 110/230VAC power supply
- **Mounting:** 0.5in. 1 ft. rod and x-block
- **Fitting:** barbed luer-locks, or optional CFPS-FIT kit
- **Peristaltic Tubing:** 0.015in. I.D.; 0.020in. I.D.; 0.031in I.D.; 0.062in. I.D.; 0.093in. I.D.



dimensions: 1.40 x 3.0 x 3.2 in.
flow rates from 0.34 μ l to 22 ml/min

Micro Pump 37x77x82mm, CFPS-1

This is a simplified small pump without computerized controls - only manual 10-turn dial. The unit provides precise linear flow rate control in selectable ranges from 8 μ l/min to 7.3 ml/min. The range is defined by tubing I.D. Precision design and miniature size minimize pulsations to provide smooth perfusion. Designed for stable solution delivery, infusion or substance application during microscope imaging, recording, calcium and other ions measurement, and biochemical assays. The miniature size of 37x77x82mm allows to mount the pump next to the sample to minimize the connecting tubing length. Can be used for both inflow and suction to prevent solution overflow during perfusion in coverslip chambers, lab-on-chips and miniature incubators, and small organs and animals perfusion setups. Can be used to apply multiple solutions, if linked to automated valve systems, which can be programmed to deliver sequences of different solutions. Allows accurately mix different solutions or generate dose-response curves. Includes a 100-240VAC power supply and an X-block to mount on a standard 0.5" posts. Comes with a 0.093in. I.D. tubing. Add different I.D. tubing for different flow ranges. All metal body design eliminates electrical noise.. **Item#: CFPS-1**



4-Channel Programmable Dosing System, CFPS-2

- **Flow control:** manual dial, analog signal (-5 - +5V), software control through RS232/USB port, reverse direction
- **Remote control:** wireless channel switch ON/OFF and to start programmed sequences
- **Timers:** 1sec accuracy, up to more than 24hours for each channel
- **Programmable Volume:** Can be programmed to deliver volumes, up to 999.9ml
- **Programmable Sequences:** Can be programmed to activate channels in sequences with programmable delays
- **Continuous Delivery:** Can be programmed to deliver liquid continuously with set volume/ time and period
- **Dimensions:** 4x2.5x1.85 in.
- **Power:** 110/230VAC
- **Mounting:** 0.5in. 1 ft. rod and x-block
- **Fitting:** barbed luer-locks
- **Peristaltic Tubing:** 0.015in. I.D.; 0.020in. I.D.; 0.031in I.D.; 0.062in. I.D.; 0.093in. I.D.

This is a 2-channel perfusion system for precise control of solution flow rate from 8 μ l/min to 7.3 ml/min. Includes a 4-channel programmable controller, which allows upgrade to a 4-channel system. Precision design and miniature size minimize pulsations to provide smooth perfusion. Designed for stable solution flow or substance application during imaging, recording, calcium and other ions measurement, biochemical assays or small organs and animals perfusion. Used with small chambers in lab-on-chip setups, imaging and recording workstations.

Digital interface and analog inputs allow you to calibrate each channel independently and to apply one or multiple substances by switching channels manually or through data acquisition and imaging software.



The controller can be programmed using timers for each channel, or to dispense preset volumes. It also allows to program continuous sequence of solution applications, which can be used to replenish liquid media during long-term experiments. You can accurately mix different solutions or generate dose-response curves using only two solutions: buffer and concentrated test compound.

Each channel can be controlled through wireless remote, manually, by analog signal, TTL or through RS232 connection for fully automated setups controlled through third party software packages (optional USB adapters are also available).

The system can be upgraded to operate up to 4 channels in parallel. Can be connected to solution switching miniature systems for changing and mixing solutions in sequence. The optional luer-lock manifolds will combine multiple solutions into a single output. The size of the 2-channel system is 4x2.5x1.85 in (separate from the controller). Multiple systems can be attached to each other to form a multi-channel system. Includes 1 ft. mounting rod and X-block to attach a standard 0.5in. posts. Comes with 0.093" I.D. tubing -370-7300 $\mu\text{l}/\text{min}$. Optional tubing for different flow ranges: 0.015" I.D. - 8-170 $\mu\text{l}/\text{min}$; 0.020" I.D. - 20-340 $\mu\text{l}/\text{min}$; 0.031" I.D. - 50-920 $\mu\text{l}/\text{min}$; 0.062" I.D. - 170-3400 $\mu\text{l}/\text{min}$.. Includes 4-channel controller **Item#: CFPS-2**

