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Equipment for cellular & electrophysiology research

mTC3 micro-Temperature Controller & Heaters



- **Miniature temperature** controller for heating small tissue baths, microscope stages, small animal heaters
- **3 independent channels** with feedback
- **Compatible** with many low voltage **heater elements**
- **USB-RS232** port for control and temperature logging
- **2 heating modes, PWM** (more power) or **analog** (low noise).
- Maintains **setpoint** and **parameters** in **EEPROM**
- **Bluetooth** control for remote operation
- **Firmware reprogrammable** - for upgrades, customization

DESCRIPTION

The **mTC3 micro-Temperature Controller** is a multi-purpose microcomputer based temperature controller powerful enough to heat small tissue baths, microscope stages, small animal heaters or containers used in a laboratory. It is simple to set up a mini-incubator to hold cells, or alternatively, heat tubes on a shaker. The **mTC3** uses a state-of-the-art microcontroller to provide a flexible instrument rather than a on/off PID module where there is no control over the user interface and instrument function. Updated or customized firmware can easily be downloaded via the USB-RS232 port to add new features and update existing firmware. For example our firmware checks the heater resistance in case there is a shorted or damaged lead. Firmware also detects the temperature of the internal heatsinks used for the power amps and controls the internal fan speed. In an onboard library parameter sets are saved for many different heaters and devices and can be updated or new ones created. Via the USB-RS232 port you can easily change the setpoints, change parameters and receive reports of the probe temperatures

for data logging and analysis. Parameters for control, set-points etc. are stored in non-volatile EEPROM. Our control software for the **mTC3** to create temperature protocols, chart and log temperature data (eg. to condition with a temperature protocol, test for thresholds etc.). The **mTC3** can also be controlled using Labview, MATLAB, C# and other programs using VCP.

On Ch1 & Ch2 the **mTC3** outputs **high output powers** (approx 15W), and up to 1.5Amps/ Lower power is available on Ch3.

Application notes

The **mTC3** can drive virtually all our accessories including the **HPRE2** and **MPRE8** pre-heaters, all our ITO heaters and foil type heaters with a resistance of 5-15Ω as well as custom devices designed by customers. Our **HS-3x3p** silicon coated heater and our **TH-10Kmr** Tygon sleeved rectal probe can be used as a small animal heater. Without heaters the additional channels can monitor temperatures. In analog mode the **mTC3** can drive low power devices and achieve some low level electrical measurements where digital mode switching noise would be an issue.

Controls & Display

Up/down: Increments or decrements set-point, also used for menu selection.

Menu: Displays parameters. Can set control parameters for each channel, set TFT display mode, etc.

Display: Shows current temperatures, digital/analog mode, status

LEDs: ON-indicates that unit is receiving DCIn
 CH1-indicates output to heater and error (flashing)
 CH2-indicates output to heater and error (flashing)

Input/Output:

CH1 - channel 1 heater thermistor
 CH2 - channel 2 heater thermistor
 CH3 - channel 3 heater thermistor

Control software(avail Q2 2023)

Compatibility: Windows 7/8/10/11.

Protocol: can set temp protocol for each channel. Also can set to repeat protocol.

Control: can set separate set points or have common setpoint.

Charting: 2 minute scrolling plot. Main plot can continue for months. Can zoom, set axis range, select plots to view.

Logging: Log data for unlimited time to .csv file. Includes time stamp for each point.

Specifications

Temp Ref Range: 5°C (in cool env) to 50°C (also version to 95°C). Accuracy: ± 0.2°C (reduced for 95°C version)

Heater Output: 0 to 12V at up to 1.5Amps.

PWM (pulse width modulated) output (15W Max)
 Analog output (2W Max)

Suitable Heaters: 5 to 15Ω resistance.

Supply Voltage/DCIn: 15V at up to 4.0Amps.

Included power supply: 15V, 4.0Amp switching power supply.

Temperature sensor: Compatible with 10kΩ interchangeable thermistors.

Fan: internal fan under microprocessor control

Control: USB/RS232 port for temperature logging and control

Dimensions: 4.5 x 3.25 x 1.5 inches (LxWxH)

Accessories

Below are some of the accessories compatible with the **mTC3** 3Ch micro-Temperature controller. Most accessories used with the **TC2BIP** will also work with the **mTC3**. For example you can use the **HI-xx** heaters plus **TH-10Kmp** probe, **HPRE2**, **MPRE8** etc. Also different heaters on each channel. The **mTC3** uses the **CAB-HXTH/DIN** or **CAB-HP2/DIN** cables for heater/thermistor probe setups or pre-heaters.

