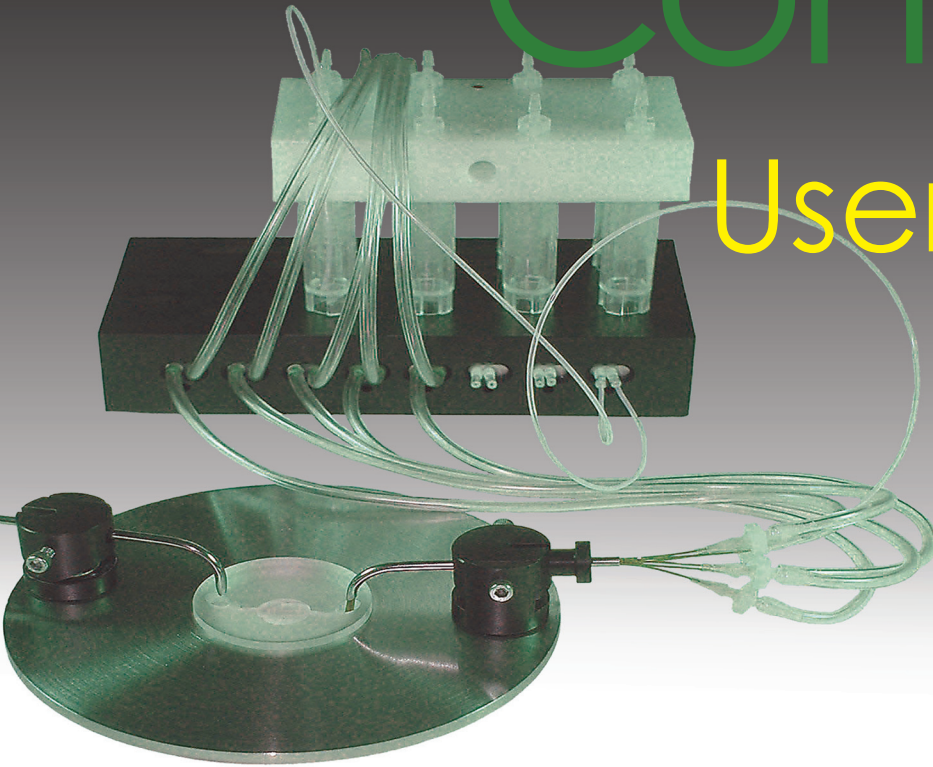


Flow Control

User's Guide



Pressure Controller for liquid delivery systems

- Precise Pressure Control throughout the experiment
- Flow control
- 1ms Resolution Timer
- Ideal for Small Volume Delivery systems
- Manual, Foot and TTL Controls



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Specifications

Output Range 0 to 750mmHg (14.5 PSI)
Input not required
Timer 1 ms resolution, up to 99 min
Control manual/foot and TTL input
RS232 port monitor and control pressure

Output: easy disconnect for 1/8 O.D. tubing,
#10-32 threaded
includes barbed and luer fitting
Size (Controller) : 12Wx6Hx8D in
Power Supply 100 to 240 VAC, 50/60 Hz

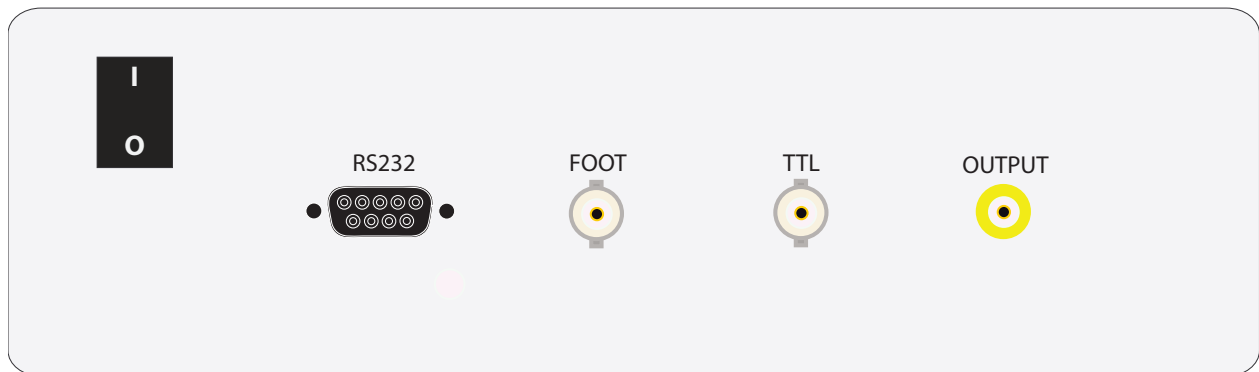
Introduction

The complete pressure control system comes with a controller, tubing to connect to custom setups, and fitting. No pressurized source of gas is required to operate the system. During operation, the controller is continuously monitoring the output pressure level to provide consistent pressure pulses or continuous and defined flow of solution.