Flow Rates ml/min

Tube ID	CFPS-2/1U
.015"	0.008-0.17
.020"	0.017-0.34
.031"	0.046-0.92
.062"	0.17-3.4
.093"	0.37-7.3

Accessories

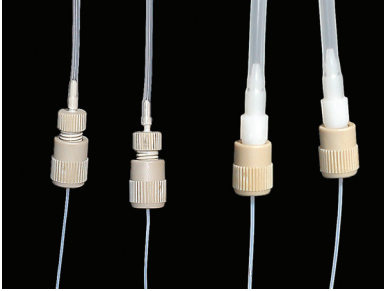


4-Channel Flow Controller This 4-channel programmable controller, which allows upgrade to 4-channel system. Designed for stable solution flow or substance application during imaging, recording, calcium and other ions measurement, biochemical assays or small organs and animals perfusion. Used with small chambers in lab-on-chip setups, imaging and recording workstations. Each channel can be controlled through wireless remote, manually, by analog signal, TTL or through RS232 connection for fully automated setups controlled through third party software packages (optional USB adapters are also available).

Digital interface and analog inputs allow you to calibrate each channel independently and to apply one or multiple substances by switching channels manually or through data acquisition and imaging software. The controller can be programmed using timers for each channel, or to dispense preset volumes. It also allows to program continuous sequence of solution applications, which can be used to replenish liquid media during long-term experiments. You can accurately mix different solutions or generate dose-response curves using only two solutions: buffer and concentrated test compound. **Item#: CFPS-UC2**



Additional 2-Channel Upgrade Adds another two independent channels. Turns ON/OFF independently by analog signals, TTL or/and RS232 connection, or manually (depending on the controller used). Attached together to another system, forms a single unit. Can be mounted horizontally, vertically or simply left on the desktop. Includes mounting hardware. Tubing is not included. **Item#: CFPS-2U**



USB Adapter Converts your computer USB ports into RS232 ports. Includes cables and software drivers. **Item#: USB-RS232**

Fitting Kit

Includes a set of fitting for tubing used inside controlled flow system and microbore tubing, including our Teflon, polyimide, and polyethylene PPT tubing. **Item#: CFPS-FIT**

Mounting Brackets Kit Allows you to attach multiple flow control units together into one solid piece. Includes 2 brackets (top and bottom) and 12 screws. **Item#: CFPS-MB**

