

Perfusion Systems

ALA Scientific's 4 and 8 channel perfusion systems fulfill the basic requirements of the student lab but also can be optimized to fit the most demanding applications of patch clamp recording and/or imaging. All VCPlus systems provide electronic control of solution exchange which improves reproducibility over manual methods. These systems are designed to minimize electronic noise so sensitive electrophysiological recordings can be performed.

Key features of the VCPlus 4 & 8 channel systems include:

- Choice of low-maintenance pinch valves or faster-sponse Isolation valves
- Customizable reservoir sizes and materials
- Bath or focal perfusion applicability
- Valve control through DAQ, VCPlus software, or controller
- Optional spill sensor with automatic shutoff to protect microscope optics
- **MilliManifold™** and **MicroManifold®** outlet options for low volume and rapid applications
- Valve open and close timestamps via analog or digital output

VCPlus systems have the option of integrating either pinch or isolated valves. Three-way pinch valves have response times of 15 - 20 ms and are easy to clean because solution runs through the valve in removable tubing. Isolation valves have response times of 2 - 3 ms and are made for high speed applications.

Unlike other competitive perfusion systems, all VCPlus systems include Windows compatible command software which allows users to set protocols for opening and closing of specific channels for preset amounts of time. Protocols can be initiated by starting within software or by external trigger from data acquisition systems. Individuals valves of the VCPlus systems can also be controlled via analog or TTL input.



VCPlus 4 channel controller



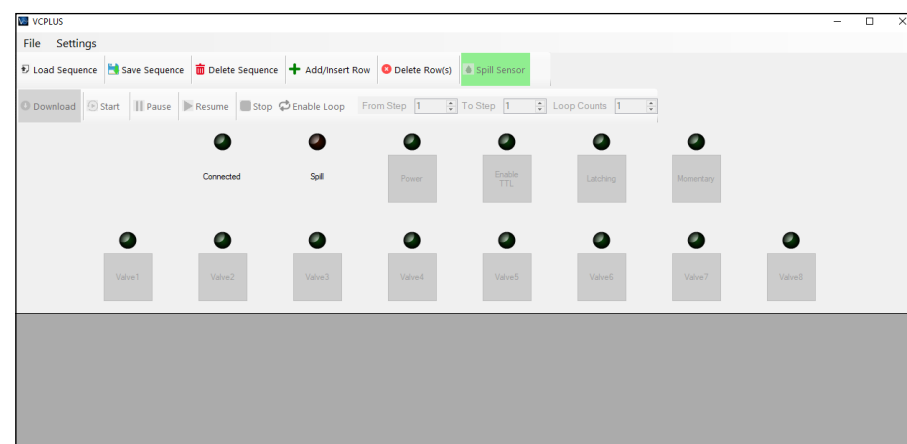
VCPlus 8 channel controller

VCPlus Controller Features:

