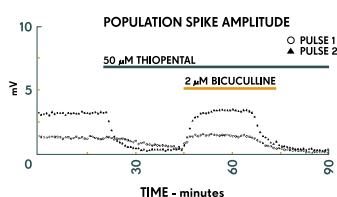


"I am writing to tell you how pleased I am with the ValveBank8 Perfusion System. It's great that I can load the reservoirs, press go, and start recording. I can read papers rather than fussing with solutions and switching valves every 10-15 minutes. Since solutions are switched at exactly the same time from one experiment to the next, I have been able to automate my data analysis protocols as well."

Brain Slice Field Recording



Unattended solution delivery using a ValveBank8 AutoPrime Perfusion System

Dr. M. Bruce MacIver,
M.Sc., Ph.D.

Department of Anesthesia
Stanford University
Medical Center

Increase reproducibility with fewer hours in lab.



Perfusion Systems

- Unattended solution switching**
 Avoid vibrations from switching valves by hand. The ValveBank® or ValveLink® controller handles all solution delivery so you can watch results – not switch stopcocks. Many special features are included for easy perfusion control. Low noise circuitry.
- Increased reproducibility**
 Valve switching is accurate to 0.01 seconds with programs up to 99 hours long under microprocessor control. Consistent liquid delivery means better data.
- Pinch, Teflon™ and Lee™ Valves**
 Choose between speed, cost, and ease of cleaning. Several options are available for fittings and reservoirs.
- Manual and external valve control**
 Flexible design. Easy cleaning and calibration. Slave mode valve operation controlled by your computer, pClamp, Pulse, Acquire, LabView, AxoGraph, etc.

Valve Choices:

- **Pinch Valves for Reduced Maintenance**

Easiest valves to clean and switch tubing. Liquids never touch the valves. Switches in 30-50 ms. 1/32" i.d. silicone tube passes through, and is pinched closed by solenoid activation. All AutoMate Scientific valves include an individual indicator LED. Our new aluminum enclosure keeps the valves dry from spills and offers luer lock ports for syringe reservoirs.

- **Teflon™ Valves for Fast Switching**

Required for fast kinetics applications. Excellent chemical and corrosion resistance. Non-stick surface resists particles and chemical deposits. Switches in less than 10 ms, with 20 µl of dead volume from port to port. Threaded female inlet and outlet ports accept Hose Barb, Luer Lock and Nut & Ferrule fittings (see diagrams next page).

- **Lee™ Mini Valves for Extremely Fast Switching and Minimal Pressure Pulse**

For the most demanding applications AutoMate Scientific offers tiny valves from the Lee Company. Enclosed in our new aluminum box with luer locks for syringe reservoirs, these valves can open and close in 1.5-4 ms with a ValveLink8.2 controller.

Perfusion Systems Include:

Controller, valves, 60 ml syringe reservoirs, 2-way stopcocks, (reservoir bracket and drippers in Teflon systems only), ringstand, 1/16" i.d. tubing and four-, eight- or sixteen-into-one micro-manifold with built-in flow control. 5, 15, 35, 60 or 140 ml syringe reservoirs available.

The Economy Pinch Valve System includes a ValveLink8 controller, four pinch valves, 35 ml syringes, 2-way stopcocks, ringstand, 1/16" i.d. tubing and four-into-one micro-manifold with built-in flow control.

Computer Interfacing:

Perfusion systems can be controlled by a computer using data acquisition hardware (i.e., DigjData, ITC-16, or National Instruments board) and software (i.e., pCLAMP, Pulse, or LabView). Both ValveBanks and ValveLinks accept real-time TTL inputs to control valves. Most acquisition software already being used in your experiments can talk to our controllers. AutoMate Scientific offers an optional program called EasyCode® for the Macintosh and PC/Windows to program ValveBanks (not ValveLinks). This software is used before an experiment – valve sequences are downloaded into the memory of the ValveBank where they are run. An article by AutoMate Scientific can be found in Axon Instrument's AxoBits 17 newsletter outlining these strategies – accessible on our web site.

Pinch Valves



Teflon™ Valves



Lee™ Valves



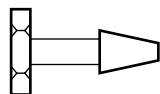
Luer-lock Fittings in Teflon Valves



Luer-lock fittings in Teflon™ valves allow direct connection of syringe reservoirs for minimal dead volume.

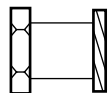
Teflon™ Valve Fitting Choices

Hose Barb



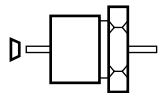
- Standard
- Available for 1/8" and 1/16" i.d. soft tubing

Lure-Lock



- For direct attachment of syringes
- Eliminates extra tubing between reservoirs and valves
- Includes 2-way stopcocks and 35 ml syringes

Nut & Ferrule



- HPLC-like, screw-in fittings for rigid, small-diameter (1/16" o.d.) tubing



Perfusion Systems Ordering Information

| Part No. | Product Description | Price |
|----------|---|----------|
| 17-21-20 | ValveLink®4.2 Economy Pinch Valve Perfusion System | \$ 1,395 |
| 13-01-23 | ValveBank®4 Teflon Perfusion System | \$ 2,395 |
| 13-pp-24 | ValveBank4 Pinch Valve Perfusion System - 1/32" i.d. silicone tube | \$ 1,895 |
| 13-21-27 | ValveBank4 Lee Mini Valve Perfusion System | \$ 2,595 |
| 17-01-23 | ValveLink4.2 Teflon Perfusion System | \$ 2,295 |
| 17-pp-24 | ValveLink4.2 Pinch Valve Perfusion System - 1/32" i.d. silicone tube | \$ 1,795 |
| 17-21-27 | ValveLink4.2 Lee Mini Valve 1.5 to 4 ms Perfusion System | \$ 2,495 |
| 13-01-53 | ValveBank8 Teflon Perfusion System | \$ 3,995 |
| 13-pp-54 | ValveBank8 Pinch Valve Perfusion System - 1/32" i.d. silicone tube | \$ 3,195 |
| 13-21-57 | ValveBank8 Lee Mini Valve Perfusion System | \$ 4,385 |
| 17-01-53 | ValveLink8.2 Teflon Perfusion System | \$ 3,295 |
| 17-pp-54 | ValveLink8.2 Pinch Valve Perfusion System - 1/32" i.d. silicone tube | \$ 2,495 |
| 17-21-57 | ValveLink8.2 Lee Mini Valve 1.5 to 4 ms Perfusion System | \$ 3,685 |
| 17-01-83 | ValveLink16.2 Teflon Perfusion System | \$ 5,995 |
| 17-pp-84 | ValveLink16.2 Pinch Valve Perfusion System - 1/32" i.d. silicone tube | \$ 4,695 |
| 17-11-87 | ValveLink16.2 Lee Mini Valve 1.5 to 4 ms Perfusion System | \$ 7,995 |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.

xx-[TB]-xx Indicate [T]op inflow and [B]ottom outflow Teflon valve fittings:
 [0]=1/8" i.d. hose barb, [1]=1/16" i.d. hose barb, [2]=Luer-lock female with stopcocks and 35 ml syringes, [3]=10-32 threaded nut & ferrules for 1/16" o.d. tubing (add \$30/set of 4), [p]=Pinch valves have no fittings

Systems include: Controller, user manual, valves, 35 ml or 60 ml syringes, stopcocks, (reservoir bracket and drippers in Teflon systems only), ringstand, 1/16" i.d. Tygon tubing, and 4-, 8- or 16-into-1 micro-manifold with flow control. 5, 15, 35, 60 or 140 ml syringe reservoirs available.

