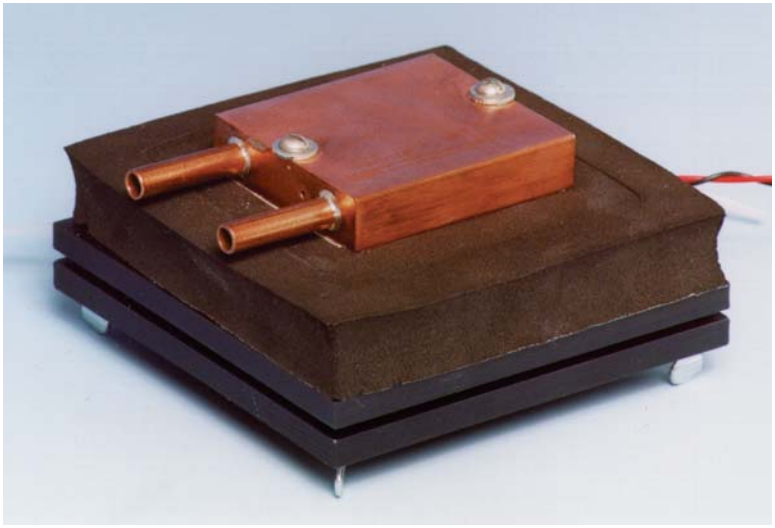
Model # HCPPS
INSTRUCTION MANUAL



ALA Scientific Instruments Inc.
60 Marine Street
Farmingdale, NY 11735
Tel # 631 393-6401
FAX: # 631 393-6407
E-mail: support@alascience.com
www.alascience.com

Table of Contents: Page

INTRODUCTION

Caution: **This product contains electrical components that are used in close conjunction with water, which may, or may not, be grounded. Only qualified personnel in a laboratory setting should only use this product. Common sense and proper electrical precautions should be used. This is a low voltage, DC powered, product.**

The Heating /Cooling Perfusion Pre-Stage (HCPPS) is used to pre-heat or pre-cool a perfusion solution that is being passed into a cell chamber. Mostly it is used as a pre-cooler since smaller devices can be used for pre-heating. The HCPPS allows one meter of tubing to be wound in a zigzag fashion around dowel pins set in an aluminum plate (Heat Exchange Plate, or Cold Plate). Another plate is screwed down over the former to sandwich the tubing . The plate with the dowel pins is attached to a Peltier thermo-electric device. As power flows to the Peltier, it can drive heat away from, or toward, the plate. As heat is driven away form the plate, for cooling, a separate flow of cooling water must be installed to remove the excess heat.

The flow of cooling water is very critical for the HCPPS. When the system is being used to cool a perfusion, there are many calories that must be pumped out of the system. Without water cooling, the unit will quickly overheat and fail! **It is very important that a flow of cooling water be provided. The minimum flow cannot be less than 300ml/min.** Cooling water can come form a sink, gravity or pump feed. It is best if the water temp. is fairly constant. The system will work best if the copper plate is cool, or room temperature to the touch. Cooling water should be connected to the copper plate. Be sure all seals are tight so that no water will leak on the pre-stage itself.

The stage should be positioned as close to the preparation as possible. Solution that travels even a short distance through a thin tube can warm up quite a bit. Flow rate is important. Slower flow rates will give better temperature results. Tubing size matters as well since this directly correlates with surface area and flow rates. Silicone tubing is best because it can flatten out a bit when compressed. This makes more surface area available for heat transmission. Try to use a tubing with as thin a wall as possible. With the HCPPS you can use tubing up to 4mm OD.

If you wish to control the temperature of the perfusate, you will need an active temperature controller. It is very important that the flow of solution be uniform. Irregularities in flow rate can cause temperature oscillation. When trying to control the temperature of the perfusate, you should place the thermistor as close to the output as possible. There is no mounting for a thermistor on the HCPPS other than a small hole on the cooling plate. (Note that information about the cooling plate temperature is only useful for reference, and not for temperature control.)