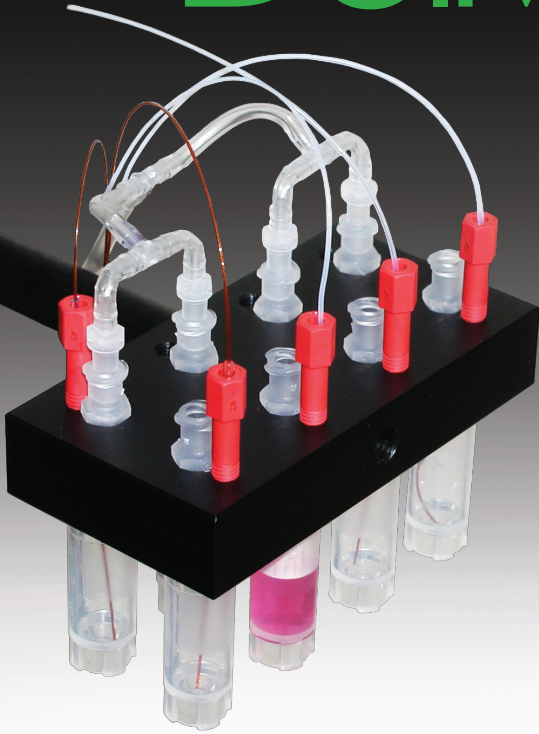
Flow Control

Catalog No.	Description	Price
CFPS-1U	Flow Control Unit, 8µl/min to 7.3ml/min	\$1,395
CFPS-1	Micro Pump 37x77x82mm, 8µl/min - 7.3ml/min	\$695
CFPS-2	Programmable 2-Channel Controlled Flow Perfusion System	\$3,255
CFPS-UC2	Programmable 4-Channel Flow Controller	\$1,600
CFPS-2U	Additional 2-Channel Upgrade	\$1,995
USB-RS232	USB Adapter	\$95
CFPS-FIT	Fitting Kit	\$270
CFPS-MB	Mounting Brackets Kit	\$95
CFPS-ST-15	Tubing, 0.015" I.D.	\$95
CFPS-ST-20	Tubing, 0.020" I.D.	\$95
CFPS-ST-31	Tubing, 0.031" I.D.	\$95
CFPS-ST-62	Tubing, 0.062" I.D.	\$95
CFPS-ST-93	Tubing, 0.093" I.D.	\$95
CFPS-S	Replacement protective tape	\$95

Small Volume Delivery Systems

Pressurized Delivery of MicroVolumes

- Flow control in microfluidics systems
- Injection into single cells and tissue
- Local extracellular perfusion
- Compatible with Imaging & Data Acquisition systems
- Works with Temperature Controlled Systems

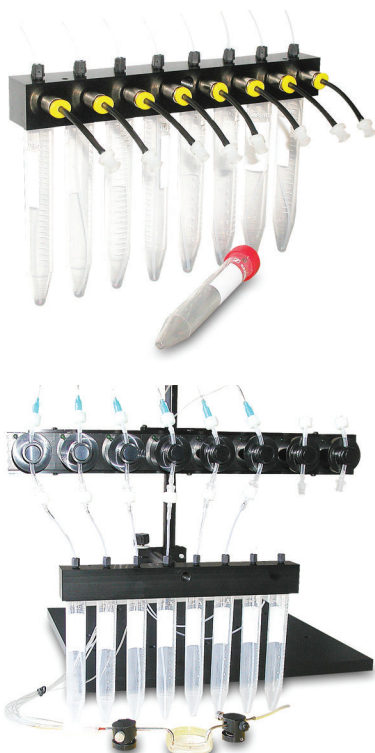


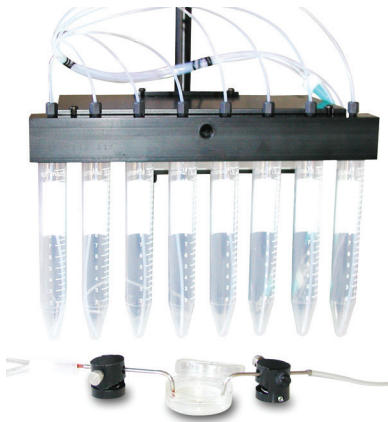
Small Volume Delivery

Small Volume Delivery System SVDS2 For use with standard 15ml tubes from Sarstedt. This system utilizes eight small plastic tubes with conical bottom and thin PTFE tubing to connect to your setup. Tubes with solutions are simply threaded into the holder. Solutions are easy to refill during the experiment. Can be used with miniature manifolds, perfusion systems, and pressure controllers. Requires pressurized gas to deliver the solutions. Solutions can be also withdrawn using controlled flow or vacuum systems. Can be used to collect samples by aspiration.

The system comes with all necessary tubing and fitting to connect to a single pressure source. The small size of 200x25x25mm (without tubes attached) allows to position solutions near your sample. Can be attached to a 1 ft. rod (included). Comes with X-block to attach onto a standard 0.5 in. stand. Includes replaceable plastic tubes 15ml, PTFE tubing, fitting and tubing to connect to a pressure source.

Provided fitting allows you to connect tubes directly to valves of perfusion systems, and the output from valves directly to the manifolds or custom tubing and chambers. All our manifolds can be connected, including zero-dead volume, luer-lock, and miniature manifold for single cell perfusion. Shown on the picture, is SVDS2 system connected to the pinch valves of PS-8H setup. Output from SVDS2 then goes to ZMM manifold to provide liquid delivery and solution switching inside a Petri dish with PDI insert inside. The outflow is provided through a suction tubing of MTH-S holder. **Item#: SVDS2**





Small Volume Delivery System with pressure switch, SVDS2-P This is the same SVDS2 manifold for 15ml tubes with incorporated pressure switch, which is controlled by PC-16 controller. It allows you to connect tubes directly to the manifolds without using valves. Ideal for use with custom fluidics devices and zero-dead volume manifolds that do not have back-flow, although the system has an input port for the secondary balance pressure. The valve controller can be programmed using built-in timers to generate solution sequences. Requires pressurized gas to deliver the solutions.