Visit www.autom8.com/build_your_own.html to configure a perfusion system and quote.

Valves & Fittings Ordering Information

| Part No. | Product Description | Price |
|-----------|---|----------|
| | Each pair of 4 valves ordered together will be mounted in a case of 8. | |
| 02-01-02 | Set of 4 Teflon™ valves - cabled and mounted | \$ 895 |
| 02-pp-04 | Set of 4 Pinch valves - cabled and mounted, 1/32" i.d. silicone tube | \$ 545 |
| 02-21-07 | Set of 4 Lee mini valves - cabled and mounted | \$ 1,095 |
| 02-01-02i | Individual Teflon replacement valve | \$ 125 |
| 02-pp-04i | Individual Pinch replacement valve | \$ 90 |
| 02-21-07i | Individual Lee mini replacement valve | \$ 165 |
| 01-05 | Low-noise, valve and case grounding package (per 4 valves) A grounding wire attached to all valves extending back to the controller. This item is recommended for electrophysiology and required for CE conformity. | \$ 55 |
| 02-06 | Valve extension cables - 3 meter RCA M/F (set of 4 cables) | \$ 15 |
| 05-01 | Luer-lock fittings - with 2-way stopcocks (set of 4) | \$ 10 |
| 05-02 | Nut & ferrule fittings - for 1/16" o.d. tubing (set of 4) | \$ 30 |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.

02-[TB]-02 Indicate [T]op inflow and [B]ottom outflow Teflon valve fittings:
 [0]=1/8" i.d. hose barb, [1]=1/16" i.d. hose barb, [2]=Luer-lock female with stopcocks, [3]=10-32 threaded nut & ferrules for 1/16" o.d. tubing (add \$30/set of 4), [p]=Pinch valves have no fittings

Ten times faster, new protection, inputs, and event marker in a smaller box.

"Our lab has been using ValveLink controllers for years with good, reliable results. The new ValveLink8.2 is even smaller and faster than its predecessor. It also looks cool and the buttons feel nicer than the previous version. I use it manually or programmed by outputs from my stimulator. I haven't observed any noise from the valve system on my electrophysiology rig."

Hillel Adesnik, Ph.D.

Department of Cellular and
Molecular Pharmacology
University of California,
San Francisco



ValveLink8.2® Controller

- **ValveGuard™ technology detects bad valves**
Prevent damage to your ValveLink8.2® and easily observe problem valves.
- **Run experiments automatically – even unattended**
By running experiments automatically, AutoMate Scientific systems will leave you free to accomplish other tasks – saving you both time and money.
- **Microprocessor-based for accuracy and flexibility**
Our low-cost ValveLink8.2 controller has powerful perfusion commands and capabilities not offered by competing valve drivers: open single or multiple valves, master channel for control/buffer solution, computer control.
- **Low noise & low voltage valve control**
Designed for electrophysiology. CE marked for Europe.
- **Manual, TTL (digital), analog, and USB inputs**
Control valves manually (by pushbutton) or by computer – simultaneously thanks to the microprocessor design. Optional spill sensor protects your equipment when a leak is detected.



ValveLink8.2 Controller



- Manual pushbuttons
- Red/green LED indicators
- 1.5 amp, 12V AC supply included
- Dimensions: 9.28" x 1.6" x 5.13"
- Weight: 3 lbs. (1.4 kg.)



- Eight TTL inputs directly activate 8 valves
- Or control 16 valves with only four digital outputs

Additional Features

- One analog input can control eight valves
- Analog event marker allows you to record all valve activity
- An optional spill sensor stops all valves when a leak is detected to protect your microscope and table. All LEDs blink until you press a button to continue.

Free ValveLink PC Software



- Control valves directly from your PC screen by USB
- Network multiple ValveLinks into a single, virtual instrument



ValveLink8.2s can switch 12V DC solenoid valves open and closed in one millisecond using full power, then hold-in at 1/2 power to prevent thermal transfer to your solutions. Low noise circuitry minimizes recording artifacts in electrophysiology. The ValveLink8.2 is less expensive than AutoMate Scientific's ValveBank controller. It is the controller of choice for dose response work at pharmaceutical companies and the NIH. Both ValveLink8.2s and ValveBanks are designed for use with pClamp, Pulse, et al. All AutoMate Scientific products include a one-year warranty.

ValveGuard™ technology detects bad valves to prevent damage to your ValveLink8.2 and easily observe problem valves. Front-panel LEDs are dark for broken or disconnected valves, or blink for short-circuited valves. Automatic networking lets you connect up to eight ValveLink8.2s to a USB hub and PC to create a single 64-channel controller. A ValveLink8.2 can power individual valves up to 1 amp (12 watts), and a total of 2 amps for all valves open simultaneously.

ValveBank or ValveLink8.2: Which controller is right for you?

| Features | ValveBank | ValveLink8.2 |
|------------------------|---|--|
| CHANNELS | 4 or 8 channels available | 8 channels each, USB network to 64 channels |
| COMPUTER I/O | 8 digital in, 8 digital out, serial (RS-232) | 8 digital in, USB, analog input, event marker out |
| DIGITAL INPUTS | One pulse can start a ValveBank program, or TTL inputs each control 1 valve | One TTL input per valve, or demultiplex and control up to 16 valves with 4 inputs |
| PROGRAMMABLE | Yes- ValveBank keypad, EasyCode software or digital outputs from your data acquisition software | Only using real-time analog or digital outputs from your computer / data acquisition software. |
| SOFTWARE | Mac and PC "EasyCode" software to pre-program ValveBanks (up to 16 ch.) | Free Windows XP real-time USB control and networking software for up to 64 valves at once |
| MANUAL CONTROL | External keypad | Front panel buttons |
| MANUAL FEATURES | 1-on, master channel, timed open, TTL outputs | 1-on, master channel |
| SPEED | 10 milliseconds | 1 millisecond |
| VALVE POWER | 4 watts per channel or 8 watts total | Up to 12 watts (1 amp) per channel, 24 watts (2 amps) total |
| PRICE | Higher | Lower |

ValveLink8.2 Controller Ordering Information

| Part No. | Product Description | Price |
|----------|--|----------|
| 01-18 | ValveLink®8.2 digital/manual controller | \$ 995 |
| 01-26 | ValveLink®16.2 digital/manual controller | \$ 1,895 |
| 01-19 | BNC cable - ValveLink8.2 to pCLAMP/Digidata, et al., 4 BNC plugs to DB-9 | \$ 55 |
| 01-27 | BNC cable - ValveLink16.2 to pCLAMP/Digidata, et al., 5 BNC plugs to DB-15 | \$ 85 |
| 01-29 | USB cable - USB-A male, USB-B male 10' cable | \$ 9 |
| 01-30 | USB hub - 4 port unpowered | \$ 24 |
| 01-17 | Rack-mounting brackets - ValveLink8.2 to standard 19" rack | \$ 20 |
| 01-25 | Rack-mounting brackets - ValveLink16 to standard 19" rack | \$ 35 |
| | Cables for Heka/InstruTECH and LabView | \$ call |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.