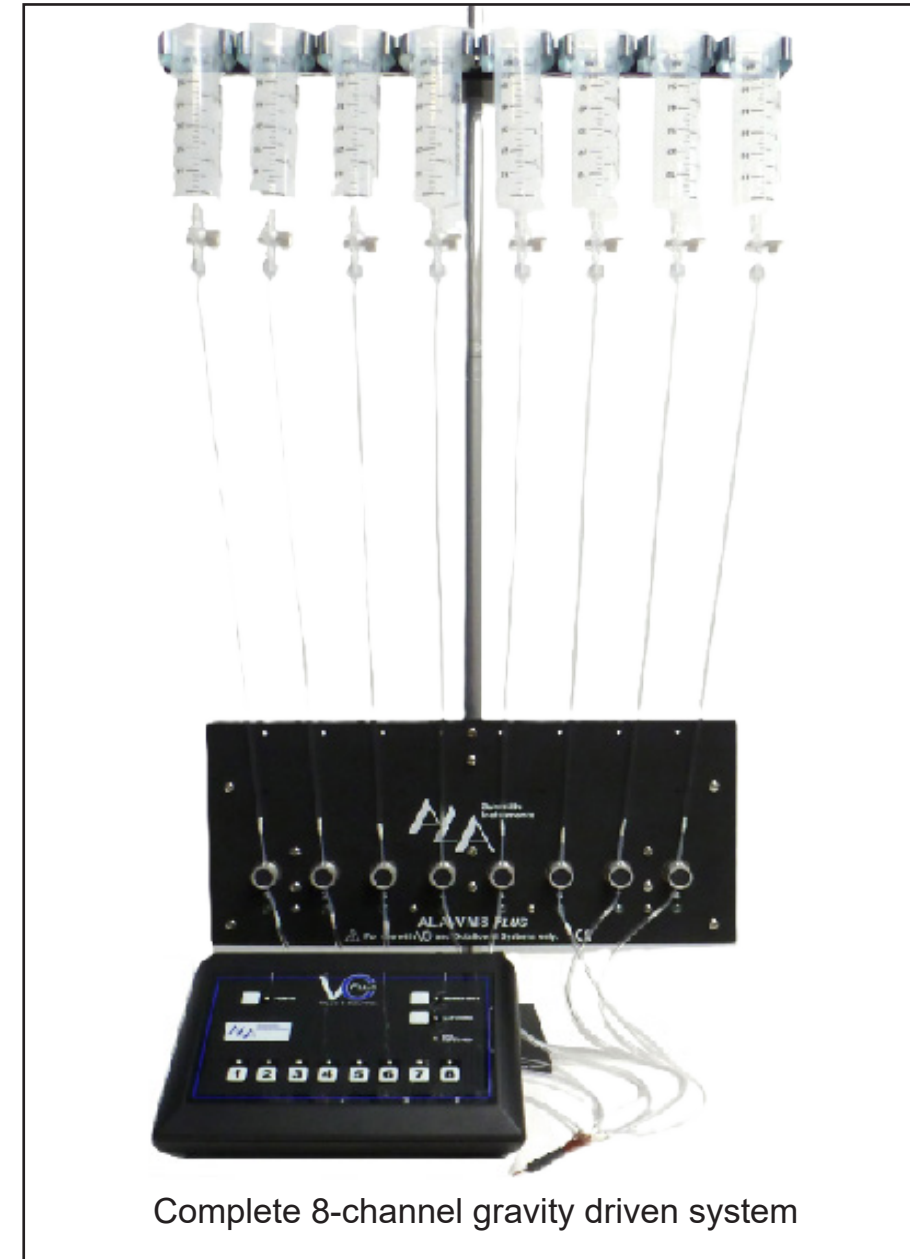
- Membrane front panel for touch control
- Automatic valve power reduction to 1/2 value after 20ms to prevent overheating
- Manual control: toggle on/off or momentary on/off
- Auxiliary valve control for automatic outlet clearing
- Sync output for valve open marking
- Programmable TTL input for even more flexible DAQ control
- Valve Commander Software - USB 2.0 for PC control included free with updates available for download via ALA website.
- Lasso Spill Sensor™ to protect expensive microscope parts - audible alarm and automatic shut off when spill is detected
- Analog input/output 0.5V per valve
- Control system from Pclamp, PatchMaster, and other DAQ systems



VCPlus rear panel



Gravity Perfusion Systems



Complete 8-channel gravity driven system

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 VCPlus 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.

VCPlus systems can drive fluid by using gravity.

Gravity driven systems are ideal for use with larger diameter tubing and can be used to perfuse bath preparations to maintain viability and establish experimental conditions. Gravity systems includes a valve manifold with isolated or pinch valves, 60 ml reservoirs, VCPlus controller, power supply, Luer valves, magnetic stand, USB cable, and software. Options include spill sensor, MLF or MMF perfusion outlet, BOB-8 BNC box for connection to digital In on controller, and flow control valve (FCV-1).