The system comes with all necessary tubing and fitting to connect to a single pressure source. The small size allows to position solutions near your sample. Comes with X-block to attach onto a standard 0.5 in. stand. Includes replaceable plastic tubes x8 15ml, PTFE tubing, fitting and tubing to connect to a pressure source, and cable to connect to the valve controller. **Item#: SVDS2-P**



Small Volume Delivery System SVDS1 For use with small chambers, lab-on-chips, and intracellular perfusion. Can be used with miniature manifolds, perfusion systems. Requires pressurized gas to deliver the solutions. Solutions can be also withdrawn using controlled flow or vacuum systems. Can be used to collect samples by aspiration.

The majority of available perfusion systems have long lines of tubing, which have to be filled before conducting experiments. However, sometimes applied substances are available only in limited quantities or are extremely expensive, prohibiting the usage of conventional perfusion. This system utilizes small plastic tubes with conical bottom and thin PTFE tubing to connect to your setup. It can be used with as little as 100 μ l volumes of perfusate. Tubes with solutions are simply threaded into the holder. Solutions are easy to refill during the experiment. The system comes with all necessary tubing and fitting to connect to a single pressure source, if required. The small size of 91 x 48 x 17 mm (without tubing attached) allows to position solutions near your sample. Can be attached to a 1 ft. rod (included). Comes with X-block to attach onto a standard 0.5 in. stand. The body has 6.5 mm I.D. opening, which allows to mount the system on a micromanipulator. Includes replaceable plastic tubes 2/3.5ml, PTFE tubing, fitting and tubing to connect to a pressure source. when ordering. **Item#: SVDS1**

Small Volume Delivery Systems

Catalog No.	Description	Price
SVDS2	Small Volume Perfusion System SVDS2	\$195
SVDS2-P	Small Volume Perfusion System SVDS2 with pressure switch	\$495
SVDS1	Small Volume Perfusion System SVDS1	\$195



Digital Pressure Controllers with RS232 port

For use with small volume delivery systems, pressure cylinders and solution switches. Generates pressure up to 15PSI (does not require an external source of pressure). The controller regulates output pressure to provide defined solution flow through sample chambers, microfluidics chips for example. Prevents flow blockage by bubbles inside solutions. Simple to use. This is an advanced alternative to syringe pumps (easy solution refill and unlimited volume). **PC-R15/10 a source of pressure with stability of 0.1mmHg for smooth liquid flow in sensitive fluidics devices, and RS232 port to monitor and SET pressure.**
Item#: PC-R15/10

- **Output:** max pressure 7.5 / 15 PSI (385 / 775 mm Hg)
- **Stability:** 0.5 mm Hg
- **Connectors:** Easy-connect for 1/8in. O.D. tubing; 10-32 threaded
- **Indicators:** PRESSURE digital display
- **Controls:** START/STOP, CLOSE/OPEN output touch screen PRESSURE settings, RS232 port to set and monitor pressure
- **Dimensions:** 6 x 13 x 9in.
- **Power:** internal 120/230VAC power supply

Pressure regulator For use with small volume delivery SVDS1 and pressure cylinders PC. Connects to a cylinder with a compressed gas mixture (max. input 300PSI). The controller regulates output pressure to provide consistent defined smooth solution flow through sample chambers and microfluidics chips (prevents flow blockage by bubbles inside solutions for example). Simple to use. Different output pressure ranges are available upon request. **Item#: PC-100-25**

Pressure Controllers

Catalog No.	Description	Price
PC-R10	Pressure controller, adjustable up to 10PSI - 510 mm Hg - output.	\$2,995
PC-R15	Pressure controller, adjustable up to 15PSI - 775 mm Hg - output, unregulated vacuum	\$2,995
PC-100-25	Pressure regulator, adjustable up to 30PSI output	\$2,995

