
THORLABS

PTC1(/M)
Temperature-Controlled
Breadboard

User Guide



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Chapter 1 Safety

The device comes with a power adapter compatible with voltages from 100 to 240 VAC. There is no need to change the fuse or switch the voltage setting.



SHOCK WARNING



High voltage inside. To avoid electrical shock, before powering unit, make sure that the protective conductor of the 3-conductor power cord is correctly connected to the protective earth contact of the socket outlet. Improper grounding can cause electric shock resulting in severe injury or even death. Do not operate without cover installed.



WARNING



This unit must not be operated in explosive environments.



CAUTION: HOT SURFACE



The surface of the breadboard may reach 45 °C or higher during operation. Avoid extensive skin contact.

Chapter 2 Overview

The PTC1(/M) is a temperature-controlled breadboard based on thermoelectric elements (TECs) and active-air cooling. It allows for bi-polar operation of the TEC so it can be operated either as a coldplate or a hotplate. It has a maximum heat pump capability of 18 W at a 25 °C ambient temperature. The temperature can be set between 15 °C and 45 °C using the front panel controls, or between 5 °C and 45 °C using the software GUI when the unit is connected to a PC via the included USB cable.

The PTC1(/M) is equipped with a Mini-Series breadboard that has a high-density array of 8-32 (M4) and 1/4"-20 (M6) tapped holes for both standard and Mini-Series components.

The PTC1(/M) is equipped with an internal thermistor sensor. It also has an external sensor port that is compatible with Thorlabs' TSP-TH temperature probe (not included) to allow users to achieve more precise temperature control.

Chapter 3 Getting Started

3.1. Shipping List

The package contains the following items:

- 1 Temperature-Controlled Breadboard
- 1 Power Adapter
- 1 USB Cable
- 1 Power Cord
- 1 Flash Drive Containing the Operation Software and Manual

3.2. Front & Back Panels

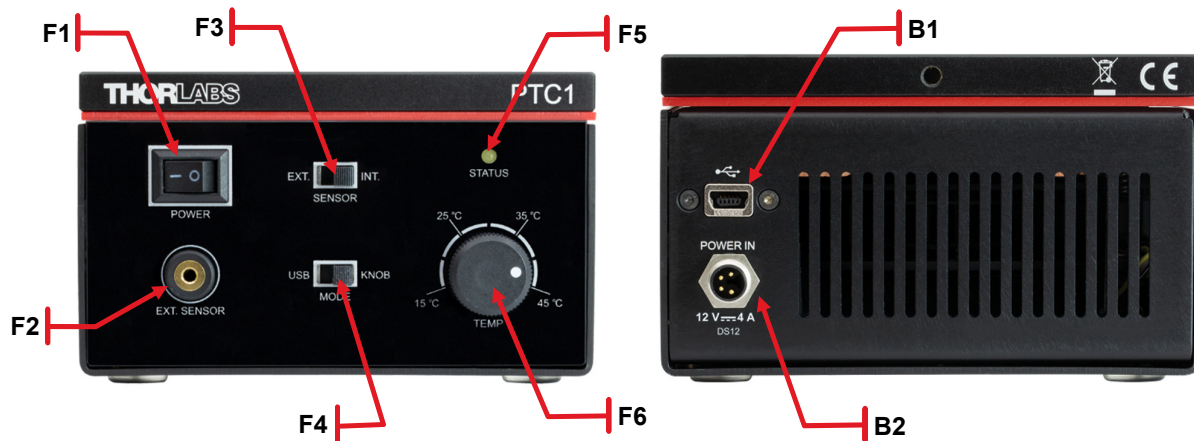


Figure 1 Front and Back Panels of PTC1 Temperature-Controlled Breadboard

- F1. Power Switch
- F2. 2.5 mm Stereo Earphone Jack for External Thermistor
- F3. Switch for Toggling between External/Internal Thermistor
- F4. Switch for Toggling between USB and Front Panel Operation
- F5. LED Status Indicator
- F6. Temperature Adjustment Knob
- B1. USB Mini-B Connector
- B2. 4-Pin Power Connector

Chapter 4 Operation

4.1. Starting the Device

The front and back panels of the PTC1(/M) are shown in Figure 1. Make sure the device is connected to the power supply which is connected to a socket outlet with proper grounding protection.