TH-10Kmp Thermistor probe

Application: general purpose miniature thermistor probe



- TH-10Kmp thermistor 0.45mm diam.
- max oper. temp: 100°C; 15cm lead.

TH-10Kmp Thermistor probe

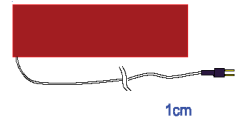
Application: mouse rectal probe



- TH-10Kmp Tygon sleeve 1.7mm diam
- max oper. temp: 100°C; 15cm lead; 6mm plug

HLS-1p/HLS-8x0.8p Heater - objective, silicon

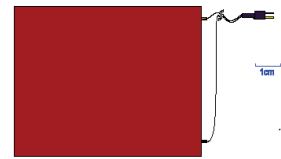
Application: objective heater (typically used with TH-10Kmp Thermistor probe)



- heater size:
HLS-1p 20x70x≈0.35mm thick
HLS-8x0.8p 8x80x≈0.35mm thick
- max. operating temp. 150°C

HS-3x3p Heater - 7.5x7.5cm, silicon

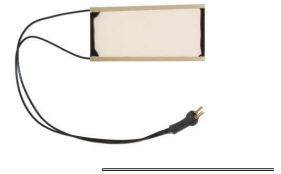
Application: small animal heater, culture dish heater



- size 7.5cm x 7.5cm.
- resistance nominally 4.9Ω
- constructed of a thin foil coated silicon. Total thickness 0.5mm.
- max. operating temperature 150°C

HI-24p/24Tp Heater-ITO transparent

Application: heating BT-1-xx Tissue chamber or similar small tissue chambers. Use with **inverted** or **conventional** microscope. **HI-24Tp** is thinner for fluorescence or work with immersion lenses.



- transparent indium tin oxide coated heater
- sizes:
HI-24p: 40x22x≈0.25mm thick.
HI-24Tp: 40x22x≈0.14mm thick.
Heated area≈35x18mm
- resistance nominally 6-13Ω
- max. operating temp. 70°C

HPRE2/HPRE2HF Pre-heaters

Application: pre-heating solution (3 loop high efficiency capillary heater)



- **HPRE2[HF]** dims. 45[70] x14x7mm (LxWxH); heater resistance ≈11Ω
- Thermistor sensor: 10kΩ NTC

MPRE8 Multitube Pre-heater

Application: superfusion of cells or small tissue pieces



- Dims. 10 x 0.4cm (LxDiam); heater resistance ≈11Ω
- Thermistor sensor: 10kΩ NTC

HI-22Dp/25Dp/55Dp/57Dp/711Dp/812Dp Heater-ITO transparent

Application: heating 30mm culture dishes, Nunc Lab-Tek chambers. Heater forms a platform for dishes/chambers.



- transparent indium tin oxide coated heater
- sizes: HI-22/25/55/57Dp 0.6mm thick; HI-711/812Dp 1.1mm thick.
- resistance 6-12Ω
- max. operating temp. 70°C

HWPT-96NIK/OLY Well plate heater/ITO transp. microscope stage

Application: heating well plates, culture dishes, Nunc Lab-Tek chambers



- transparent ITO microscope stage heater
- size: 70x110mm x1.1mm
- resistance nominally 9Ω
- versions for Olympus/Nikon round inserts
- max. operating temp. 70°C

HWPT-384S Well plate heater & HWPT-LID Heated lid

Application: heating well plates, culture dishes, Nunc Lab-Tek chambers



- transparent ITO micro. stage HWPT-384S
- transparent lid HWPT-LID
- fits within well plate base
- fits optical instruments/auto stages
- resistance nominally 9Ω
- max. operating temp. 70°C

BT-I55D ITO transparent microscope stage

Application: heating culture dishes, Nunc Lab-Tek chambers



- transparent ITO microscope stage heater
- size: 50x50mm x0.6mm.
- fits into any MSA-xxx stage adapter
- resistance nominally 9Ω
- max. operating temp. 70°C

HWP-96 Well plate heater

Application: heating 96/384 well plates. Low profile fast warmup heater with integrated thermistor sensor.



- Low thermal mass, fast heatup
- Fits within well plate base
- connects directly to mTC3
- Supports temp. sensing from well using second thermistor probe

mTC3 Control software (avail Q2 2023)

Application: Allows control of temperatures, protocols, data plotting and logging. Also allows channel setpoints to be locked. Runs on Windows 7/8/10/11.

