

HPRE2HF High flow Pre-heater

Description

The **HPRE2HF** High-flow Pre-heater is a 3-loop pre-heater (see figure) intended to heat solutions at flow rates up to 7ml/min. By heating solution over a longer "length" fluctuations in output temperature are smoothed due to lateral heat transfer between adjacent loops. The reduced fluctuations also allow stable control when the set point temperature is suddenly raised or lowered. The **HPRE2HF** has a thermistor embedded at the outflow end to sense the temperature of the pre-heater assembly. Typically the **HPRE2HF** is used with the Aux channel of the **TC2BIP** Bipolar Temperature Controller.

Performance of HPRE2HF

The performance of the **HPRE2HF** alone is illustrated in the figure. The power and voltage necessary to heat solution flowing through the pre-heater by 15°C is plotted for flow rates from 1ml/min to 6.5ml/min. Typically if flow is in the **normal** direction the outflow temperature is **1-2C below** the temperature indicated by the embedded thermistor. The pre-heater should **not** be used with the flow in the reverse direction because the outflow temperature can be significantly above the temperature indicated by the embedded thermistor. Whenever possible you should monitor the temperature independently in the tissue chamber.

On the **TC2BIP** you will have to increase G_{Aux} to **45%** assuming you are using a 12-14V power supply to provide adequate power for flow rate over 3ml/min.

Precautions

Take care of the **HPRE2HF**, it cannot be disassembled for repair. Observe the following:-

1. **HPRE2HF** is made using fine glass capillaries. Don't bend or stress the capillaries. Use **soft flexible silicon** tubing (1/32" ID 3/32"OD Cole Parmer #06411-60; www.coleparmer.com 800-323-4340) for connections to the **HPRE2HF**.
2. Rinse the **HPRE2HF** after each use to prevent things growing inside and drain.
3. Do not subject the **HPRE2HF** to high pressures. If using a syringe only apply enough pressure to pass solution through the tubing.
4. Keep fluid off the outside of the **HPRE2HF**. The connectors will corrode if contacted with saline.
5. Do not overheat the **HPRE2HF**. Limit the input power to 9W ($V \approx 6.5$ Volts). If you use higher powers (voltages) you can burn the heater coil. The coil can't be repaired.
6. You **MUST** use the embedded thermistor for feedback.

HPRE2 Specifications

DIMENSIONS: 7.0 x 1.4cm x 0.7cm (LxWxD)

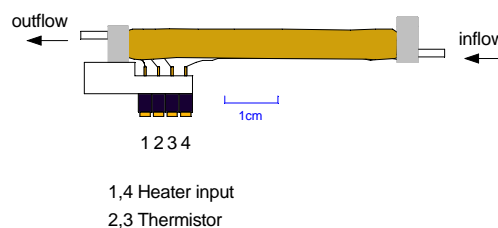
DEAD VOLUME: approx. 100 μ l.

HEATER RESISTANCE: nominally 5.5 Ω .

CONSTRUCTION: 3 loop pre-heater surrounded by resistance wire. Thermistor embedded in thermally conductive epoxy surrounding capillaries. 2-56 threaded mounting hole.

TEMPERATURE SENSOR: miniature 10k Ω (@ 25°C; Res. Ratio 4.4) NTC thermistor)

CABLES: Normally supplied with cables to connect to **TC2BIP** Bipolar Temperature Controller **TCII 2Ch** *micro*-Temperature Controller.



HPRE2HF Power vs Flow rate for 15C temp increase