After the device is turned on, the LED on the front panel will show the state of the device.

4.2. LED Indicator

The LED indicator (F5 in Figure 1) has three possible colors indicating the current status of the device:

1. Green: the temperature has reached the target and stabilized. By default, the unit achieves this status when the temperature reaches within ± 0.1 °C of the target temperature. The value of this tolerance can be set using the PTC1(/M) software, included with the device.
2. Yellow: indicates one of the following conditions:
 - a) The device is working properly but the temperature has not reached the target.
 - b) No sensor is detected; the device has been switched to external sensor mode and no sensor is connected.
3. Red: there are errors in the device the operation has been stopped. When an error occurs, it may be due to one of the following reasons:
 - a) The device is overheated.
 - b) Other defective electronics in the device.

4.3. Panel Operation

After switching on the device, set the “MODE” toggle switch to “KNOB” and the “SENSOR” toggle switch to “INT”. Then use the knob to tune the target temperature of the breadboard.

After the unit reaches the target temperature and stabilizes, the LED indicator will turn green.

4.4. Software Operation

Set the “MODE” toggle switch to “USB” and connect the device to a computer with the included USB cable. The device can be controlled by the PTC1 software, included with the device.

With the software, users can set the target temperature with higher resolution. The user can also see a precise readout of the temperature detected by the internal or external sensor. The temperature stabilization window and PID settings of the device can also be fine-tuned.

In this mode, the device will not respond to any adjustment on the knob.

4.5. Connecting an External Sensor

On the front panel of the PTC1(/M), there is a 2.5 mm Stereo Earphone Jack (F2 in Figure 1). It is designed to accept a Thorlabs TSP-TH temperature probe as an external sensor.

Connect the TSP-TH and toggle the “SENSOR” switch to “EXT”. Then the PTC1(/M) will use the external thermistor as the temperature monitor for its TEC control feedback loop instead of the internal thermistor in the breadboard.



Figure 2 TSP-TH Temperature Probe Connected to PTC1/M

4.6. Command Line Operation

PTC1(/M) uses the Thorlabs MTD1020T temperature controller. By connecting the USB to a PC, it is possible to operate and configure the MTD1020T directly through the USB port. This enables operation through a terminal interface; alternatively, users can write their own program to control the unit. Prior to running the command line interface, the included drivers should be installed, the unit should be powered on, and a USB cable should be connected between the device and the host PC.

The terminal emulator should be configured as follows:

- Baud Rate: 115.2 kbps
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None

For the detailed command line operation and configuration of MTD1020T, please refer to the data sheet for the MTD1020T.

Chapter 5 Specifications

Item #	PTC1	PTC1/M
Temperature Control Specifications		
Maximum Cooling Power ^a	18 W	
Temperature Setting Range ^b	15 to 45 °C (Panel) 5 to 45 °C (Software)	
Temperature Readout Resolution	±0.001 °C (Software)	
Temperature Stabilization Window	0.1 °C	
Breadboard Specifications		
Threading	Imperial	Metric
Material	Aluminum (Al-6063-T5)	
Finish	Matte Black Anodized	
Breadboard Thickness	8 mm	
Flatness	±0.15 mm	
Hole Size and Spacing	8-32 Taps with 1/2" Spacing 1/4"-20 Taps with 1" Spacing	M4 Taps with 12.5 mm Spacing M6 Taps with 25 mm Spacing
Distance from Edge to First Hole	0.5" on All Sides	13.5 mm from Front & Back 13.3 mm from Left & Right
General Specifications		
Power Supply	100 - 240 VAC, 50 - 60 Hz	
Power Consumption	28 W Max	
Operating Temperature	0 to 45 °C	
Storage Temperature	-15 to 70 °C	
Dimensions (L x W x H)	127.0 mm x 101.6 mm x 62.5 mm ^c	
Weight	1.3 kg	

