

# VC<sup>3</sup>: 4 & 8 Channel Gravity Perfusion Systems

Gravity perfusion is critical in most biological applications, both for maintaining the viability of preparations and establishing experimental conditions. Electronic control of solution exchange improves fluid delivery and enhances reproducibility over manual methods. With the VC<sup>3</sup> systems, you can configure systems for the basic requirements of the student lab or you can optimize them for the most demanding applications of patch-clamp recording and/or imaging.

## VC<sup>3</sup> Gravity System Highlights

- \* 4 & 8 channel versions
- \* Easy and fast setup
- \* Includes **MiniManifold™** outlet & **PV-2** flow control valve



- \* Electronics compatible with electrophysiology
- \* Low maintenance pinch valves or fast response solenoid valves



VC<sup>3</sup> 4 channel controller

### VC<sup>3</sup> Controller Features:

- \* Membrane front panel for touch control
- \* Automatic valve power reduction to 1/2 value after 50ms
- \* Manual control: toggle on/off or momentary on/off
- \* Auxiliary valve control for automatic outlet clearing
- \* Sync output for valve open marking
- \* Programmable TTL input or output for even more flexible DAQ control
- \* Valve Commander software - USB 2.0 for PC control



VC<sup>3</sup> 8 channel controller

included free with updates available for download via ALA web site

- \* Lasso Spill Sensor™ to protect expensive microscope parts - audible alarm and automatic shut off when spill is detected
- \* Computer control: Analog input 0.5V per valve - control system from Pclamp, PatchMaster, and other DAQ systems



VC<sup>3</sup> rear panel

# VC<sup>3</sup>: 4 & 8 Channel Gravity Perfusion Systems

## Choice of valves gives users greater flexibility

### Valve Options



3 way pinch

3 way pinch valves with normally open and closed positions. Easy to clean where the normally open port are used for long term perfusion experiments. Response times are 15 to 20ms.

2 way normally closed custom made solenoid valves for high speed 1 to 2ms response times



2 way solenoid

### Valve Manifold Options



- \* Enclosed in a shielded case for low noise operation
- \* Includes bracket for bar mounting
- \* Comes in 4 or 8 channel configurations
- \* Can hold either pinch or solenoid valves
- \* Single cable connection to VC<sup>3</sup> controller
- \* LED indicators for each valve



All gravity systems are complete; no need to buy additional parts to complete a setup!

#### MMF Minimanifold™:

These are the standard outlets that comes with all VC<sup>3</sup> gravity systems. Minimanifolds™ are available in 4 to 1 or 8 to 1 versions. They are designed for gravity fed solution exchange. They are made of ABS plastic. The inlet / outlet connections are made with 1/16" barbed fittings and connect to standard components.



#### PV-2 Flow Control Pinch Valve:



By attaching the PV-2 to the Minimanifold™ outlet you can accurately control the flow rate of all solution lines. With the PV-2 fluid contact with the valve is eliminated. Fluid flow is from zero to full flow (depending on gravity head). It was designed for fine adjustment of fluid flow and includes an easy to read metered scale. No fittings, cutting, removal of existing tubing, or adjusting hard to reach set screws are required to install these. These are included with every gravity fed VC<sup>3</sup> system.

#### Lasso Spill Sensor™:

Every VC<sup>3</sup> system includes one. Just wrap the lasso around your recording/imaging chamber and as little as a drop of solution will cause an automatic shutdown of all valves and an audible alarm.



#### TTL to BNC cable:

Every VC<sup>3</sup> system includes a TTL to 4 or 8 BNC cable. Each BNC is color coded for easy identification. All cables are professionally made.



### All gravity systems include:

- Reservoir manifold with 60ml luer lock syringes
- 3 way stop cock luer valves for easy filling
- VC<sup>3</sup> valve controller with TTL to BNC cable
- PV-2 flow control valve with flow graduations
- Valve manifold with choice of pinch or solenoid valves

- Lasso Spill Sensor™
- Magnetic stand with 2x 18" poles
- All tubing needed
- Minimanifold™ outlet

# VC<sup>3</sup>: 4 & 8 Channel Gravity Perfusion Systems

## Optional Accessories



### 4 or 8 Channel Bubbler System:

Bubbling perfusion solutions with CO<sub>2</sub>/O<sub>2</sub> mixtures is the best way to regulate carbonated buffers and insure proper oxygen content. ALA makes it easy to infuse critical gases with our bubbler manifolds that drop-in to our perfusion reservoirs with rod mounted

slide brackets. Each bubbler comes with high quality air stones, 2 way luer stop cock valves, tubing, and slide bracket. By using our oxygen safe PR-10 regulator system you are assured the right pressure every time.