Installation Guide

1 Using provided fitting connect 1/8" O.D. black tubing to your setup: injection needle, pressure switch PS-V8P, gas mixture adapter SH-A, pressure cylinders PC or a small volume delivery system SVDS1/2. Some additional tubing and fitting might be required. Usually luer-lock fitting or other easy-connect adapters are used to splice different diameter tubing while connecting to the tubing with a luer-lock provided, which fits inside OUTPUT port on the back of the controller. After splicing tubing to your setup, simply push the black tubing inside OUTPUT port all way, and slightly pull back to clamp. In order to disconnect the tubing, push YELLOW rim inside the connector, and pull the tubing out.

Connect power cable to the controller. Plug the power cable into the wall outlet.



2

Turn the controller ON. The display will show three control buttons, and numerical key-pad.

Buttons:

ZERO – adjust the output by subtracting (offset) the initial background readings if present. This is an optional procedure and can be done just after the controller was turned ON and the OUTPUT is CLOSED, if the pressure readings are not 0.

IMPORTANT: While operating the controller some residual pressure can accumulate inside the controller. Thus, before applying ZERO function, disconnect the controller from the setup and OPEN the output to release the pressure.

START/STOP – starts the pressure generator, after which the buttons turns to **STOP** button, which stops the generator and releases the output pressure.

OPEN/CLOSE – opens the output, so pressure is supplied out from the controller. The buttons turns to **CLOSE**, which indicates that the output can be closed by touching the button again.

KEY-PAD is used to adjust the output pressure and timer;

CLEAR – clears the windows from the previous PRESSURE/TIMER level;

ENTER – enters the new PRESSURE/TIMER level into the controller memory,

TIME – switches the key-pad into **TIMER** control. The button will turn into “**mmHg**” button, which will switch the key-pad back to pressure control. Although the timer can be programmed down to 1ms, in practice, any duration less than 25ms will not result in actual opening of the output due to mechanical constrains.



3 The output pressure will regulate solution flow rates in your liquid delivery setup.

IMPORTANT: in case of open (not-sealed) systems, it is normal for pressure reading being low. This, however, should be avoided since the controller is designed to provide pressure to closed systems in order to regulate flow rates in small volume delivery setups.

4 The front panel INJECT button can OPEN the OUTPUT to deliver pressure pulses to the setup. If the TIMER is set to 0, pushing and releasing the button will OPEN and CLOSE the OUTPUT respectively. However, if the TIMER is not 0, the OUTPUT will CLOSE automatically after TIMER becomes 0. The same applies to OPEN button on the display: the OUTPUT will CLOSE automatically. The green led inside the button will indicate if the OUTPUT is open (regardless of how it was opened, manually, by foot or by TTL input).

5 Applying TTL signal (+5V) through the BNC connector on the back panel will also OPENS the output and triggers the TIMER. If the TIMER is not 0, the OUTPUT will close automatically after countdown.

6 The TIMER can be stopped and the OUTPUT closed during operation by pushing INJECT button or touching CLOSE button on the display.

Software control and monitoring

Use NULL-modem cable to connect the controller to a computer RS232 port. The port should be set to 115,200 baud, 8bits, 1stop, NO parity. Every command should be followed by decimal 13 code (/n).

!S - Start

!Z - stop and Zero output

!C - Close output

!O - Open output

!V - return pressure Value in mmHg Pvvv.v

!R - return Reference value (Set in mmHg Snnn)

!Pvvv - set Pressure value in mmHg

!N - return serial number

!? - return list of commands

!A - return A scale calibration (An.nnn)

!B - return B offset calibration (Bnnn.n)

!D - return Digital output (Dnn - first n for output valve, second n for Zero valve, 1 - open, 0 - closed)

!L - show caLibration screen

!0 - offset compensation of output pressure, similar to ZERO button

!Tsnnn - sets the timer, where s is a scale: 1 for ms, 2 - sec, 3 - min

!t - returns the current timer countdown.

Calibration procedure.

After sending !L command, the controller will erase the previous calibration values, and will store the default values.