Behind every great perfusion system is a reliable valve controller.



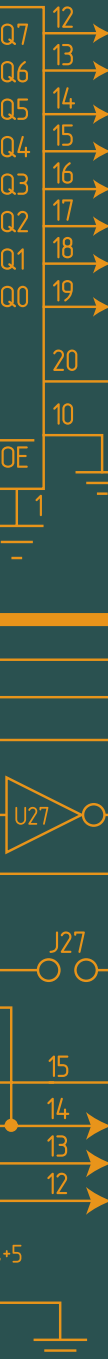
"We use the ValveBank in electrophysiology on a Xenopus oocyte recording rig. We have run a twelve-channel manual perfusion delivery system for several years with timed solenoid valves. The ValveBank and accompanying EasyCode Macintosh software allow us to program full wash and delivery sequences in advance with significantly more accurate switching. The new manual perfusion timing option allowed the ValveBank to perform exactly like the controller we had built before. Basically, the ValveBank saves us the worries of monitoring reagent-delivery, and it works."

Dr. David Julius

Department of Cellular and
Molecular Pharmacology
University of California,
San Francisco

ValveBank® Controller

- **Run experiments automatically – even unattended**
By running experiments automatically, AutoMate Scientific systems will leave you free to accomplish other tasks – saving you both time and money.
- **Microprocessor-based for accuracy and flexibility**
The ValveBank® can store sixteen user programs with 10 millisecond switching accuracy. It includes powerful perfusion commands and capabilities not offered by competing valve drivers: open single or multiple valves, master channel for control/buffer solution, and computer control.
- **Low noise & low voltage valve control**
Designed for electrophysiology. CE marked for Europe.
- **Manual, TTL (digital), and serial (RS-232) inputs**
Control valves manually (by keypad) or by computer – simultaneously thanks to the microprocessor design.
- **Low cost & low profile, simple design**
Optional BNC cables and 19" rack-mounting brackets.



ValveBank4 & 8

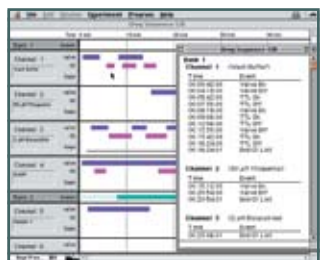
- Dimensions: 10" x 7.5" x 2"
Weight: 5 lbs. (2.27 kg.)



- User-selectable for normally open or closed valves
- 1.5 amp, 12V AC power supply included



- Back-lit LCD display
- Detached 16-key membrane keypad
- Easy menu-driven interface
- 16 or 32 user programs of 256 commands up to 99 hours long

EasyCode Software

- Program up to sixteen channels of valves and digital outputs.
- Open multiple experiment windows. List sequences to screen or printer. Copy and paste. Zoom in and out of your experiment. Please see page 16.



AutoMate Scientific
READY FOR RESEARCH.™

All AutoMate Scientific valve controllers switch 12V DC solenoid valves open and closed rapidly using full power, then hold-in at 1/2 power to prevent thermal transfer to your solutions. Low noise circuitry minimizes recording artifacts in electrophysiology. ValveBanks are designed for use with pClamp, Pulse, et al. All AutoMate Scientific products include a one-year warranty.

The ValveBank® remains the only programmable valve controller for physiology that does not require a computer. ValveBanks include digital and manual control, plus programming through their keypad and LCD screen or EasyCode® software from a Macintosh or PC. ValveBanks run user valve sequences without a computer and include eight programmable digital outputs for control of external devices such as stimulators, pumps and recording devices. Entire ValveBank programs can even be triggered by a single TTL pulse.

EasyCode® - Expand the computing power of your ValveBank

Optional EasyCode software helps you program your ValveBank with a Mac or PC-Windows using easy "click-and-drag" time bars. Download your valve sequences into the ValveBank's memory with the included cable. Run programs on the ValveBank, which can be disconnected from the computer.

ValveBank or ValveLink8.2: Which controller is right for you?

| Features | ValveBank | ValveLink8.2 |
|------------------------|---|--|
| CHANNELS | 4 or 8 channels available | 8 channels each, USB network to 64 channels |
| COMPUTER I/O | 8 digital in, 8 digital out, serial (RS-232) | 8 digital in, USB, analog input, event marker out |
| DIGITAL INPUTS | One pulse can start a ValveBank program, or TTL inputs each control 1 valve | One TTL input per valve, or demultiplex and control up to 16 valves with 4 inputs |
| PROGRAMMABLE | Yes- ValveBank keypad, EasyCode software or digital outputs from your data acquisition software | Only using real-time analog or digital outputs from your computer / data acquisition software. |
| SOFTWARE | Mac and PC "EasyCode" software to pre-program ValveBanks (up to 16 ch.) | Free Windows XP real-time USB control and networking software for up to 64 valves at once |
| MANUAL CONTROL | External keypad | Front panel buttons |
| MANUAL FEATURES | 1-on, master channel, timed open, TTL outputs | 1-on, master channel |
| SPEED | 10 milliseconds | 1 millisecond |
| VALVE POWER | 4 watts per channel or 8 watts total | Up to 12 watts (1 amp) per channel, 24 watts (2 amps) total |
| PRICE | Higher | Lower |