There is no minimum or maximum flow rate for this product. The user may have reasons for using a specific speed, even if that results in insufficient cooling or heating. It is best to try to adjust the experimental parameters to what you have observed that the HCPPS can do in your particular setting. One should bear in mind that pre-heating, or pre-cooling your solution will give better results.

INTRODUCTION (cont.)

When using this product to cool, if the flow of cooling water is sufficient, the temperature of the "cold plate" can be well below zero degrees C. The Peltier device is capable of a 67°C differential between the hot and cold side. This means that if the hot side were kept cool say to 25°C, then the cold side could be as cold as -42°C! These are nominal conditions, and they may not be reached ordinarily. However, the user should be aware that freezing can occur. At the very least, there may be condensation, or frost, which will melt once the unit is turned off. It may be prudent to place a small towel under the unit to collect any melt off.

INSTALLATION

If you are going to use the HCPPS to cool the perfusion solution that flows to a chamber, then it must be positioned as close the chamber as possible. This will probably mean positioning on the microscope stage. Use a good quality temperature controller. One that uses a steady, electrically quiet, DC output (Please contact ALA or your representative for these types of controllers). A good controller will prevent electrical noise in your set-up. Have a good supply of cooling water. This water should be clean and no warmer than room temperature. It can come directly from a sink faucet, or you may use a pump and a re-circulating tank. **Always maintain at least the minimum 300 ml/min. flow rate.** Gravity fed water is just fine.

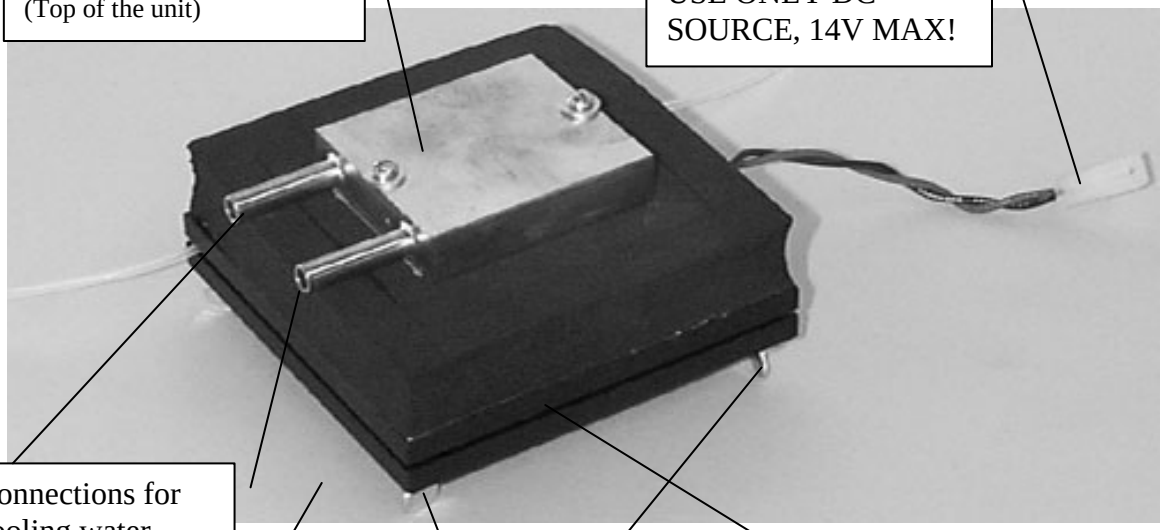
Check all connections to make sure there are no leaks.

Never run the HCPPS in cooling mode without water circulation.

