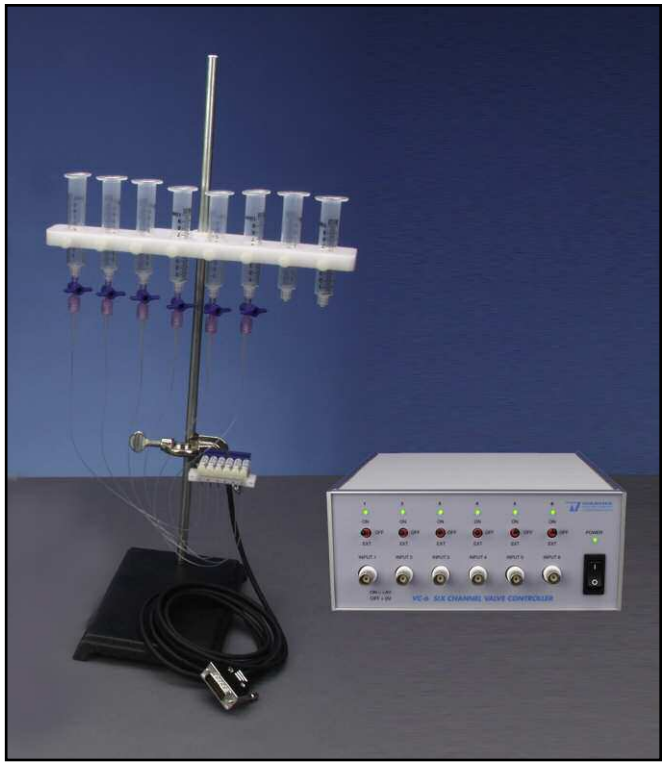
Perfusion Valve Controller

Model VC-6M



WARNER INSTRUMENTS

A Harvard Apparatus Company

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WEEE/RoHS Compliance Statement

EU Directives WEEE and RoHS

To Our Valued Customers:

We are committed to being a good corporate citizen. As part of that commitment, we strive to maintain an environmentally conscious manufacturing operation. The European Union (EU) has enacted two Directives, the first on product recycling (Waste Electrical and Electronic Equipment, WEEE) and the second limiting the use of certain substances (Restriction on the use of Hazardous Substances, RoHS). Over time, these Directives will be implemented in the national laws of each EU Member State.

Once the final national regulations have been put into place, recycling will be offered for our products which are within the scope of the WEEE Directive. Products falling under the scope of the WEEE Directive available for sale after August 13, 2005 will be identified with a "wheelie bin" symbol.

Two Categories of products covered by the WEEE Directive are currently exempt from the RoHS Directive – Category 8, medical devices (with the exception of implanted or infected products) and Category 9, monitoring and control instruments. Most of our products fall into either Category 8 or 9 and are currently exempt from the RoHS Directive. We will continue to monitor the application of the RoHS Directive to its products and will comply with any changes as they apply.

- **Do Not Dispose Product with Municipal Waste**
- **Special Collection/Disposal Required**

Table of Contents

Introduction

The **VC-6M** Valve Control System lies at the heart of a multi-valve perfusion system designed to automate and control the delivery of small quantities of fluids to Warner Instruments imaging and recording chambers. However, its flexible design allows the system to be used in many applications not using Warner equipment.

The miniature solenoid valve assembly is standard with the system. They are lightweight and made from rugged materials for long life. Valves are dual acting with both NORMALLY OPEN and NORMALLY CLOSED sides. The NORMALLY OPEN side is plugged with removable stoppers and when these are removed solution can flow to waste while the valve is in the off position.

The controller can independently regulate the function of up to six valves. The system can be purchased in a two or four valve configuration and can be easily expanded by simply adding more valves. Individual valves can be controlled via a manual switch or an external digital (TTL) signal. Valve transitions (opened or closed) occur at full power to insure rapid response times and are then held in place at less than half power to prevent heat transfer to solutions. An event-marker pulse, generated each time a valve is switched on, is provided at the rear of the controller for recording into your acquisition system.

The basic system includes the valve controller, a valve manifold with mounted valves, connecting cable and an **ML Series** manifold. The complete system includes all of the above plus a ring stand, eight 10 cc syringes, a syringe holder, 20 feet of PE-50 tubing and tubing connectors.

Operating Directions

Before beginning setup, take an inventory of the plastic fittings supplied with the complete system. These fittings include eight (8) **LPE-50** tube-to-Luer connectors and eight (8) stopcock-with-Luer connectors. Connectors are shown below. Basic Systems are supplied with a manifold only.