- a. When Breadboard is Kept at Same Temperature as Ambient
- b. The actual achievable temperature range is related to the thermal load and ambient temperature.
- c. Not Including Controls

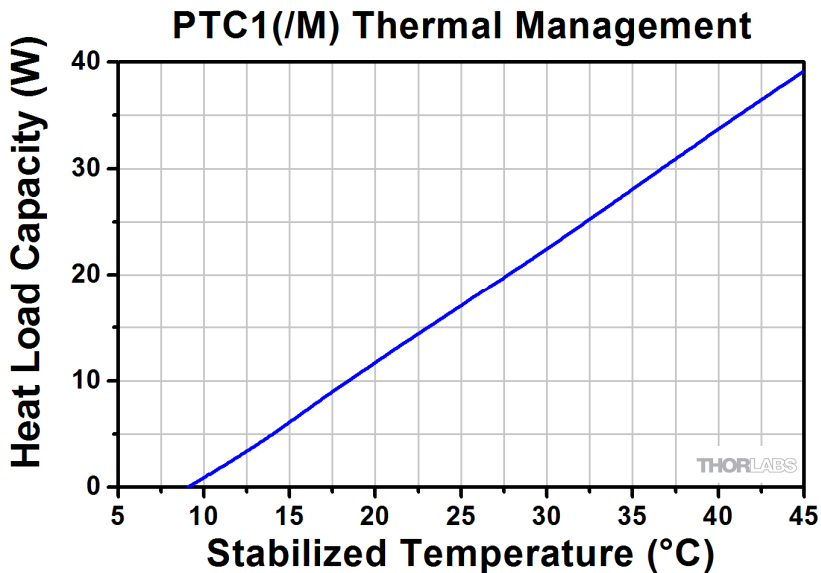


Figure 3 Given a stabilized temperature (i.e. temperature of the breadboard after it has been achieved and stabilized by the TEC), this graph shows the maximum heat load that the unit can dissipate. Alternatively, given a known heat load, this graph shows the minimum temperature that the unit can achieve and stabilize at. This data was measured at a 25 °C ambient temperature.