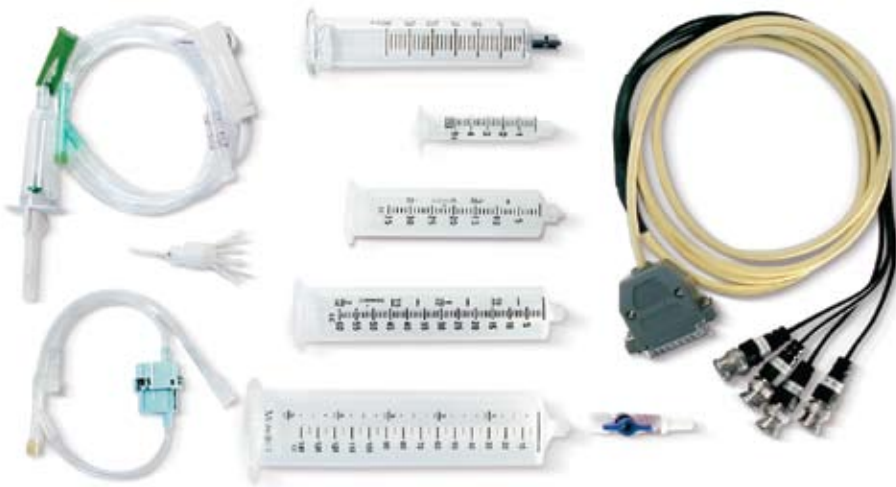
ValveBank Controller Ordering Information

| Part No. | Product Description | Price |
|----------|--|----------|
| 01-01 | ValveBank®4 programmable controller | \$ 1,095 |
| 01-08 | ValveBank®8 programmable controller | \$ 1,695 |
| 01-09 | BNC cable - ValveBank to pCLAMP/Digidata, et al., 4 BNC plugs to DB-25 | \$ 55 |
| 01-07 | Rack-mounting brackets - ValveBank to standard 19" rack | \$ 20 |
| 01-06 | ValveBank keypad 6' extension cable | \$ 20 |
| | Cables for Heka/InstruTECH and LabView | \$ call |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.

800.998.MATE | www.autom8.com | 650 University Ave #5, Berkeley, CA 94710 USA
tel 510.845.6283 | fax 510.665.3975 | e-mail info@autom8.com

Save time by purchasing
disposable perfusion
accessories from one source.



Perfusion Accessories

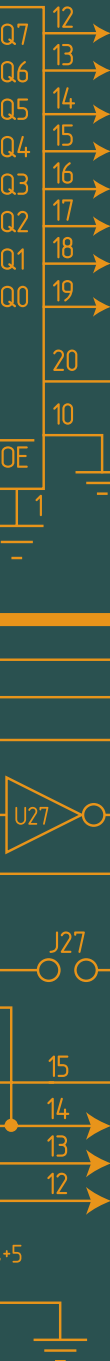
Syringe reservoirs

Replacement syringes and reservoirs are available for all perfusion systems. Luer lock 5, 15, 35, 60 and 140 ml plastic syringe reservoirs are standard. 35 ml glass syringes and Teflon tubing are available with our "Volatiles Pressure Upgrade" for researchers with volatile agents in solution. 800 ml beakers with luer lock fittings are available as replacements for the In Vivo Perfusion System.



Pressurized reservoirs

Custom, closed, pressurized Nalgene HDPE reservoir bottles are available in 1, 2, and 10 liter sizes with ringstand holders. Why keep refilling buffer all day? These require an AutoMate Scientific Pressurized Perfusion System or regulated pressure source.





Micro-manifolds and stoppers

4-, 8-, and 16-into-1 Teflon™ micro-manifolds for bath perfusion combine multiple tubes (1/16" (1.6 mm) i.d. or o.d.) into a single outflow tube. The manifolds include a built-in flow adjustment screw to decrease flow rate without adding dead volume. The 1/4 inch (6.35 mm) outflow is interchangeable with manifolds from Warner Instruments and all AutoMate Scientific perfusion chambers. Teflon™ Stoppers are available to temporarily close unneeded holes.



Hospital I.V. perfusion accessories

Disposable hospital I.V. drippers (drip chambers) get flow started in empty tubes and help visualize flow rates. Flow regulators restrict perfusion flow rates like the adjustment screw in our micro-manifolds. They are helpful in matching perfusion inflow rate to outflow rate. Both use 1/8" i.d. tubing. Case pricing available.



Perfusion reservoir gas bubbler

Available with or without an oxygen-safe regulator, the Perfusion reservoir gas bubbler is used to split a gas bottle like oxygen, carbogen, or CO₂ into multiple perfusion reservoirs. The included high-quality stones create a stream of fine bubbles to evenly saturate your solutions with gas. Each gas line can be individually adjusted. Replacement stones also available.



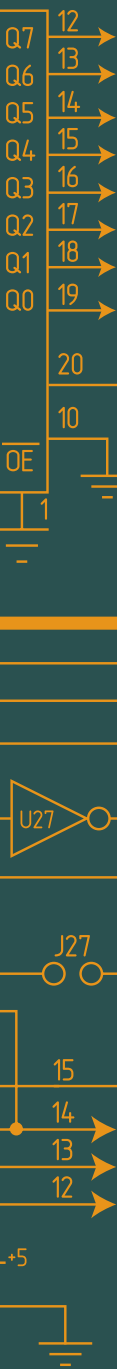
Tubing

Tygon, Teflon™, Silicone pinch valve, and Polyethylene tubing available in any length over 10 feet (3 meters).



Vacuum pump and trap

For labs without an easy vacuum source we offer a quiet Lab-duty oil-free vacuum pump with muffler for both 110V and 220V mains. Our large 10 liter polypropylene Vacuum Trap means you won't have to empty it as often. This Nalgene bottle includes easy luer lock fittings for vacuum tube connections and all necessary tubing to the pump and chamber.



"The EasyCode software you provided is simple to use. We use a large screen Macintosh for creating and storing protocols. We especially like the ability to create new protocols and download them directly to the ValveBank, it really couldn't be easier."

Dr. Susan Abrahamson
University of California,
Berkeley

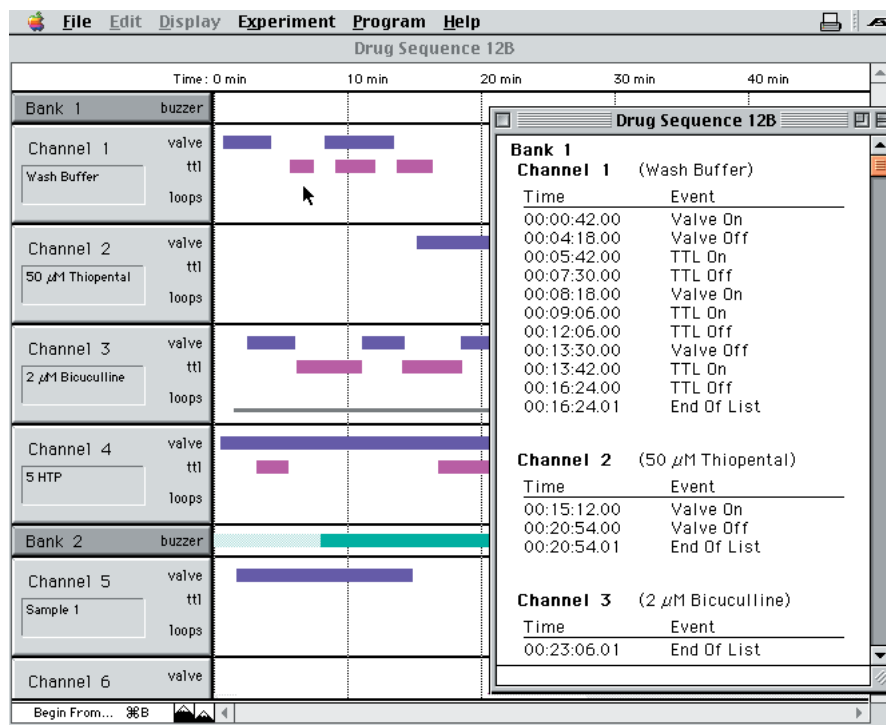
EasyCode Dialog Box

- Enter start and stop times accurate to 0.01 sec.
- Use all ValveBank commands including multi-channel looping and interface triggering

Free your computer during experiments

Transfer and run programs stored in the ValveBank, which can be disconnected from the computer – leaving it available for data acquisition.