LPE-50 Luer-to-PE tubing connector

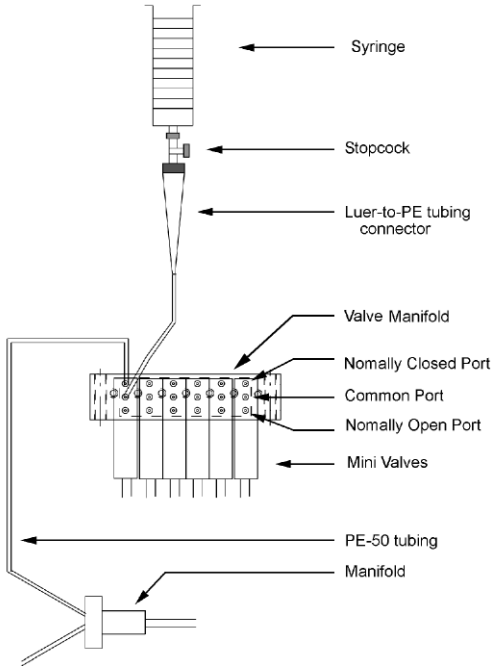
Stopcock with Luer connector

ML-6 manifold

Setup

The diagram below shows connections for the **VC-6M Perfusion System.** The valve manifold comes with plugs to block flow to the NORMALLY OPEN flow lines. Remove these plugs and use these ports if a flow-to-waste system is desired.

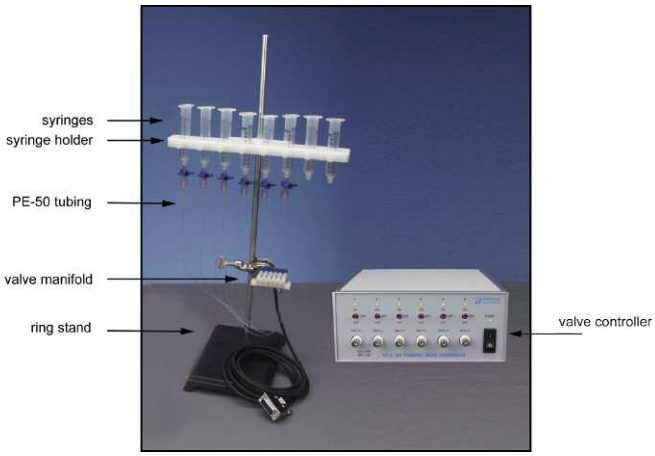
In general, the shortest response time of the system will be achieved by keeping the tubing length between the MANIFOLD and sample as short as possible.



The **VC-6M Valve Controller** is assembled in the following manner:

First, attach the VALVE MANIFOLD to the RING STAND as shown below. This is followed by insertion of PE-50 tubing into the valve ports on the VALVE MANIFOLD. Depending on the flow arrangement you're using (on-off or flow-to-waste), cut either six (6) or twelve (12) pieces of PE-50 tubing long enough to reach from the VALVE MANIFOLD to the MANIFOLD and from VALVE MANIFOLD to the your waste container.

Attach cut tubing to the output ports on each MINI-VALVE on the VALVE MANIFOLD by gently pressing into place. Port positions are shown in the figure on page 4. Place flow-to-waste tubing into the waste container and attach sample tubing to the perfusion MANIFOLD.



Next, attach the SYRINGE HOLDER to the RING STAND. Affix a LUER-TO-PE-50 TUBING connector to each STOPCOCK-WITH-LUER connector. Mount SYRINGES into the SYRINGE HOLDER and attach a prepared stopcock assembly to each SYRINGE. Now cut six (6) pieces of PE-50 tubing just long enough to run from the LUER-TO-PE-50 TUBING connector (on the SYRINGE) to the input port on each MINI-VALVE.

Finally, make a connection between the perfusion MANIFOLD and your sample with PE-50 tubing. Plug the VALVE MANIFOLD into the VALVE CONTROLLER and the system is ready to use.

AC Conversion

ATTENTION

PLEASE READ BEFORE APPLYING POWER TO YOUR UNIT!!

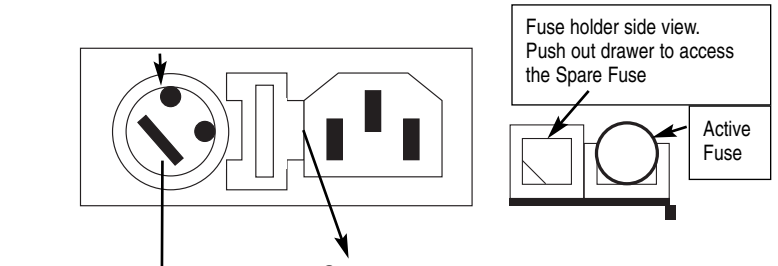
The unit has been set to be used with 120 VAC.