Digital Pico-Injectors Spritzers with RS232 port

Generate pressure up to 15PSI (higher pressure range is available upon request) or uses external pressure source (100PSI max). Do not require an external source of pressure (unless pressures above 25PSI are required). The controller regulates output pressure to provide defined solution flow through puffer pipettes and tubing. Simple to use. Programmable timers and sequences with 100ms resolution. **RS232 port to switch, monitor and SET pressure.**



1-Channel Programmable Pressure Pico-Injector - Spritzer and aspirator, UC-1 For use with pipettes, thin tubing, and small volume delivery systems. Connects to an external pressure source up to 100PSI for injection and to a vacuum source (100PSI max) for aspiration. Built-in programmable timers (100 ms min). Manual push button Includes a foot pedal control for easy operation. **Item#: UC-1**



4-Channel pico-injector spritzer with x4 independent pressure controls For use with pipettes, thin tubing, and small volume delivery systems. Four channels with independent timers and independent pressure levels that can be programmed through the touch screen. Choose from two options: one does not require an external source of pressure and generates pressure up to 15PSI, or another that works with the external pressure source to provide up to 100PSI output. The controller regulates output pressure to provide defined solution flow to your sample. Prevents flow blockage by bubbles inside solutions. Includes remote control for easy operation. **Item#: UC-4**

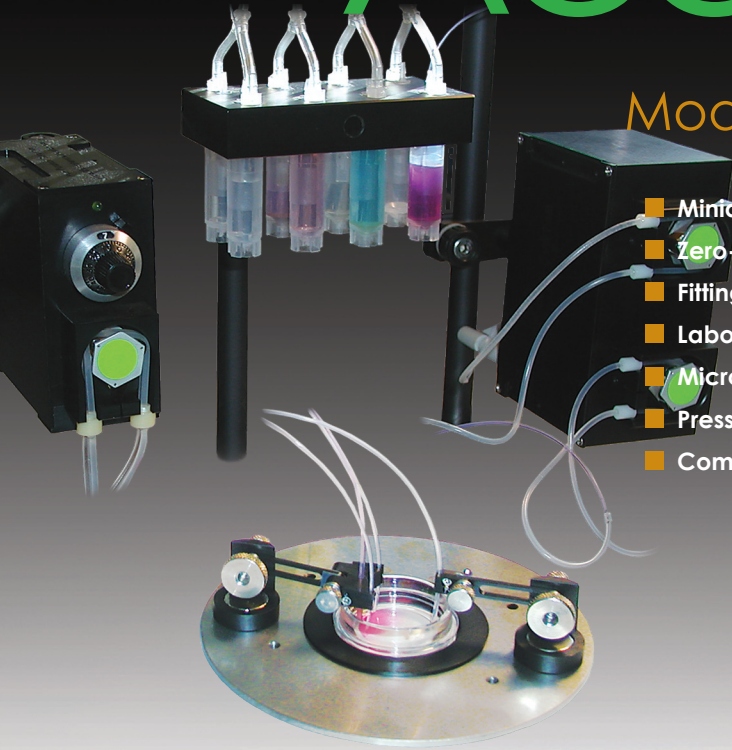
8-Channel pico-injector spritzer For use with puffer pipettes, small volume delivery SVDS1 and pressure cylinders PC. The controller regulates output pressure up to 14.5PSI to provide consistent defined smooth solution flow through sample chambers and microfluidics chips (prevents flow blockage by bubbles inside solutions for example). Simple to use. Different output pressure ranges are available upon request. **Item#: UC-8**

Pressure Injectors, Spritzers and Aspirators

Catalog No.	Description	Price
UC-4	4-Channel pico-injector spritzer with x4 independent pressure pumps	\$5,995
UC-8	8-Channel pico-injector spritzer	\$3,995
UC-1	1-Channel programmable pico-injector spritzer	\$995
PC-16P	16-Channel Valve Controller, programmable, with 15PSI pressure pump, for use with PS-V8P 8-channel pressure switch	\$1,995
PS-V8P	8-Channel pressure switch, requires a valve controller	\$295

Perfusion Accessories

Modular Design for Extreme Flexibility



- Miniature Manifolds for single cell superfusion
- Zero-dead volume manifolds
- Fitting to any custom systems and tubing
- Laboratory stands for vibration free operation
- Microscope adapters
- Pressurized solution holders
- Compatible with Temperature controlled and Perfusion systems