After sending !L command to the controller, the display will show two additional buttons:

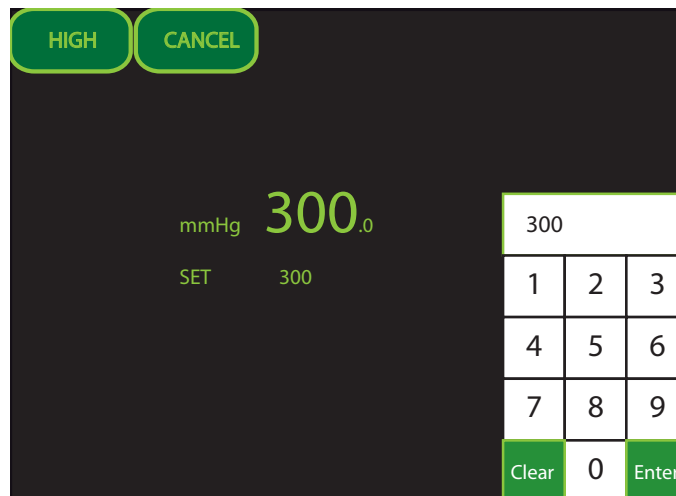
HIGH – initiates the calibration procedure by supplying high level of 300mmHg pressure to the output. After the pressure readings are stabilized, enter the correct value measured with a third party manometer, using CLEAR key, numerical key-pads, and then ENTER key (should be around 300mmHg value). After the first entry, the button turns to

LOW, and the controller starts supplying low level of 50mmHg. Again, after the pressure readings are stabilized, enter the correct value using the key-pad. After, the second entry, the buttons turns to

SAVE button, which can be used to put the calibration values into the controller memory.

CANCEL – cancel the calibration procedure.

The controller should be turned OFF before resuming the normal operation.



Warranty

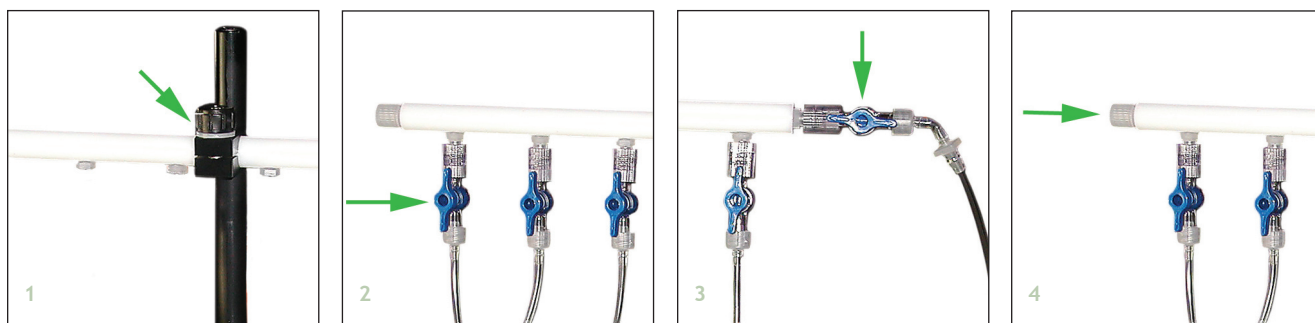
This product is warranted to be free from defects in material and workmanship for the duration of one year. Normal wear, or damage resulting from abuse, accident, alteration, misuse, service by an unauthorized party or shipping damage, are excluded from this warranty and are not covered. Bioscience Tools will repair or replace the defective product covered by this warranty free of charge if it is returned, postage prepaid, to Bioscience Tools, ph: 1-877-853-9755.

Inputs & Outputs	
OUTPUT port	Connects to a customer setup to deliver consistent pressure or pulses.
INJECT BNC connector	Connects to a foot pedal to deliver pressure pulses and trigger the timer.
RS232 DB-9 connector	Connects to a computer for software control.
GREEN LED	Front panel GREEN led is ON when the OUTPUT is open.

Front Panel Control	
INJECT button	Opens the output to deliver pressure pulses and trigger the timer.