### PR-10 Regulator Option:

The PR-10 is an oxygen safe dual regulator system that completely removes pressure fluctuations at the output. It is used to send pressure for precise, fast, focal drug delivery or



for use as the gas bubbler controller. It controls output pressures from 0 to 10 psi. The PR-10 employs a unique pressure switch with two modes for use with fast, focal perfusion. Bleed and pressure modes are used to completely depressurize the pressure reservoirs to prevent in-gassing when not in use. The PR-10 includes a dual scale pressure gauge and luer fittings for the inlet and outlets. Adjusting pressures is easy because the PR-10 sits right next to your microscope, unlike the hard to reach pressure regulators that are directly attached to the pressure source or situated on the holding pole.

### MS-Stage Plate & Tool Holders:

Electrophysiology experiments often require positioning of electrodes and perfusion devices within the confined space of a microscope stage. Utilize the small space efficiently with the MS-Stage Plate and Tool Holders.



Advantages of these tools are:

- \*Locking ball and socket mount with all tool holders
- \*Magnetic base anchors holders anywhere on plate
- \*Durable powder-coated steel construction
- \*Many different tools for all applications

for further information ask for MS-Stage literature

### MLF Millimanifold™:



Millimanifolds™ use polyimide tubing and offer smaller volumes than the standard Minimanifolds™. The Millimanifolds™ do not have a removable tip. They include standard barb fittings that connect to 1/16" ID tubing. The MLF's are completely inert, easy to clean, and can be mounted onto any manipulator. They are ideal for focal applications of solutions when applied solution volume isn't critical. Large output diameters (500µm) work well with gravity fed systems. Standard configurations of 4 to 1, 8 to 1, and 16 to 1 are available. Custom variations are also available.

### Specifications for MLF:

Material: polyimide tubing, Overall length: 4"/10cm,

Tip length: 0.59"/15mm

ID: 500µm OD: 900µm

Dead Volume: MLF-4: ~5µl, MLF-8: ~6µl

Tubing connections: 1/16"/1.57mm barb fittings

for further information ask for manifolds literature

### LL-2, LevelLock™ Chamber Level Controller



Minimizing fluid levels in recording and imaging chambers is critical for reducing stray capacitance and noise, but maintaining low fluid levels with surface aspiration generates turbulent flow and unstable liquid levels. ALA's LevelLock™ LL-2 features a miniaturized, exquisitely sensitive optical sensor that regulates aspiration beneath the air to liquid interface, providing stable and smooth liquid flow at very reduced fluid levels. The LevelLock™ LL-2 is excellent for cellular electrophysiology and imaging applications.

for further information ask for LL-2 literature

### VWK, Vacuum Waste Kit:



The VWK is an economical laboratory waste system. It is designed to assist in the removal of fluid from cell preparations. It can provide up to -2.5psi/-17.2kPa suction and trap nearly 2l of fluid. It serves as an ideal suction source for the ALA LevelLock™ chamber level controller, and is good for all light duty suction jobs involving small cell chambers.