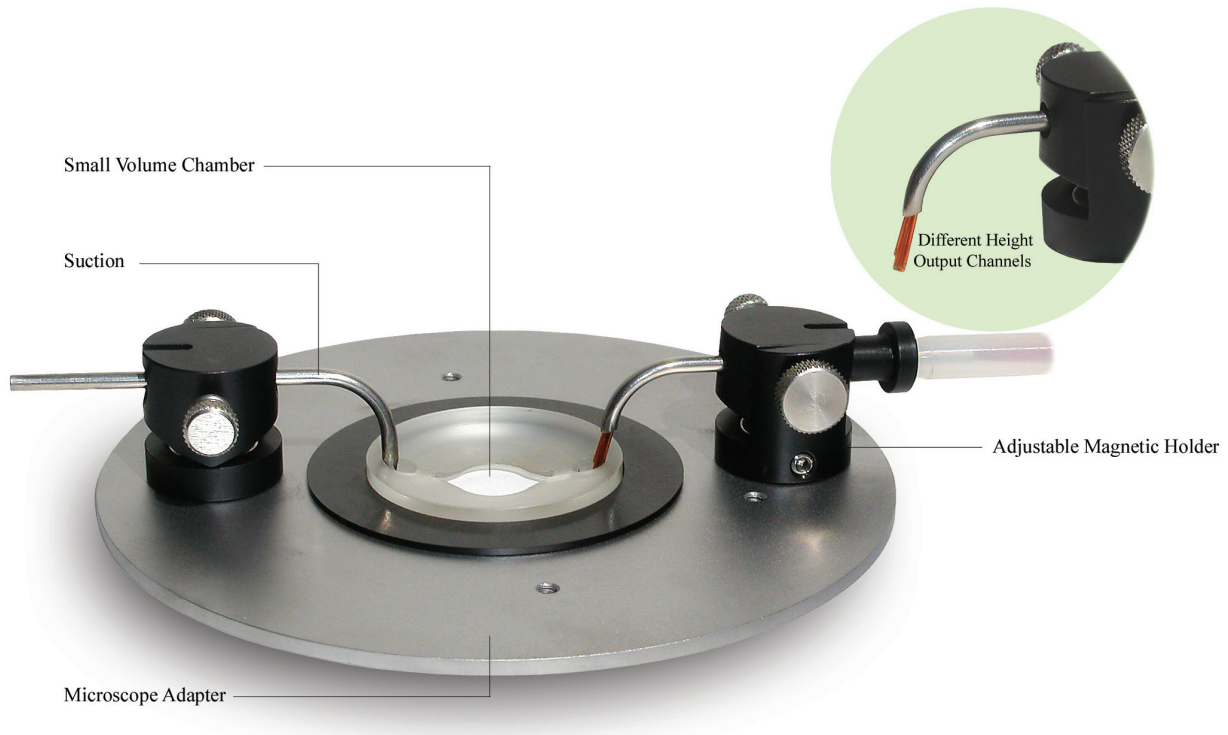
Miniature Manifolds



Zero-Dead Volume Manifold Zero-dead volume facilitates solution exchange inside small volume perfusion chambers. The output channels can be adjusted at a different height to prevent contamination of solutions. The outputs for lower concentration solutions, for example, can be positioned higher so that they do not mix with other solutions. The upper channels can be also used to provide suction of excess of solution from small volume perfusion chambers.

Incorporated magnetic holder allows you to position the manifold anywhere around your sample. Two thumb screws fix the manifold in required position: height, angle, length. Comes with 2 ft. long Teflon tubing, attached to polyimide 250/360 micron I.D. channels. All tubing is replaceable and washable. Perfusion system or/and pressurized Small Volume Delivery System SVDS1 is required. Can be used with small volume PCCS2, CSC chambers and petri dish inserts. Consider microbore tubing fitting PS-kit. Ships configured with six 360micron channels, which allow you do make from 1 to 6-channel manifolds. Specify if 8-channel 250 micron I.D. channels are required.. **Item#: ZMM**

- **Output Channels:** 6-channel, 360 micron per channel with luer connectors
- **Connecting tubing:** incorporates 2ft. tubing



