

## Accessories

### Tissue chambers & microscope adapters



We make many different tissue chambers with volumes from 120 $\mu$ l to 1ml. Shown is the **BT-1-TBS** with field stimulation.

### ITO Transparent heaters



Our **transparent ITO** heaters range from **120 $\mu$ m** thick to form the bottom of tissue chambers to **1.1mm** for heating microscope stages.

### Thermistor probes



Low solution levels require miniature thermistor probes like the **TH-10Km** (0.45mm diam.)

### Pre-heater [single channel]



The **HPRE2** is very compact, (3 tube construction) has excellent heat exchange properties and a **low thermal mass**.

### Pre-heater [8 channel]



With 8 fine (360 $\mu$ m ID) fused silica barrels merging in a miniature mixing tip (**1-2 $\mu$ l**) the **MPRE8** delivers temperature controlled solutions near individual cells for **rapid** solution changes (typ. 100ms).

### Culture/stim system



The **Culture/stim** system allows you to use acutely dissociated or culture cells grown in a **low cost reusable** tissue chamber that clips into a holder. Field stimulation can be applied using a low voltage (<10V) stimulator.

### Transparent ITO microscope stages



These **transparent ITO** stages allow temperature control of a transparent glass surface for observation, use of transparent 96 well plates etc.

### Microscope stage adapters



To simplify installing our tissue chambers on your microscope we have microscope stage adapters for most microscopes.

### International Distributors: Australia



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### Warranty information

**TC2BIP, mTCII, cFlow, CH** are warranted against defects in material or workmanship for 2 years. **TC2BIP, mTCII & cFlow** accessories warranted against defects in material or workmanship for 6 months.

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Since 1989 we have been designing and manufacturing temperature control and perfusion instruments for electrophysiology and microscopy research, where precision and low noise are critical. Our wide range of accessories include tissue chambers, thin transparent ITO heaters, miniature thermistor probes, reusable culture chambers, miniature perfusion devices, etc. Our customers are in over 250 universities and companies in North America, Europe and Asia.



- Equipment for cellular & electrophysiology research*
- Temperature Control
  - Low noise temp controller
  - Digital temp controller
  - Cooler module
  - Miniature temp probes
  - Transparent heaters
  - Perfusion Control
  - Flow/switch valve controller
  - Shielded valve assembly
  - 8Ch miniature pre-heater
  - 1Ch Pre-heater
  - Accessories
  - Heated microscope stages
  - Miniature thermistor probes
  - Tissue chambers
  - Stage adapters
  - Culture/stim chamber system

## TC2BIP Analog 2/3ch Temperature controller



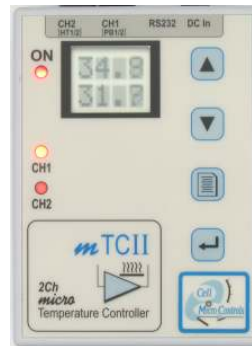
- **Bipolar, 2 channel** [3rd opt] controller for **heating/cooling** tissue chambers
- **DC/Battery** powered to **eliminate** interference
- **Flexible** controller, **many** control options
- **Accurate** temperatures for **wide range** of flow rates
- For **conventional** and **inverted** microscopes
- **External** input for **programmed** temperature changes
- Compatible with **thin transparent (ITO)** heaters
- **Uniform** temperatures ( $<\pm 1^{\circ}\text{C}$ ) over  **$>35 \times 18\text{mm}$**  area with **HI-24**.
- **Rapid** temperature changes with **BT-1-xx Tissue chambers & HI-24 ITO Heater**

The **TC2BIP** was designed for patch clamp/microscopy studies where low noise and accuracy are critical. It is flexible enough to put 2Amps into a 12V Peltier device (see our **CH Cooling/Heating module**) or as little as 0.25Amps into our **MPRE8 8Ch Pre-heater**. It can easily be upgraded to 3 channel operation. Typically the Main channel is used for the tissue chamber, AUX channel for the **HPRE2 Pre-heater** and the 3rd channel (if installed) for the **MPRE8** for superfusion but there are many other possibilities. The setpoint range can be extended beyond the standard  $50^{\circ}\text{C}$  range to  $>60^{\circ}\text{C}$  for studies on nociception.