VCPlus Gravity System Highlights

- 4 & 8 channel versions
- Easy and fast setup
- Electronics compatible with electrophysiology
- Low maintenance pinch valves or fast response isolated valves
- Comes complete with all tubing



Complete 4-channel gravity driven system

Gravity flow rate specifications assuming 60ml reservoirs are full and FCV-1 valve is not attached

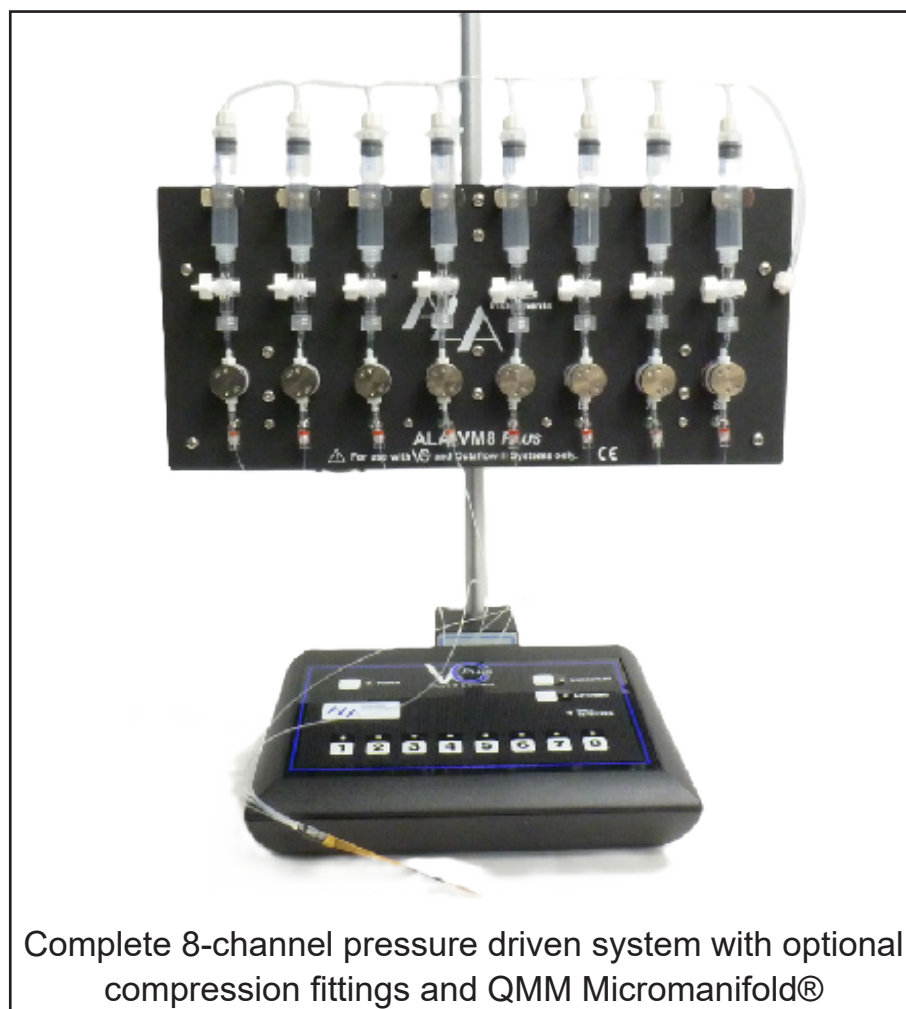
Height (cm)	w/Millimanifold™ (ml/min)	w/Minimanifold™ (ml/min)
90	11	37
80	10	31
70	9	29
60	8	25
50	7	22

Fast Focal Perfusion Systems

VCPlus Fast Focal System Highlights

- Easy and fast setup
- 4 & 8 channel versions
- Use with ALA's QMM Micromanifold® for rapid solution exchange and low dead volume (<90nl)
- Low maintenance pinch valves or fast response isolated valves
- Electronics suitable for electrophysiology recording

Sample pressurized flow rate:
1ml in 9 minutes
at 10 PSI/ 70kPa
through
QMM Micromanifold® with 100µm
ID tubes



Complete 8-channel pressure driven system with optional compression fittings and QMM Micromanifold®

Rapid focal perfusion is critical for establishing experimental conditions, such as dose response curves. Electronic control of solution exchange is the only way to ensure rapid fluid delivery and reproducibility. By using a VCPlus system with focal outlet, you can configure the system for very basic perfusion requirements or you can optimize the system for the most demanding applications of patch-clamp recording and/or imaging.