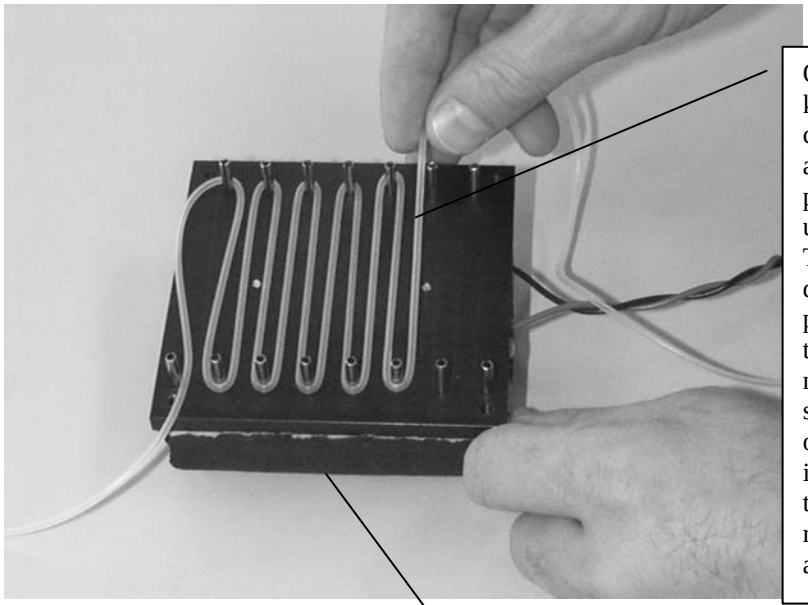
Check to see that the polarity of your electrical hook-up is correct. If you are using a controller with an automatic heat/cool control, or a selectable heat/cool control, you must be sure that the proper polarity exists. A Peltier element can heat or cool either side depending on the polarity of the power provided to it. The power must always be DC. The best way to make sure your power is correctly connected is to manually check it. Plug in your HCPPS to a controller, or power supply. If you want it to cool, turn it on in the cooling mode, feel the HCPPS to be sure that the heat exchange plate responds by getting cold. If it does not, reverse the polarity of the power plugs for the HCPPS. Feel the plate again, and it should respond correctly. If it does not, please contact your representative or ALA Scientific Instruments. Always allow a few seconds for the system to respond. (Feeling the copper cooling plate will work also, but it responds a little bit slower than the heat exchange plate.)

Remember that if you use the HCPPS to warm up a solution, then no water circulation in the cooling plate is necessary. Never use the unit in reverse by heating or cooling your perfusion solution by having it flow through the copper cooling plate, and using the heat exchange side as the cooling plate!

HCPPS DETAILS



Placing Tubing on the Heat Exchange Plate



On the Heat Exchange Plate, also known as the Cold Plate, as in a beer cooler for instance, the tubing is wound around in a zigzag pattern from pin to pin. The pins hold the tubing in place until the bottom plate can be replaced. The bottom plate should be tightened down evenly with all four screws provided. Do not pull the tubing too tight as this may restrict the flow. Do not over tighten the four screws for the same reason, although some flattening of the tubing is desirable in order to increase surface contact. Silicone tubing with a thin wall is recommended, but other tubing types are fine.

Unit is placed upside down, four thumb-screws are removed, bottom plate is removed.

SPECIFICATIONS

Weight	792 kg
LWH	10cm x 10cm x 5.5cm
Max. tubing diameter	4mm
Avg. tubing length in cold plate	1m (3mm OD tubing)
Max. Volts (DC)	14.4
Max. Amps. (DC)	3.7
Max. temp. differential of Peltier	67 °c
Min. water flow though cooling plate	300ml/min.
Cooling Plate tubing connection	6mm OD
Max. Temp. for Peltier	150 °c

Specifications are subject to change.

WARRANTY

ALA Scientific Instruments, Inc. agrees to warranty this product against manufacturers defects for a period of one year from date of shipment. Remedy shall be limited to repair or replacement of the system or parts as necessary. ALA Scientific Instruments is not responsible for damage to, or occurring from, the use of this product, including damage to microscopes. This product is intended for use by qualified personnel for biological research purposes, it has no clinical applications and it has not been approved for any.