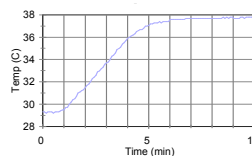
Minimal noise ( $<1\text{mV}$ ) recorded from **TC2BIP** output when driving **HWPT-96OL ITO** heater at 5V, 0.72A. 2mV/div, 1ms/div.

## mTCII Digital 2ch micro-Temperature controller



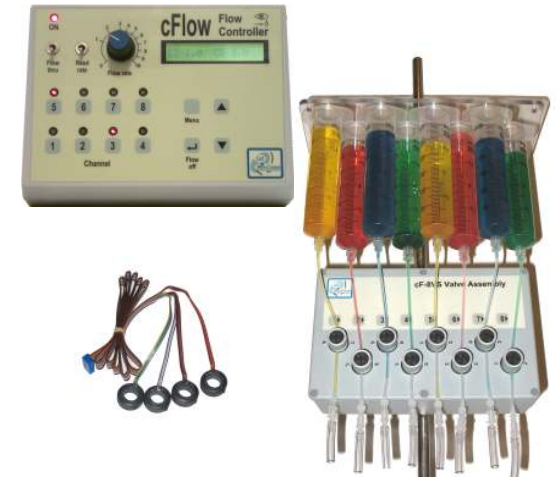
- Sophisticated **miniature low power** controller for heating small tissue baths, microscope stages, small animal heaters, portable incubator
- **2 independent channels**
- **Compatible** with many low voltage **heater elements**
- **RS232** port for control, logging
- **2 heating modes, PWM** [8W] or **analog** [2W]
- Maintains **setpoint** and **parameters** in **EEPROM**
- **Firmware reprogrammable** - for upgrades, customization

The **mTCII micro-Temperature Controller** is a versatile 2 channel temperature controller powerful enough to heat small tissue baths, microscope stages, small animal heaters etc. but also able to control miniature heating devices like the **MPRE8, HPRE2** and thin ITO heaters. The **mTCII** uses state-of-the-art microcontrollers to provide a flexible instrument rather than a modular PID design where there is no control over the user interface and instrument function. The **mTCII** has two ways of driving heaters, with a **PWM** (pulse width modulated 2.5-20kHz) or an **analog** output for lower noise. In the **PWM** mode it can control currents up to 1.5Amps provided by a Li-ion battery or 15V power supply.



Temperature in well in a 96 well plate using **mTCII** to control **HWT-96**.

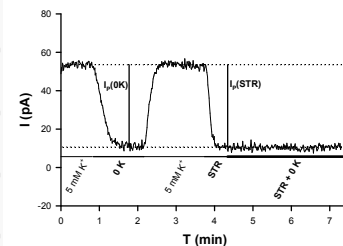
## cFlow Flow/switch perfusion controller



- **8 Ch perfusion control**
- **Rapid pinch valve switching (typ. 50ms)**
- **Simultaneous flow control** (0.1-10ml/min).
- **RS232, analog, digital interface (CLAMPEX)**
- **Upgradeable firmware via RS232**

The versatile **cFlow** 8 Channel Switch/Flow controller can be used to switch solutions as well as control the flow rate. For flow control optical sensors that fit around standard dripsets detect the passing droplets. The controller adjusts the valve open time to compensate for different size tubing, pressure head. In switched mode the **cFlow** can rapidly switch between solutions (eg. using **MPRE8**). Any channel can be set for flow or switched mode.

Push buttons select the flow channel or commands can be given from the RS232 interface, analog or digital input (using optional cable).



Na/K pump current with solutions switched with **cFlow**. Courtesy J. Gao SUNY @ Stony Brook, NY