Gas Mixture Adapter, SH-A

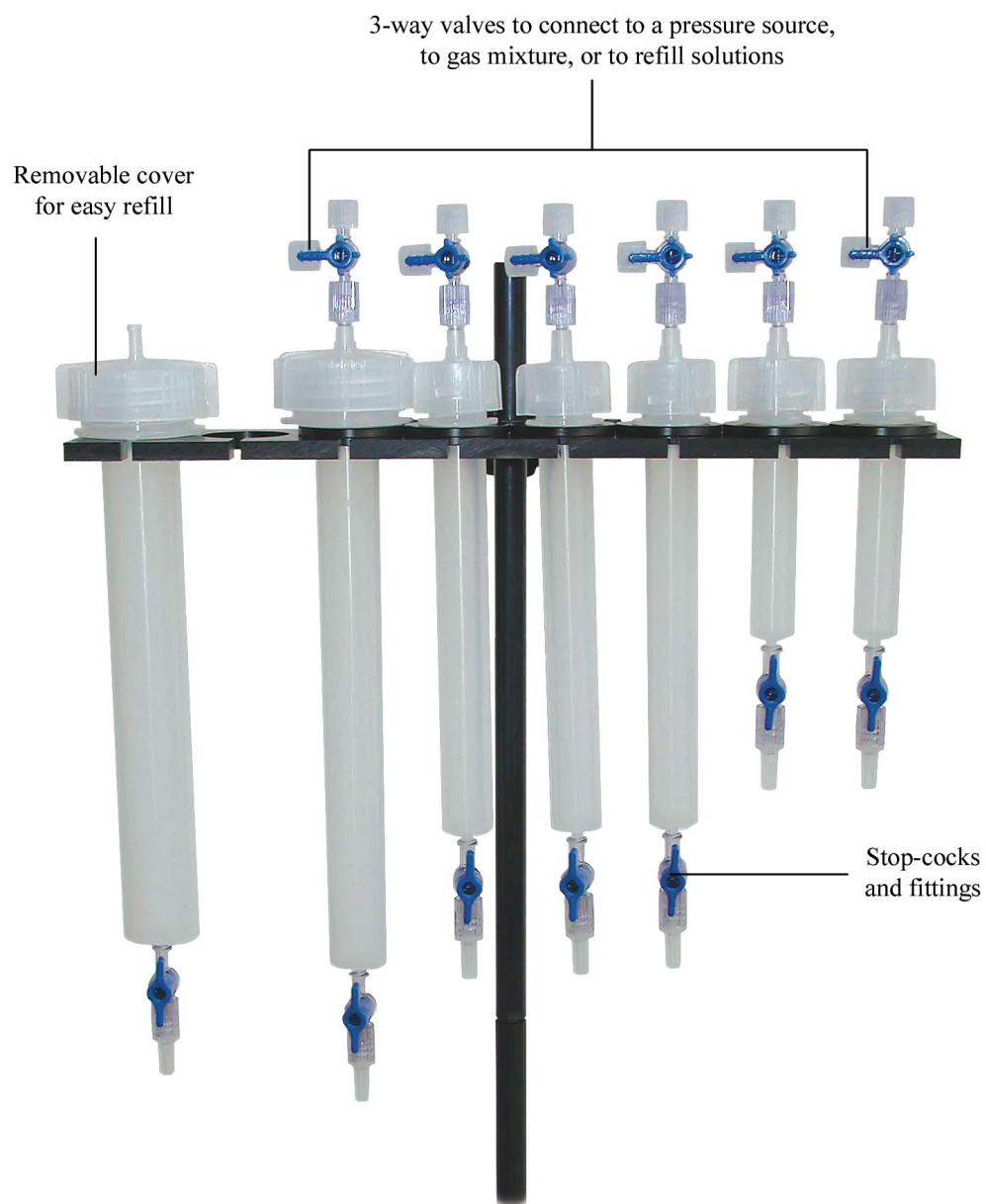
This adapter is used to pressurize or to deliver gases, CO₂/O₂ for example, to experimental solutions in syringe barrels or other containers. Continuous bubbling of the experimental solutions ensures gas saturation inside the solutions. The adapter can be also used to pressurize the solutions by connecting to optional pressure cylinders, PC, available in different sizes - volumes.



1. Mount the adapter on a 0.5in. post (included with SH-1A syringe holder) using provided X-block.
2. Eight luer connectors positioned along the adapter deliver gases to eight separate solutions through 2-way valves (stop-cocks) and thin Teflon or polyethylene tubing. The tubing can be replaced with any custom tubing and other means to dissipate gases inside solutions (aquarium stones, for example). If less than 8 solutions are used, the extra outlets can be closed.
3. Use soft tubing with luer-lock to connect to a source of gas mixture through a 3-way valve attached to the end.
4. Another end can be plugged, or connected to the second adapter (several adapters can be connected in sequence to use the same gas mixture).