If the VAC needs to be changed to 220VAC, enclosed you will find a kit (power cord (1) and fuses (2)) to be used to convert the unit from 120VAC to 220 VAC.

The unit uses only one fuse; the second one is sent as spare.

Follow these instructions to change the unit(s) from 120VAC or 220VAC:

Power Entry Module



Step 1

Depending on AC Voltage being used, turn VAC selector switch to 110VAC or 220 VAC

Step 2

Carefully, pry open the fuse holder from the inside by using a small flat screwdriver.
Replace fuse according to voltage being used.

Item # 4630130 Model VC-6 and VC-6M use:
For 120 VAC: 0.50 Amp - 5x20mm Slow Blow
For 220 VAC: 0.25 Amp - 5x20mm Slow Blow

Instructions for Use

Flow Adjustment

Flow rates can adjusted by raising or lowering the reservoir holder, as well as by adjusting the height of each reservoir within the holder.

The table below lists the approximate flow rates for a reservoir at the specified height with the supplied Tygon, tubing.

Reservoir height	Approximate flow rate
61 cm (24 in.)	1.2 ml/min
30 cm (12 in.)	0.8 ml/min
20 cm (8 in.)	0.6 ml/min

Rear Panel

- The Event Marker output produces a 500 ms logic-level output (+5 V) each time a valve is turned on. At all other times the Event Marker output is low (0 V).
- A 15 pin "D" type female connector is used to connect the VALVE MANIFOLD (and valves) to the CONTROLLER.
- A polarized, 3-conductor, IEC320/CEE-22 connector is used for line (mains) power input to the instrument. A removable cordset, terminated with a NEMA 5-15P connector, is standard. An alternate cordset may be supplied when local circumstances dictate different mains voltages and connections. Contact our offices for details.
- A fuse holder contains a protective fuse in series with the high side (brown or black wire) of the mains.The holder accepts 5 x 20 mm fuses of the type indicated.

Maintenance

Cleaning

Do not use alcohol, aromatic hydrocarbons or chlorinated solvents for cleaning. They may adversely react with the plastic materials used to manufacture the system. If salt solution spills on the valve assembly it should be cleaned as soon as possible with a soft cloth dampened with a mild solution of detergent and water.

NOTE: Valves must be completely flushed with distilled water after each use. Permanent damage will result if saline solution is allowed to crystallize inside the valve.

The exterior of the CONTROLLER may be cleaned periodically to remove dust, grease and other contamination. It is not necessary to clean the inside. Use a soft cloth dampened with a mild solution of detergent and water. Avoid abrasive cleaners.

Warranty

The **VC-6M** is warranted to be free from defects in materials and workmanship for a period of two years from the date of shipment. If a failure occurs within this period, we will repair or replace the faulty component(s) at our discretion. This warranty does not cover failure or damage caused by physical abuse or electrical stress (e.g., exceeding specified input limits).

Shipping charges to the factory are the customer's responsibility. Return shipping of the repaired unit will be paid by Warner Instruments, Inc.

Specifications

Valves	12 VDC /0.046 A, solenoid type
Valve manifold	Teflon material, mounts on a 3/8" or 1/2" ring stand
Tubing	PE-50
Connection Cable	2.4 meter (8 ft.) connecting cable terminated with quick disconnects on valve end and 15 pin male "D" type connector on controller end.
Reservoirs	10 cc capacity syringes
Reservoir Holder	Delrin. Holds eight syringes with thumb screws for each reservoir.
Valve Controller	Typical response times for valves is 2.5 ms
Switch Selection	*Manual*, *Off* or *External*
External Input	+5 V TTL-compatible (BNC Connector)
Event Marker	Logic level pulse 500 ms nominal (rear panel BNC connector)
Manifold	2/1, 4/1 or 6/1 nominal dead space
Power	110-130 or 200-250 VAC, single-phase, 50/60 Hz, 20 watt
Operating Temperature	10-40° C (50-104° F)
Dimensions (H x W x D)	89 x 203 x 305 mm (3.5 x 8.0 x 12 in.)
Weight / Shipping Weight	3.7 kg (8 lb.) / 4.6 kg (10 lb.)