

*made to measure*

# OPERATING INSTRUCTIONS AND SYSTEM DESCRIPTION FOR THE

## uniTemp-MINI

# TEMPERATURE CONTROL SYSTEM



VERSION 1.0  
npi 2023

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## 1. Safety Regulations

**VERY IMPORTANT: Instruments and components supplied by npí electronic are NOT intended for clinical use or medical purposes (e.g. for diagnosis or treatment of humans), or for any other life-supporting system. npí electronic disclaims any warranties for such purpose. Equipment supplied by npí electronic must be operated only by selected, trained and adequately instructed personnel. For details please consult the GENERAL TERMS OF DELIVERY AND CONDITIONS OF BUSINESS of npí electronic, D-71732 Tamm, Germany.**

- 1) **GENERAL:** This system is designed for use in scientific laboratories and must be operated by trained staff only. General safety regulations for operating electrical devices should be followed.
- 2) **AC MAINS CONNECTION:** While working with the npí systems, always adhere to the appropriate safety measures for handling electronic devices. Before using any device please read manuals and instructions carefully.  
The device is to be operated only at 115/230 Volt 60/50 Hz AC. Please check for appropriate line voltage before connecting any system to mains.  
Always use a three-wire line cord and a mains power-plug with a protection contact connected to ground (protective earth).  
Before opening the cabinet, unplug the instrument.  
Unplug the instrument when replacing the fuse or changing line voltage. Replace fuse only with an appropriate specified type.
- 3) **STATIC ELECTRICITY:** Electronic equipment is sensitive to static discharges. Some devices such as sensor inputs are equipped with very sensitive FET amplifiers, which can be damaged by electrostatic charge and must therefore be handled with care. Electrostatic discharge can be avoided by touching a grounded metal surface when changing or adjusting sensors. **Always turn power off when adding or removing modules, connecting or disconnecting sensors, headstages or other components from the instrument or 19” cabinet.**
- 4) **TEMPERATURE DRIFT / WARM-UP TIME:** All analog electronic systems are sensitive to temperature changes. Therefore, all electronic instruments containing analog circuits should be used only in a warmed-up condition (i.e. after internal temperature has reached steady-state values). In most cases a warm-up period of 20-30 minutes is sufficient.
- 5) **HANDLING:** Please protect the device from moisture, heat, radiation and corrosive chemicals.
- 6) **INSTRUMENT COOLING:** To prevent damage from overheated components, adequate airflow around the heat sink in the rear of the instrument must be ensured.

## 2. uniTemp-MINI Components

The following items are shipped with the uniTemp-MINI system:

- uniTemp-MINI desktop cabinet
- Power cord
- User manual

### Optional accessories:

- HPC-2 Heated perfusion cube (ALA)
- HPC-G Heated perfusion cube, high flow rate (ALA)
- HCS heated chamber stage

**Note:** This UniTemp is pre-configured to run with the HCP-2 (Serial number ...). Using different perfusion heaters might reduce performance (speed, stability).

## 3. uniTemp-MINI System

### 3.1. System Description

The uniTemp-MINI temperature control system is designed for heating purposes in electrophysiological experiments. The uniTemp-MINI system is housed in small desktop cabinet that can be placed close to the microscope. It has a built-in power supply and cooling elements for the power devices. The system guarantees low noise operation and has special protection features to prevent the preparation from damage.

The uniTemp-MINI incorporates an electronic thermometer for small semiconductor sensors (R2252, i.e. the sensor has a resistance of 2252  $\Omega$  at 25°C), two digital temperature displays (XX.X °C), a set-point control with digital readout (XX.X °C), a PI (proportional-integral) controller with factory-set parameters, an output power control unit and a high-power output stage (DC, continuous operation) for resistive ( i.e. heat only) loads with electronic protection circuits. The power output is short circuit protected, the output power is limited electronically. Maximal output voltage is approximately 12 V, the current is limited to 2 A.