Expand the computing power of your ValveBank system.



EasyCode® Software

Program your ValveBank® with a Macintosh or PC using easy "click-and-drag" time bars. Save and load unlimited programs to disk, print out program listings, then download your sequences into the ValveBank's memory with the included serial cable in one simple step.

- **Program up to sixteen channels of valves and digital outputs**
Open multiple experiment windows. List sequences to screen or printer. Copy and paste. Zoom in and out of your experiment.

EasyCode Software Ordering Information

| Part No. | Product Description | Price |
|------------|---|--------|
| 01-02-USB | EasyCode® Mac - ValveBank programming software Macintosh OS 6-9 & Classic with USB-to-serial adapter | \$ 274 |
| 01-03 | EasyCode® PC - ValveBank programming software - Windows 3.1-95 | \$ 195 |
| 01-03-2000 | EasyCode® PC - ValveBank programming software - Windows 98-XP | \$ 249 |
| USB | USB to serial converter - PC or Macintosh | \$ 79 |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.

AutoMate Scientific®
READY FOR RESEARCH.™

800.998.MATE | www.autom8.com | 650 University Ave #5, Berkeley, CA 94710 USA
tel 510.845.6283 | fax 510.665.3975 | e-mail info@autom8.com

Precise control for whole-cell or single-cell superfusion.



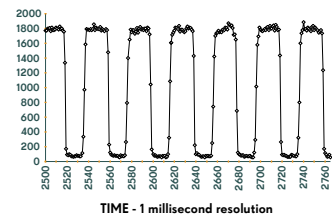
Pressurized Superfusion

For anyone who needs:

- **Faster switching and steady flow**
- **Fine microliter perfusion and microinjecting**

Easy to add to any new or existing gravity perfusion system from AutoMate Scientific, any third-party manufacturer, or even homemade rigs. Connect to house air or compressor (30 to 100 psi). Does not introduce bubbles into solution; helps overcome flow problems due to bubbles. Available in four-, eight- or sixteen-channel configurations. Syringe reservoirs may be placed in a water bath for temperature control. Elegant design allows individual control of each air line.

Liquid Switching in 3-4 msec.



Fast Flow Rhodamine B Fluorescence Switching - 40 ms period using the AutoMate Scientific Pressurized Perfusion System at 2 psi

Thilo Lacoste

Materials Science Division
Lawrence Berkeley National
Laboratory

Precision Components



- 5 micron filter and gauge
- Precision regulator delivers 0-10 psi

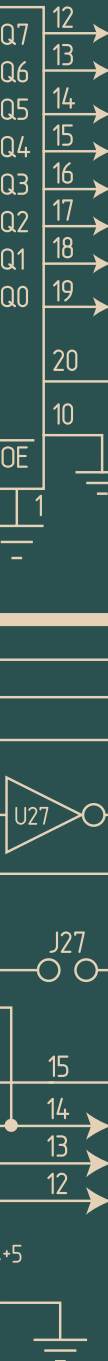


Several sizes of plastic syringe reservoirs or 35 ml glass syringes and Teflon tubing as our "Volatiles Pressure Upgrade."

Rubber Stoppers



Pressure Upgrade available with 35 or 60 ml syringes and rubber stoppers shown in this photo, or 50 ml screw-cap reservoirs.



Precision Components

- Stainless steel construction
- 5 micron filter and gauge
- Precision regulator delivers 0-15 psi
- Convenient toggle switch completely closes gas connection to tank when not in use



Oxygen8™ Bubbled Pressure Kit

You need rapid liquid switching with oxygenated solutions. How do you bubble Carbogen gas into closed, pressurized reservoirs? That's the engineering problem AutoMate Scientific has solved with several years of research: bubbled, pressurized perfusion.

You can add the new Oxygen8 to any new or existing gravity perfusion system from AutoMate Scientific, any third-party manufacturer, or even homemade rigs. Connect to your desired gas (30 to 100 psi). Available in four- or eight-channel configurations. Syringe reservoirs may be placed in a water bath for temperature control or combine with the AutoMate BubbleStop™ syringe heater.

Pressurized Superfusion Ordering Information

| Part No. | Product Description | Price |
|----------|--|----------|
| 09-04 | Perfusion Pressure Upgrade - 4 channel | \$ 395 |
| 09-08 | Perfusion Pressure Upgrade - 8 channel | \$ 495 |
| 09-16 | Perfusion Pressure Upgrade - 16 channel | \$ 750 |
| | with 35 or 60 ml plastic syringes, filter, regulator, and manifolds | |
| 09-04n | Perfusion Pressure Upgrade - 4x 50 ml screw-cap reservoirs | \$ 395 |
| 09-08n | Perfusion Pressure Upgrade - 8x 50 ml screw-cap reservoirs | \$ 495 |
| 09-16n | Perfusion Pressure Upgrade - 16x 50 ml screw-cap reservoirs | \$ 750 |
| 06-50 | Replacement 50ml screw-cap reservoir | \$ 12 |
| | with 50ml plastic screw-cap reservoirs, filter, regulator, and manifolds | |
| 09-04v | Volatiles Pressure Upgrade - 4 channel | \$ 796 |
| 09-08v | Volatiles Pressure Upgrade - 8 channel | \$ 1,240 |
| 09-16v | Volatiles Pressure Upgrade - 16 channel | \$ 2,225 |
| | with 35 ml glass syringes, Teflon tube, filter, regulator and manifolds | |
| 06-30g | Glass 30cc Syringes - set of four | \$ 259 |
| 09-14 | Oxygen8™ Bubbled Pressure - 4 channel | \$ 1,215 |
| 09-18 | Oxygen8™ Bubbled Pressure - 8 channel | \$ 1,480 |
| | with 35 or 60 ml plastic syringes, filter, regulator, and manifolds | |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.



Liquid switching times in milliseconds without moving sewer pipes.