VCPlus systems can drive fluid by using pressure.

Pressure driven systems can perfuse solution through tubing with very small ID's, therefore, are ideal for use in focal applications where only a small amount of solution is needed around the preparation and pressurization also means a faster switch rate at the cell membrane. This focal application is especially useful for researchers looking for dose response curves. Pressurized systems include valve manifold with isolated or pinch valves, 5ml pressurized reservoirs, VCPlus controller, power supply, magnetic stand, USB cable, and software. Quartz MicroManifold® (QMM) perfusion outlet, BOB-8 BNC box, compression fittings (CF), PR-10 Pressure Regulator, and spill sensor are sold separately.



Complete 4-channel pressure driven system with optional compression fittings and QMM Micromanifold®

Ordering & Specifications

Ordering information for the VCPlus	
All VCPlus systems include controller, power supply, magnetic stand, valve manifold, spill sensor, valve bank to controller cable, and software	
VCPlus-4PG	4 Channel incl. 4 pinch valves, 4 x 60ml reservoirs, 4 Luer valves. Flow control valve, MMF-4 or MLF-4, spill sensor, and Bob-8 are not included: MUST be purchased separately.
VCPlus-4CLG	4 Channel incl. 4 Isolation valves, 4 x 60ml reservoirs, 4 Luer valves. Flow control valve, MMF-4 or MLF-4, spill sensor, and Bob-8 are not included: MUST be purchased separately.
VCPlus-8PG	8 Channel incl. 8 pinch valves, 8 x 60ml reservoirs, 8 Luer valves. Flow control valve, MMF-8 or MLF-8, spill sensor, and Bob-8 are not included: MUST be purchased separately.
VCPlus-8CLG	8 Channel incl. 8 Isolation valves, 8 x 60ml reservoirs, 8 Luer valves. Flow control valve, MMF-8 or MLF-8, spill sensor, and Bob-8 are not included: MUST be purchased separately.
VCPlus-4PP	4 channel pinch valve system w/ pressurized 5ml reservoirs. 4 x CF-1's and QMM-4WT or MLF-4 and tubing not included; MUST be purchased separately.
VCPlus-4CLP	4 channel Isolation valve system w/ pressurized 5ml reservoirs. 4 x CF-1's and QMM-4WT or MLF-4 and tubing not included; MUST be purchased separately.
VCPlus-8PP	8 channel pinch valve system w/ pressurized 5ml reservoirs. 8 x CF-1's and QMM-8WT or MLF-8 and tubing not included; MUST be purchased separately.
VCPlus-8CLP	8 channel Isolation valve system w/ pressurized 5ml reservoirs. 8 x CF-1's and QMM-8WT or MLF-8 and tubing not included; MUST be purchased separately.

Specifications for the VCPlus	
Valve Controller:	
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/value; TTL high 1 bit/valve; USB 2.0 command
Computer Control Monitoring	Analog output 0.5V/value; Sync TTL high; TTL high 1 bit/valve
Manual Controls	Membrane switch 1/valve; mom on/off or toggle on/off
Valve Manifolds:	
Pinch Valves	12VDC/0.25A ea.- 3 way normally open/normally closed pinch valve
Pinch Valve Opening Speed	15 to 20 m s
Pinch Valve ID Tubing	0.020"/0.5mm for pressurized systems/.040/1mm for gravity
Isolation Valves	12VDC/0.8A ea.- Clippard inert isolation valve
Isolation Valve Opening Speed	2-3 m s
Reservoirs Pressure	5ml Luer lock pressurized syringe with 3-way stop clock valve/other sizes available
Reservoirs Gravity	60ml Luer lock syringe