### 3.2. Description of the Front Panel

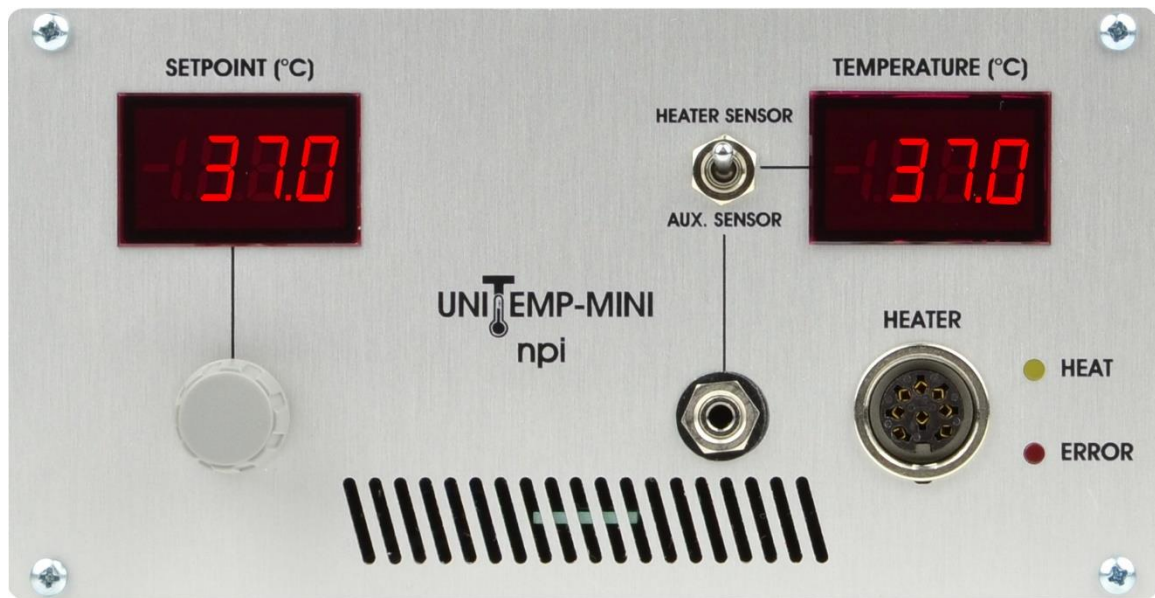


Figure 1: uniTemp-MINI front panel view

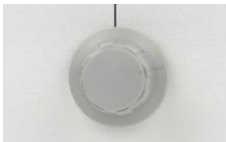
In the following description of the front panel elements and rear panel elements. Each element is described by the name (in uppercase letters) written on the front panel and the type of the element (in lowercase letters). Then, a short description of the element is given.

#### SETPOINT (°C) display



This display indicates the set temperature in °C.

#### SETPOINT potentiometer



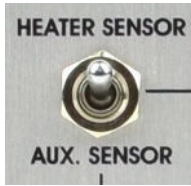
This 10-turn potentiometer is used to set the desired temperature of the controller. Range is from 15°C to 60°C.

#### TEMPERATURE (°C) display



This display indicates the actual temperature measured inside the connected heating device (HPC-2). Temperature is indicated in °C.

### SENSOR switch



This switch selects the sensor input to be displayed on the TEMPERATURE (°C) display. In upper position it displays the built-in sensor from the heating element (here: HPC-2). In lower position it displays the temperature from the AUX. SENSOR input (see below).

### AUX. SENSOR connector



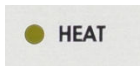
An optional auxiliary sensor can be connected here. Its temperature will be displayed on the TEMPERATURE (°C) display if the SENSOR switch is in lower position.

### HEATER connector



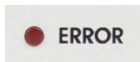
The provided HPC-2 is connected here.

### HEAT LED



When lid up, this LED indicates that the UniTemp is currently heating, i.e. transferring power to its output.

### ERROR LED



This LED lights up as soon as an error is detected. Possible errors are:

- Sensor heat exceeds 60°C.
- Sensor is broken or disconnected.

### 3.3. Rear Panel Elements



Figure 2: uniTemp-MINI rear panel view

#### POWER switch



This push button turns on/off the power supply (115/ 230 V AC, 60 / 50 Hz). The selector for the line voltage and the connector for the power cord are located on the rear panel of the instrument (see below).

#### MAINS connector



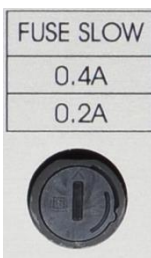
The mains power cable is connected here.

#### MAINS AC selector



This switch is used to select the main power voltage range (110-120 V @ 60 Hz or 220-240 V @ 50 Hz).

**FUSE SLOW** holder:



This holder can be opened to exchange a burnt fuse. It must be replaced with the specific type:

0.4 A for 110-120 V line power or 0.2 A for 220-240 V line power.

Always disconnect mains power plug when replacing fuse.

**Caution:** The instrument may be damaged if the wrong line fuse is installed.

**CHASSIS** connector:



4 mm banana jack providing CHASSIS ground.

**GROUND** connector:



4 mm banana jack providing system ground.

**Note:** System ground and CHASSIS ground are not connected.

## 4. Operation

The uniTemp-MINI is easy to operate:

1. Connect the HPC-2 to your perfusion system. Before heating it up, there should be liquid running through the HPC-2.
2. Connect the HPC-2 perfusion heater to the HEATER connector and secure it.
3. Connect the uniTemp-MINI to mains power using the provided power cable.
4. Switch the uniTemp-MINI ON with the POWER switch at the rear panel.
5. Set the required temperature with the SETPOINT (°C) potentiometer and display.
6. Wait until the HPC-2 has reached the desired temperature and is stable. This may take up to 5 min, depending on the start temperature and the SETPOINT.

The system has been tested with temperatures from 30°C to 48°C.



## 5. Technical Data

Sensor input:	for semiconductor $2252 \Omega$ at $25^{\circ}\text{C}$ (standard), accuracy typically $0.1^{\circ}\text{C}$ at $25^{\circ}\text{C}$ , with electronic protection
ALARM:	disconnects POWER OUTPUT if temperature is below $+3^{\circ}\text{C}$ (not connected or broken sensor) or above $+60^{\circ}\text{C}$ (short circuited sensor)
Digital displays:	3 1/2 digits, $\text{XX.X}^{\circ}\text{C}$
SETPOINT control:	10-turn potentiometer, range: $15^{\circ}\text{C}$ to $60^{\circ}\text{C}$ , $\text{XX.X}^{\circ}\text{C}$
POWER OUTPUT:	12 V / 2 A, short circuit protected, continuous DC
Measuring accuracy:	$0.2^{\circ}\text{C}$ at $25^{\circ}\text{C}$
Controller accuracy:	$0.5^{\circ}\text{C}$ at $25^{\circ}\text{C}$
Power requirements:	115V / 230V AC, 60 / 50 Hz, fuse 0.4 / 0.2 A slow
Dimensions:	desktop cabinet, 170 mm, 260 mm, 90 mm
Connector pinout:	Orientation as seen at the front panel.