Perfusion Pencil® Multi-Barrel Manifold Tip

- **Rapid solution change with micro-liter dead volume**
No piezo or stepper motor translation. No clumsy rotating valves.
- **Single-cell and patch delivery**
For mounting on any micromanipulator. Easy to connect and clean.
- **Vacuum cross-contamination prevention**
Use one tube to vacuum the tip volume clear between solution changes.

Perfusion Pencil® Ordering Information

| Part No. | Product Description | Price |
|-----------|---|--------|
| 04-04-[x] | Multi-barrel Perfusion Pencil® - 4-into-1 with 100, 250 or 360 µm i.d. tip | \$ 225 |
| 04-08-[x] | Multi-barrel Perfusion Pencil® - 8-into-1 with tip | \$ 225 |
| 04-16-[x] | Multi-barrel Perfusion Pencil® - 16-into-1 with tip | \$ 350 |
| 04-[x] | Replacement removable tips | \$ 30 |
| | [x] = specify -100, -250, or -360 µm i.d. removable tip or [ZDV] for new Zero Dead Volume Pencil (see ThermoClamp page) | |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.

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tel 510.845.6283 | fax 510.665.3975 | e-mail info@autom8.com

Pencil Tip Cross Section



4 to 16 micro-bore tubes into
1 outflow

360 Micron Removable Tip

Flow rates (±0.05):

Gravity 1.15 ml/min
2 psi 3.98 ml/min
8 psi 10.66 ml/min

250 Micron Removable Tip



Flow rates (±0.05):

Gravity .35 ml/min
2 psi 1.66 ml/min
8 psi 5.16 ml/min

100 Micron Removable Tip



Flow rates:

Gravity zero flow
2 psi 0.07 ml/min
8 psi 0.25 ml/min

100, 250 and 360 micron internal diameter removable delivery tips available

All tubing
now Teflon
lined

AutoMate Scientific®
READY FOR RESEARCH.™



Heated Perfusion Pencil with Neoprene Sleeve Removed

Easy luer-lock connections and manipulator mounting. Thermodynamic design maintains temperature with 5 ml/minute flow from both tips without any metal tubing.

Temperature Sensors Included

Separate chamber bath and Perfusion Pencil thermocouples included.

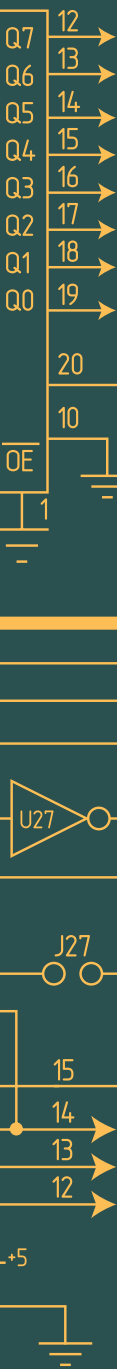
See previous page for flow rates.

See next section for syringe warmer to minimize bubbles.

Accurate temperature control, rapid solution switching and fast wash-out.

**ThermoClamp™-1 Temperature Control System**

- Combination inline heater plus multi-channel focal drug delivery**
 Maintain bath temperature and rapid drug wash-out with a high-flow bath line while quickly switching 4-8 preheated solutions through the Perfusion Pencil.® Steady 37°C at 5 ml/minute flow rates through both the bath line and tip.
- Advanced auto-tuning temperature lock**
 Fuzzy logic PID software maintains chamber or reagent temperature to within 1°C of setpoint or better. The ThermoClamp calibrates its own tuning for ideal temperature control - no need to guess "loop speed" settings.
- Designed for physiology research**
 No metal anywhere in the flow path - unlike some competitors. Low noise for electrophysiology with internal and external grounding plus electrical isolation between liquids and heating elements.
- Ready to use**
 Includes everything you need for heated perfusion: power supply, temperature sensors, and inline heater with easy luer lock tube connections.



You can have rapid switching, fast wash-out, and accurate temperature control at the same time. Set the ThermoClamp temperature from ambient to 50°C. A front-panel BNC provides an analog output of current temperature for recording. Different sizes of replaceable tips are interchangeable with our standard Perfusion Pencil. The tips have microliter dead volume for rapid switching. No messy water jacket is required, but the separate high-flow line is capable of heating a perfusion chamber with water jacket if desired.

Do you need to change your prep's temperature over the course of an experiment? A programmable "ramp and hold" feature can automatically vary the setpoint over time. The ThermoClamp system includes bath and Perfusion Pencil thermocouple sensors. Automatic overtemp and thermocouple failure protection alerts you to any problems. Incorporate temperature control into your perfusion rig with simple micromanipulator mounting.

Operation

Connect multiple reagent tubes from any perfusion system to the heated Perfusion Pencil on a manipulator directed into your chamber. If desired, connect a separate buffer line to the "high-flow" bath luer connection on the Pencil, and the outflow to your chamber. If your chamber includes a water jacket, you can use the high-flow line with a constant flow of water to heat the chamber. Place the bath thermocouple sensor in the chamber. Set your desired temperature on the controller and begin liquid flow. The ThermoClamp monitors bath temperature and heats the liquids flowing through the Perfusion Pencil keeping the chamber at exactly the desired temperature. Your perfusion system can quickly change solutions through the Perfusion Pencil tip and also deliver buffer for fast wash-out. Sophisticated circuitry will "auto tune" the ThermoClamp heating parameters based on your flow rates, chamber, and tubing to clamp the temperature and minimize over/undershoot.

ThermoClamp™ Temperature Control System Ordering Information

| Part No. | Product Description | Price |
|-----------|---|----------|
| 03-11-LL | ThermoClamp™1 - 1 channel with controller, heated Pencil and sensors | \$ 1,270 |
| 03-14-[x] | ThermoClamp™1 - 4 channel with controller, heated Pencil and sensors | \$ 1,470 |
| 03-18-[x] | ThermoClamp™1 - 8 channel with controller, heated Pencil and sensors | \$ 1,470 |
| | [x] = specify -100, -250, or -360 µm i.d. removable tip or [ZDV] for new Zero Dead Volume Pencil (see right column) | |
| 01-17b | Rack-mounting brackets - ThermoClamp to 19" rack | \$ 20 |
| 03-02 | 1 Channel replacement heated ThermoClamp Perfusion Pencil® | \$ 245 |
| 03-04 | 4 Channel replacement heated ThermoClamp Perfusion Pencil® | \$ 445 |
| 03-08 | 8 Channel replacement heated ThermoClamp Perfusion Pencil® | \$ 445 |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices. Manipulator not included.

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Easy to Read or Record



- Large LCD 0.1°C temperature display
- Analog temperature output

ThermoClamp-1



- Dimensions: 11.5" x 2" x 7"
- Weight: 4 lbs. (1.8 kg.)



Low noise - designed for electrophysiology.



Zero Dead Volume Pencils



All AutoMate Scientific Perfusion Pencils (ThermoClamp, SmartSquirt and regular Perfusion Pencils) are now available in a "Zero Dead Volume" configuration with all internal tubes extended 2 cm out of the tip.