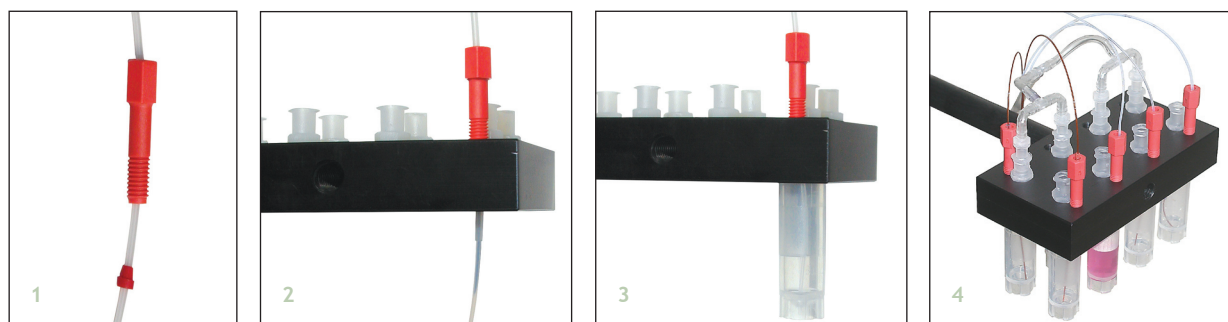
Pressurized Cylinders, PC



Small Volume Delivery System, SVDS1

SVDS1 system can be used with a pressure source, or solutions can be withdrawn by a negative pressure supplied by CFPS-1U units. The output solution tubing can be connected to valves of a solution switch, and then to a MM, PM or ZMM micro-manifolds. The pressure input should be connected to a regulated pressure source using 1/16" I.D. tubing and T/Y-connectors – one pressure input to all eight (or less) pressure input luer ports positioned on the top. The solutions will be switched by turning ON/OFF the appropriate valves by the controller of the perfusion system. The applied pressure will push the solution through the opened line.

The system ships fully assembled. Below are the instructions on connecting the replacement tubing.



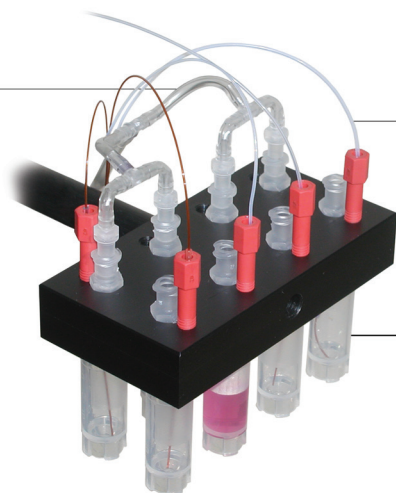
1. Measure and cut eight (or fewer) pieces of polyethylene tubing, 1/16" O.D. - fitting sleeves. Put a short piece of the fitting sleeve over delivery tubing (the system is shipped with 2' of Teflon tubing per each channel). Insert the sleeve into the ferrule.
2. Secure the tubing inside the plastic block by tightening the threaded nut (do not tighten completely yet).
3. Screw in conical plastic tube (included), and pull the delivery tubing so that the end of it still touches the conical bottom. Tighten the threaded ferrule fitting.

ALTHOUGH PROVIDED FITTING WILL ENSURE AIRTIGHT SEAL, THREADED PORTS AND TUBES MIGHT REQUIRE SOME GREASE TO MAKE AIR-TIGHT SEAL INSIDE THREAD.

4. The system can be mounted on a custom 6 mm O.D. rod or on 1' long threaded aluminum rod, which can be mounted on a standard 0.5" O.D. stand through X-block (X-block and a threaded rod are included). This allows positioning the solutions near your samples, to minimize the dead volume.

If valves used to open solution lines, connect Teflon tubing to valve's inlet using sleeves of soft tubing. The valve's outlet should be connected to a micropipette, a micro-manifold or a chamber using another tubing.

Connecting tubing to
a source of pressure



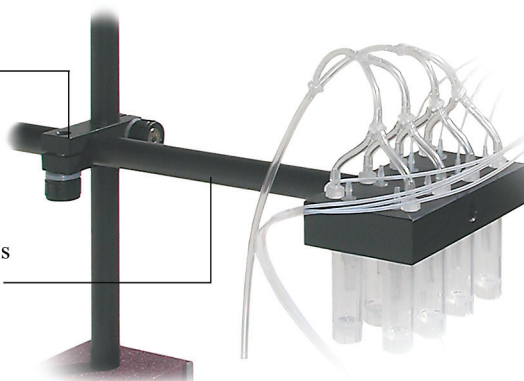
Connecting tubing goes inside small
reservoirs. (NOTE: This tubing should be
sealed using ferrule-type fitting.) The other
end of this tubing should be connected to
the valves of PS15 System using ferrule
fitting provided.

Small reservoirs attached to the bottom
of SVDS1 System. The reservoirs can be
sealed air-tight using grease.

4a

Mounting Rod is attached to
a 1/2" post through X-Block

The other end of Mounting Rod is
threaded inside SVDS1 System



4b