Luer-Lock Manifold This luer-lock manifold can be used with any needle, connecting tubing, nozzle or catheters that have luer connector. Inside tubing is 360micron diameter. Incorporates 2 ft. long connecting tubing with luer connectors. Light weight design allows one to attach the manifold directly to small chambers and animals for infusion/perfusion. Can be used with regular, controlled flow or pressurized perfusion systems. Includes a set of nozzles, from 30 to 16 gauge. **Item#: PM**

- **Channels:** specify, from 2 to 16, 360 micron
- **Connecting tubing:** incorporates 2ft. tubing per channel with luer connectors
- **Output:** replaceable luer nozzles

Teflon Perfusion Manifold For use with PS-xx perfusion systems. Comes with short pieces of Teflon tubing inserted, which fit PPT tubing. Tygon tubing fits over 0.067 in. OD polyethylene tubing. Fits into MTH1 magnetic holders. This item is included with automated miniature perfusion systems. Can be reduced to less number of channels by inserting plugs to close the unused channels. **Item#: TPM**

Miniature Manifolds

Catalog No.	Description	Price
PM-2	Luer-Lock Manifold, 2-channel	\$195
PM-6	Luer-Lock Manifold, 6-channel	\$195
PM-8	Luer-Lock Manifold, 8-channel	\$195
PM-10	Luer-Lock Manifold, 10-channel	\$195
PM-12	Luer-Lock Manifold, 12-channel	\$195
PM-14	Luer-Lock Manifold, 14-channel	\$195
PM-16	Luer-Lock Manifold, 16-channel	\$195
ZMM	Zero-Dead Volume Manifold, 6-channel	\$295
TPM	Teflon Perfusion Manifold	\$95

Tubing and Fitting

Tygon Tubing 1/16 inch I.D. 50 ft. Crystal clear, flexible durometer 55 tubing of superior quality. Non-oxidizing, non-toxic, non-contaminating, odorless, tasteless. Grips tightly to glass or metal, bends to sharp radius. Complies with Federal Specifications L-T-790A Type II for lab applications. .

Item#: TYGON-16

Perfusion Fitting Kit This kit has everything you need to match different tubing and systems together. Compatible with 1/16in. I.D. soft tubing, and polyethylene PPT tubing. Comes in a plastic box, more than 100 pieces. **Item#: PS-KIT**

Silicone Pinch Valve Tubing 1/16 in. I.D., 1/8 in. O.D., 50 ft. Can be used with pinch valve perfusion systems. **Item#: SILICON-8**

Tubing and Fitting

Catalog No.	Description	Price
TYGON-16	Tygon Tubing 1/16 inch I.D., 50 ft.	\$95
PS-KIT	Perfusion Fitting Kit	\$395
PPT	Polyethylene Tubing, 100 ft.	\$195

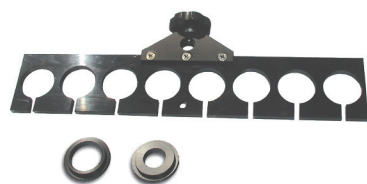


Syringe Stand - Holders

Threaded Post and X-Block For use with stands, or syringe holders. These 1 foot long 0.5in. posts can be threaded into each other to form modular constructs. They fit to our perfusion accessories and systems, including solution switches and flow control units. Includes X-block.. **Item#: SH-PX**

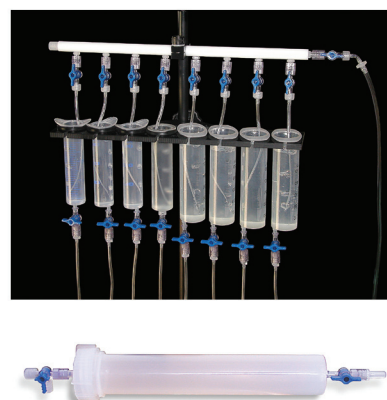
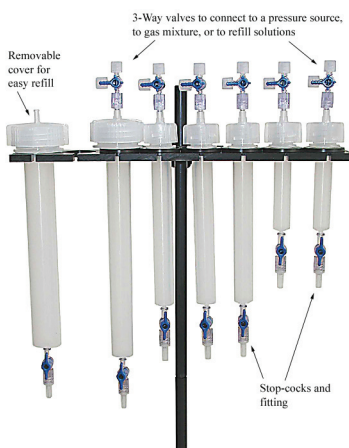
Syringe Holder, Anti-Vibration, SH-1A This is a universal 0.5in. stand. The mounting base inhibits vibrations from perfusion systems to pass through microscope tables. Several mounting options: the stand can be mounted to surfaces with M8 threaded holes. It also includes both, a stand to place the holder on non-magnetic surfaces, and a strong magnetic base. Includes three 0.5in. posts, which allow you to extend the holder up to 3 feet high. Elevated to sufficient height, this stand can be used for animal perfusion, if combined with manual flow control valves (see below). Comes with SH-10 syringe holder for 50-60ml syringes, and 16 adapters for smaller volume syringes. Includes eight stop-cocks and fitting for 1/16 in. I.D. soft tubing. The magnetic base diameter is only 2.50 in. Includes 50 feet of Tygon tubing. **Item#: SH-1A**