The "ZDV" Pencils do not use removable tips since all of the tubes go all the way to your prep.

This eliminates the possibility of backflow and decreases solution switching times down to nearly zero.

AutoMate Scientific®
READY FOR RESEARCH.™



Stop bubbles by pre-warming solutions.



Available with gravity and pressurized syringes



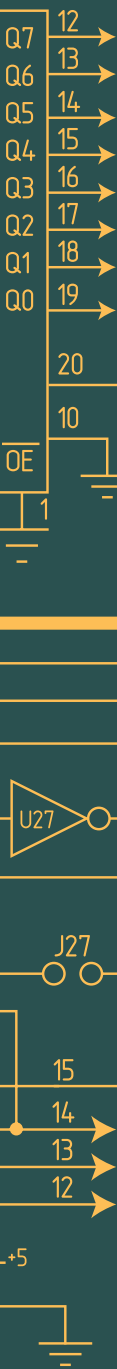
Off-gassing with pressurized perfusion

Note: the BubbleStop is NOT sufficient to warm solutions for delivery into a perfusion chamber without an inline heater like our ThermoClamp. The BubbleStop only helps stop bubbles.

BubbleStop™ Syringe Heater

Bubbles in perfusion systems are caused by solution temperature changes. As solutions warm, they cannot hold as much gas, so they off-gas. This forms bubbles in perfusion tubing. It is especially true in inline heaters where the temperature rises dramatically. The best cure for bubbles is to pre-warm your solutions. AutoMate Scientific introduces the BubbleStop™ Syringe Heater with integrated temperature sensor and feedback. Set the temperature on the BubbleStop a few degrees higher than room temperature or your inline heater, and the warmed solutions will off-gas in the syringe reservoirs to the maximum gas concentration for that temperature. Even if they cool and re-heat again inside the perfusion tubing, they will not off-gas.

- Easy to remove full syringes
- Analog DC heating circuitry means low noise for electrophysiology
- Completely shielded electronics plus external power supply
- Spill-proof design
- Range: ambient to 50°C liquid temperature
- Mounts to standard 1/2" rod



BubbleStop™ Ordering Information

| Part No. | Product Description | Price |
|-----------|---|----------|
| 10-4-60-G | BubbleStop4 60ml Syringe Heater - Gravity | \$ 1,100 |
| 10-8-60-G | BubbleStop8 60ml Syringe Heater - Gravity | \$ 1,250 |
| 10-4-60-P | BubbleStop4 60ml Syringe Heater - Pressurized | \$ 1,550 |
| 10-8-60-P | BubbleStop8 60ml Syringe Heater - Pressurized | \$ 1,700 |
| 10-4-35-G | BubbleStop4 35ml Syringe Heater - Gravity | \$ 1,100 |
| 10-8-35-G | BubbleStop8 35ml Syringe Heater - Gravity | \$ 1,250 |
| 10-4-35-P | BubbleStop4 35ml Syringe Heater - Pressurized | \$ 1,550 |
| 10-8-35-P | BubbleStop8 35ml Syringe Heater - Pressurized | \$ 1,700 |
| | Including 60ml or 35ml syringes, stopcocks and tubing. Pressurized version includes regulator, filter and gauge. | |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices.



"I just wanted to tell you that I have been using the SmartSquirt nearly every day, and I am very pleased with it. I have tested for cross contamination, and I believe it is very low. To prevent hydrostatic flow from the cryostat tubes into the bath, one line must continue perfusing bath solution after all other valves are closed. Your design changes help hold all of the fittings tightly and keep them from leaking or flowing backwards. I would also rate your company as being excellent for your immediate response to problems and questions on your products."

Dr. John G. Starkus

The Queen's Medical Center
Honolulu, Hawaii

**All tubing
now Teflon
lined**

Perfuse microliter volumes of precious solutions.



SmartSquirt® Micro-Perfusion System

- **Deliver microliter volumes starting with only 100 microliters of precious drugs**
Switch between eight solutions in milliseconds from a single tip.
- **Minimize cross-contamination with BackStop™ back-flow prevention**
Special 3-way relief valve design stops liquid flow quickly.
- **Valves and pressure controls in a small box near microscope - no stand necessary**
Includes pressurized large-volume reservoir for buffer.

Programmable dispensing, microinjection, perfusion or spritzing of reproducible microliter volumes. Up to eight solutions are stored in cryo tubes with easy syringe refill ports. Included pneumatic valves deliver regulated air pressure to push liquids out of the SmartSquirt Perfusion Pencil tip. An AutoMate Scientific (or other) valve controller offers programmable, manual or computer-controlled valve selection for switching which reagent is delivered from the tip. Pulse a valve quickly for microliter delivery, or leave it on for constant perfusion. The short delivery path saves expensive reagents. Integrated BackStop™ check valves prevent backflow found in competing micro-perfusion systems.

Detached SmartSquirt now standard with longer Pencil

No room on your microscope stage for the SmartSquirt? The Perfusion Pencil for the SmartSquirt now uses longer tubes for mounting the Reservoir Block up to 30 cm away from the delivery location. The Pencil itself is also 30 cm long for easier mounting on wide stages. Both standard.

SmartSquirt Reservoir Block



- Uses standard 2.5 ml cryo-tubes as reservoirs
- Minimize cross-contamination with BackStop™ back-flow prevention: one-way check valves inside the reservoir block prevent liquid backflow from the tip
- Easy ports for refilling reservoirs
- Convenient manipulator mounting
- Luer lock tips are interchangeable with our standard Perfusion Pencil®

Integrated Pressure Regulator



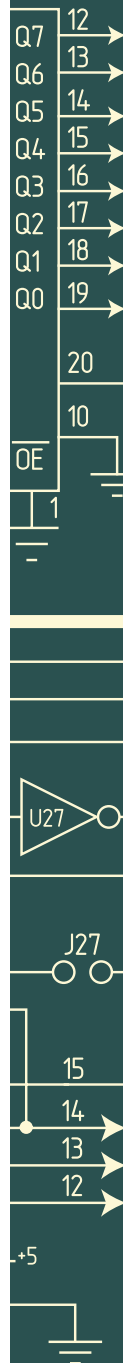
Precision regulator, gauge, 5 micron filter and electric valves are built-in.

The 0-10 psi regulator and air filter require a compressed air or other gas source -- bottle, compressor or lab air.