Chapter 6 Mechanical Drawing

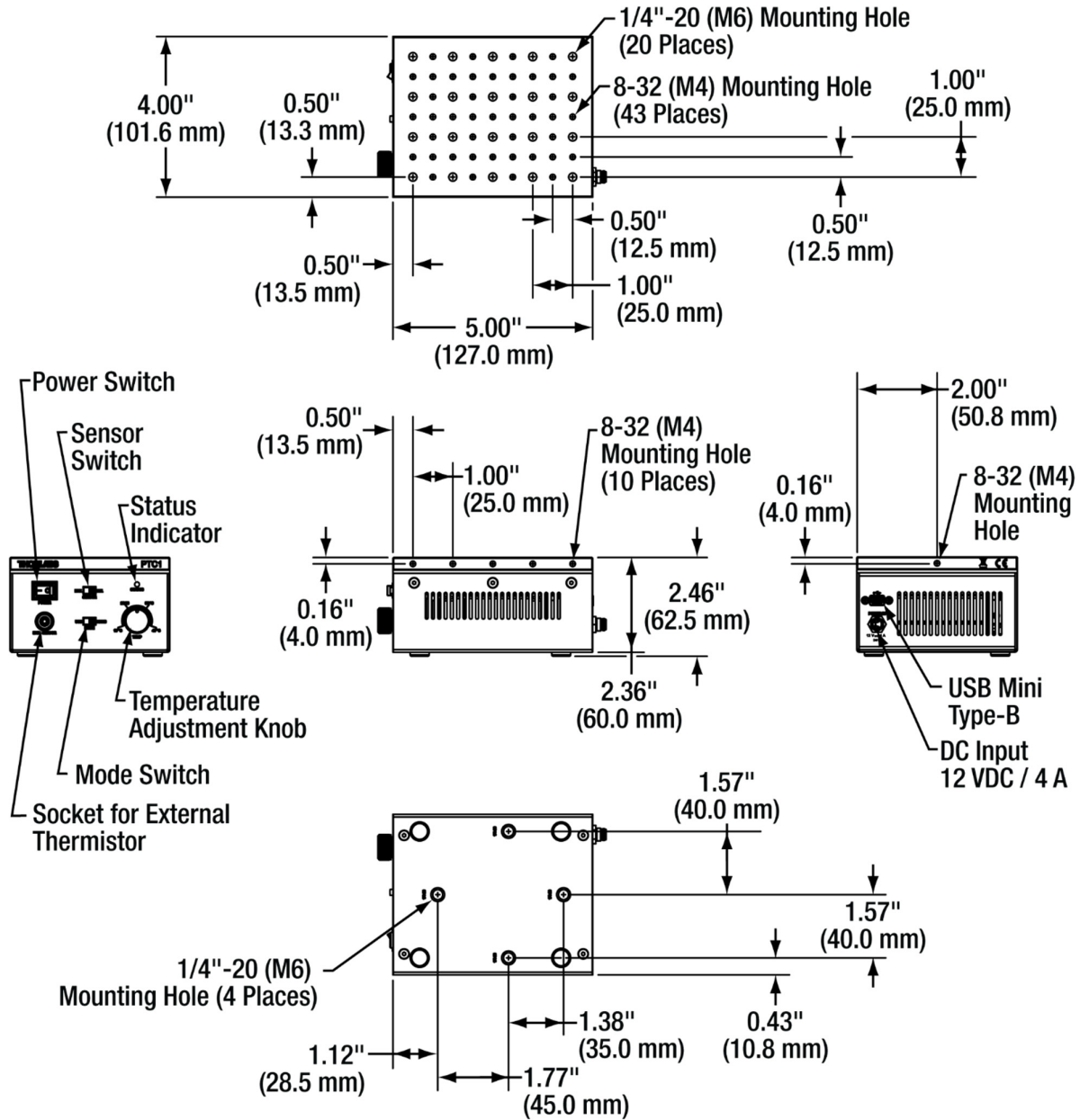


Figure 4 The mechanical drawing of the PTC1 is shown here. Dimensions and threading types on the PTC1/M are given in parentheses.

Chapter 7 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

- This offer is valid for Thorlabs electrical and electronic equipment:
- Sold after August 13, 2005
- Marked correspondingly with the crossed out “wheelie bin” logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self-contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB's, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

Waste Treatment is Your Own Responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of life products will thereby avoid negative impacts on the environment.



Declaration of Conformity

We: Thorlabs Optical Electronic Technology (Shanghai) Co., Ltd
of: Room A101, No.100, Lane 2891, South Qilianshan Rd, Shanghai

In accordance with the following directive(s):

2014/35/EU	Low Voltage Directive (LVD)
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	RoHS 2 Directive

hereby declare that:

Model: PTC1, PTC1/M
Equipment: Temperature-Controlled Breadboard

Is in conformity with the applicable requirements of the following documents:

EN 61010-1:2010
EN 55011:2016/A1:2017 (Class B)
EN 61326-1:2013
EN 61326-2-1:2013
EN 61326-2-2:2013
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 61000-4-2:2009
EN 61000-4-3:2006+A1:2008+A2:2010
EN 61000-4-4:2012
EN 61000-4-5:2014
EN 61000-4-6:2014+AC:2015
EN 61000-4-8:2010
EN 61000-4-11:2004+A1:2017

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:

does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive

I hereby declare that the equipment named has been designed to comply with the relevant section of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed:

on: 11. October 2018

Name: Shanshan Song
Position: General Manager

Declaration of Conformity

**Thorlabs Optical Electronic Technology (Shanghai) Co., Ltd
Room A101, No.100, Lane 2891, South Qilianshan Rd., Shanghai**

declares under it's own responsibility, that the product:

Temperature-Controlled Breadboard

Model No.: **PTC1, PTC1/M**

fulfills the requirements of the standard

CISPR PUB. 22, FCC Part 15 Subpart B Class A (Verification)

and therefore corresponds to the regulations of the directive.

Signed:



on: 11. October 2018

Name: Shanshan Song
Position: General Manager

Chapter 8 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



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