Syringe Holder SH-10 Syringe holder for eight 50 ml syringes. Can be fixed on a 0.5 in. post with a floweret head screw. The syringe holder has slots for tubing, so that syringes do not have to be disconnected while taking them out for refill. Comes with eight 50ml syringes and adapter rings for smaller volume syringes. Included with item SH-A1 above. **Item#: SH-10**

Cylinder to Pressurize/Oxygenate Solutions, Set of 8 A set of autoclavable cylinders to pressurize your solutions. Can be used to drive solutions through 100 micron tip of MM manifold, for example. Can be also used to saturate solutions with gases (bubbling) by feeding a thin tubing inside the cylinder. Comes with stop-cocks and fitting for 1/16 in. I.D. tubing. Includes a 3-way valve to connect to a pressure source, to release the pressure, to refill the cylinder, or to connect to a source of gas mixture (oxygenation, for example). Comes with threaded cover for easy refill. Material: polypropylene. Specify volume when ordering. Large 650ml volumes are available upon request. Cylinders with built-in 10, 25 or 40 micron filters are also available (specify when ordering). Volumes up to 100ml fit to our SH syringe holders. **Item#: PC**



Gas Mixture Delivery Adapter - Pressure manifold SH-A

Adapter for syringe holders to connect to a gas source to saturate/bubble eight solutions during experiments (CO₂ saturation or oxygenation, or pressurizing the solution.) Comes with X-block to fit 0.5 in. posts. Includes 9 stop-cocks and plugs to close unused channels or the common inlet. It also comes with tubing and fitting to connect to output barbs and thin tubing to form bubbles inside the solutions. Can be used with stones, or any other diffuser, to bubble larger volumes. Can be also used to pressurize solutions by connecting to pressure cylinders PC. Can be connected to another adapter to use the same source of gas mixture/pressure.. **Item#: SH-A**

Accessories

Catalog No.	Description	Price
SH-PX	Threaded Post and X-Block	\$95
SH-1A	Syringe Holder on Magnetic Base	\$595
PC-10	Cylinder to pressurize/oxygenate solutions, 10 ml, set of 8	\$195
PC-50	Cylinder to pressurize/oxygenate solutions, 50ml, set of 8	\$195
SH-10	Syringe Holder	\$195
SH-A	Gas Mixture Delivery Adapter	\$195

Manual Flow Control



Two-way manual valve - stop-cock Manual valve to stop inline liquid/gas flow. Female luer-lock is on one end, and male luer-lock is on the other end. Eight pieces are included in PS-FLOW kit (see table below). Mating luer-lock barbed connectors for different size tubing are included in PS-KIT.

Three-way manual valve This manual valve redirects flow of liquid/gas between three outlets: two are female luer-locks and one is with male luer lock. Eight pieces are included in PS-FLOW kit (see table below). Mating luer-lock barbed connectors for different size tubing are included in PS-KIT.

Flow Dial Regulates liquid flow in gravity driven perfusion setups. Can be used to provide uniform flow rate in different lines of multi-channel systems. Barbed connectors on both ends for 1/8in. I.D. tubing. Eight pieces are included in PS-FLOW kit (see table below).

Manual Flow Control

Catalog No.	Description	Price
PS-FLOW	Flow control kit	\$95
PS-KIT	Perfusion Fitting Kit	\$395