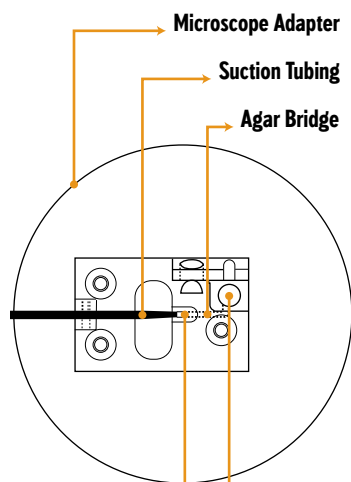
SmartSquirt® Micro-Perfusion System Ordering Information

| Part No. | Product Description | Price |
|--------------|---|----------|
| 07-04-[x] | SmartSquirt® 4 Micro-Perfusion System | \$ 1,650 |
| 07-08-[x] | SmartSquirt8 Micro-Perfusion System - SmartSquirt Valve Pressure Unit, Reservoir Block & Perfusion Pencil | \$ 2,049 |
| | SmartSquirt Systems with Valve Controllers | |
| 07-VL-04-[x] | SmartSquirt4 ValveLink Micro-Perfusion System | \$ 2,595 |
| 07-VL-08-[x] | SmartSquirt8 ValveLink Micro-Perfusion System | \$ 2,995 |
| 07-VB-04-[x] | SmartSquirt4 ValveBank Micro-Perfusion System | \$ 2,695 |
| 07-VB-08-[x] | SmartSquirt8 ValveBank Micro-Perfusion System | \$ 3,695 |
| | [x] = specify -100, -250, or -360 µm i.d. removable tip or [ZDV] for new Zero Dead Volume Pencil (see ThermoClamp page) | |
| 06-25 | SmartSquirt Cryo vials - 2.5 ml - Qty 8 | \$ 3 |
| 06-25c | SmartSquirt Cryo vials - 2.5 ml - Bag of 100 | \$ 25 |
| 02-01-05i | Replacement SmartSquirt Valve | \$ 59 |
| 05-07 | Colored SmartSquirt Tubing - 1/16" i.d. (per foot) | \$ 4 |
| 07-04-c | Replacement SmartSquirt Perfusion Pencil® - 4 channels | \$ 225 |
| 07-08-c | Replacement SmartSquirt Perfusion Pencil® - 8 channels | \$ 225 |

U.S./Canada prices shown. International prices add 15%. Email or visit web store for latest prices. Manipulator not included.



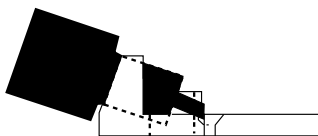
Oocyte Chamber Diagram



Oocyte
Reservoir for Reference Electrode

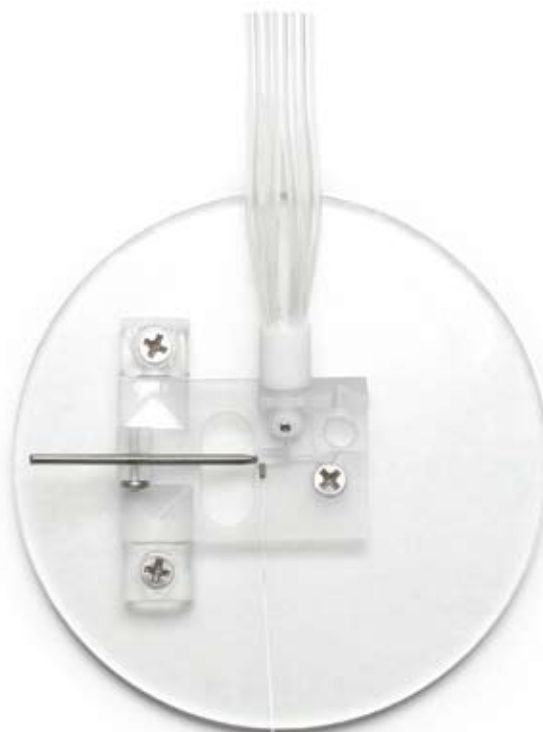
- Integrated outflow tube and agar bridge
- Chamber dimensions: 45 x 30 x 10 mm
- New slot for virtual ground electrode

Oocyte Chamber Side View



Insert micro-manifold for very low dead space

Low working volume means fast exchange times.



Oocyte Perfusion Chamber

- Small working volume (< 20 μ l)
- Fast solution exchange

Expression of recombinant receptors in oocytes has been a favorite choice for researchers to assess the pharmacology of signal transduction pathways. Since the oocytes are 1 - 1.5 mm in diameter, however, fast solution exchange around the oocyte was difficult. After several years of electrophysiological research, we have designed a *Xenopus* oocyte perfusion chamber for use in automated and unattended experiments. Combined with an automated perfusion system, this chamber allows researchers to obtain dose-response data quickly and easily.

Oocyte Perfusion Chamber Ordering Information

| Part No. | Product Description | Price |
|----------|---|--------|
| OPC-1 | Oocyte perfusion chamber - specify 80, 90, 100, or 120 mm stage adapter (Micro-manifold also recommended) | \$ 185 |

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Q7 12
Q6 13
Q5 14
Q4 15
Q3 16
Q2 17
Q1 18
Q0 19
20
10
OE
1
U27
J27
15
14
13
12
+5

Why transfer to coverslips?



"We do, indeed, get a rapid change of solution (depending, of course, on the adjusted fluid level), with mechanical stability otherwise very good, and no problems with noise, and the system is otherwise rather easy to set up. I could confidently recommend it to any investigator who works with cells that adhere strongly to the substrate."

Dr. Jonathan E. Freedman, Ph.D.

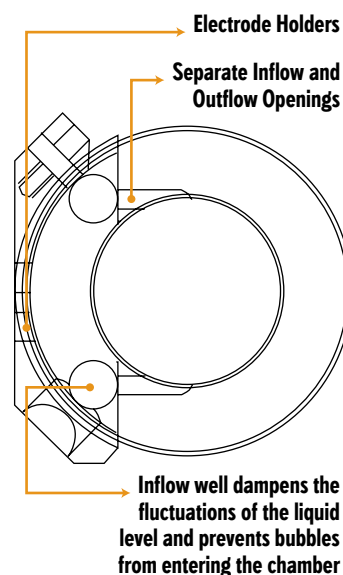
Department of
Pharmaceutical Sciences
Northeastern University

Petri Dish Perfusion Chamber

- Perfuse cells right in your Petri dish**

Cells cultured in Petri dishes are a popular research tool used in applications from patch clamping to intracellular ion probe imaging. True perfusion (continuous inflow and outflow) of solutions in the dish can be difficult to configure. This forces scientists to plate cells on cover slips for placement into specially designed perfusion chambers. The PCP-1 chamber was designed by scientists after years of patch clamp research to overcome this problem. Perfuse cells right in your Petri dish with any perfusion system and an optional Teflon manifold (sold separately). Ideal for inverted microscopy using optically clear Petri dishes. Adjustable metal suction tube included. Dimensions: 35 mm outside dia. x 20 mm tall.

Petri Chamber Diagram



Petri Dish Perfusion Chamber Ordering Information

| Part No. | Product Description | Price |
|----------|--|--------|
| PCP-1 | Petri dish perfusion chamber insert - optional specify Corning, Falcon, Nunc (Micro-manifold also recommended) | \$ 195 |

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