for further information ask for VWK literature

# VC<sup>3</sup>: 4 & 8 Channel Gravity Perfusion Systems

## Ordering Information

ALA VC <sup>3</sup> -4PG	4 Channel Bath Perfusion System: incl. 4 pinch valves, 4 x 60ml reservoirs, VC3 controller, power supply, 4 luer valves, magnetic stand, spill sensor, MMF-4, PV-2, TTL/BNC4 cable, and USB software		
ALA VC <sup>3</sup> -4SG	4 Channel Bath Perfusion System - incl. 4 Lee solenoid valves, 4 x 60ml reservoirs, VC3 controller, power supply, 4 luer valves, magnetic stand, spill sensor, MMF-4, PV-2, TTL/BNC4 cable, and USB software		
ALA VC <sup>3</sup> -8PG	8 Channel Gravity Perfusion System: incl. 8 pinch valves, 8 x 60ml reservoirs, VC3 controller, power supply, 8 luer valves, magnetic stand, spill sensor, MMF-8, PV-2, TTL/BNC8 cable, and USB software		
ALA VC <sup>3</sup> -8SG	8 Channel Gravity Perfusion System: incl. 8 Lee solenoid valves, 8 x 60ml reservoirs, VC3 controller, power supply, 8 luer valves, magnetic stand, spill sensor, MMF-8, PV-2, TTL/BNC8 cable, and USB software		
ALA VC <sup>3</sup> -4C	4 Channel Valve Controller including power supply, valve cable, TTL/BNC4 cable, and USB software	ALA DB9-CABLE	VC <sup>3</sup> controller to valve manifold replacement cable
ALA VC <sup>3</sup> -8C	8 Channel Valve Controller including power supply, valve cable, TTL/BNC8 cable, and USB software	ALA DB9F-BNC4	TTL trigger to 4 BNC cable for use with VC <sup>3</sup>
ALA VC <sup>3</sup> -PS	VC <sup>3</sup> controller power supply	ALA DB9F-BNC8	TTL trigger to 8 BNC cable for use with VC <sup>3</sup>
ALA BUBBLER-4	4 channel air bubbler option w/4 air stones, bracket for VM-Stand, 4x2-way stopcocks, and air manifold	ALA VC <sup>3</sup> -BREAK	Breakout board to VC <sup>3</sup> controller for up to 8 12V valves
ALA BUBBLER-8	8 channel air bubbler option w/8 air stones, bracket for VM-Stand, 8x2-way stopcocks, and air manifold	ALA VM-STAND	Magnetic base stand for BPS valve manifolds - 2 rods and magnetic base
ALA PV	3 way NC/NO replacement pinch valve	ALA L2V	2-way LFAA Lee Co. replacement valve
ALA RESBRACK-4	4 Reservoir bracket for 60ml reservoirs w/mounting block - other sizes available	ALA RESBRACK-8	8 Reservoir bracket for 60ml reservoirs w/mounting block - other sizes available
ALA PV-2	Flow control manual adjusted pinch valve	ALA SPILSNSR	Replacement Lasso Spill Sensor with connector
ALA MLF-4	MilliManifold™ 4 to 1 polyimide tubing 500 mm ID w/1/16" barb fittings	ALA MLF-8	MilliManifold™ 8 to 1 polyimide tubing 500 mm ID w/1/16" barb fittings
ALA MMF-4	MiniManifold™ 4 to 1 for 1/16" ID tubing	ALA MMF-8	MiniManifold™ 8 to 1 for 1/16" ID tubing
ALA TUBING-2	1/16" ID x 1/8" OD PVC tubing 10'	ALA TUBING-3	Gravity silicone pinch valve tubing 2' - gravity flow
ALA VC <sup>3</sup> -4TUBE	VC <sup>3</sup> -4 tubing kit - PVC/silicone tubing & connectors w/o MMF-4	ALA VC <sup>3</sup> -8TUBE	VC <sup>3</sup> -8 tubing kit - PVC/silicone tubing & connectors w/o MMF-8
ALA 3WLV	3 way stop cock luer valve	ALA SFK	Misc. tube and luer fitting kit
ALA 60MLSYPINGE	Box of 25 60 ml syringes	ALA PR-10	Adjustable 0-10 psi pressure regulator controller

## Specifications

<b>Valve Controller:</b>	
Dimensions/Weight	8"/20.32cm x 6"/15.24cm x 2.5"/6.35cm / 1.5lbs/0.68kg
Power	15VDC/3.15A
Computer Control Input	Analog input 0.5V/valve; TTL high 1 bit/valve; USB 2.0 command
Computer Output Monitoring	Analog output 0.5V/valve; Sync TTL high; TTL high 1 bit/valve
Manual Control	Membrane switch 1/valve; mom on/off or toggle on/off
<b>Valve Manifolds</b>	
Pinch Valves	12VDC/0.25A ea.- 3 way normally open/normally closed pinch valve
Pinch Valve Opening Speed	15 to 20 ms
Pinch Valve ID Tubing	0.040"/1mm
Solenoid Valves	12VDC/0.08A ea.- Lee OEM Inert Solenoid Valve
Solenoid Valve Opening Speed	1 to 2 ms
Reservoirs	60ml luer lock syringe

**Gravity flow rate specifications assuming 60ml reservoirs are full without the PV-2 valve attached.**

Height (cm)	w/ MLF ml/min	w / MMF ml/min
90	11	37
80	10	31
70	9	29
60	8	25
50	7	22

Specifications are subject to change without notice.