TCM1000T
3 W TEC Controller

User Guide

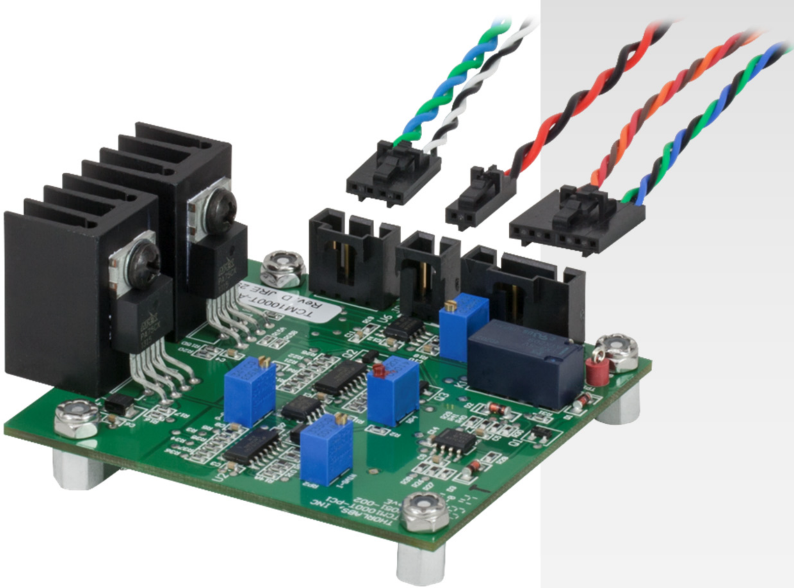


Table of Contents

Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution: Risk of Electric Shock
	Caution: Hot Surface
	Caution: Risk of Danger
	Warning: Laser Radiation

Chapter 2 Safety

Precautions of a general nature should be gathered here. Wherever possible, however, safety warnings, cautions, and notes should only appear immediately before the instructions to which they apply (versus being listed in this section).

SHOCK WARNING

The device may pose a risk of injury from electrical shock when powered on.

Chapter 3 Overview

- The TCM1000T TEC Control Module will control current through a Thermal Electric Cooler in order to maintain a constant temperature on the device mounted to the cooler. Operating from a +5 VDC power supply the module can provide up to 3 Watts of power and is current limited to 1 Amp.
- The module is designed to maintain temperature based on feedback provided from a 10 kΩ NTC type thermistor sensor.
- Temperature is set and monitored using a scaled voltage based on the thermistor resistance for a given temperature, and is available at test points referenced to system ground.
- Maximum adjustment range is 5 kΩ to 25 kΩ.
- System response can be adjusted for various thermal loads using a Proportional Gain adjustment pot and an Integral Gain adjustment pot.
- Status is available on a Form C relay that is energized when the thermistor resistance is matched within approximately 1000 Ω of the set-point resistance. Outputs are available for external monitoring of the set point and feedback thermistor resistances.

Chapter 4 Setup

4.1. Connections

Three wiring harnesses have been provided to make the proper connections from the TCM1000T to its power source and the thermal system being controlled. For ease of identification each consists of the following wire color schemes and functions. For a detailed schematic of the connectors and layout, please see *Chapter 8*.

Input Connections

Jumper	Wire Color	Description
JP1-1	Green	TEC (+)
JP1-2	Blue	TEC (-)
JP1-3	White	Thermistor In
JP1-4	Black	Thermistor Out (common)
JP2-1	Red	+5V power
JP2-2	Black	+5V return (common)

Special Note: All connections made with BLACK wires are common to each other and may at some point in your system be common to ground. Take care when connecting the thermistor to butterfly type laser packages that have one leg of the thermistor common to case.

In addition to the above inputs and outputs a 6-pin header is installed in JP3 to allow monitoring of the status relay and analog signals. The pin assignments are as follows:

Jumper	Wire Color	Description
JP3-1	Brown	Relay1 N.O.
JP3-2	Red	Relay1 COM
JP3-3	Orange	Relay1 N.C.
JP3-4	Black	Monitor Ground
JP3-5	Green	Monitor TSET
JP3-6	Blue	Monitor TACT

Pin JP3-1 is nearest connector JP2.

Chapter 5 Operation

1. Connect the unit to a suitable DC power supply taking care to observe correct polarity.

2. Connect the unit to the TEC system to be controlled.

3. For initial settings it is suggested that the PGAIN pot and the IGAIN pot be set to their middle adjustment points (six turns from either end of travel).

4. Apply power to the unit.

5. Using a digital multimeter, monitor the TSET test point with respect to the GND test point. This test point will provide a voltage proportional to the resistance that you want the feedback thermistor to regulate at. The transfer function is 1.000 V = 10.00 kΩ. TSET can be adjusted using the TSET potentiometer. The adjustment range is from approximately 0.500 V (5 kΩ) to 2.500 V (25 kΩ). Keep in mind that in an NTC type thermistor the resistance is highest when the temperature is lowest. The TSET pot will increase the resistance when turned clockwise (effectively ***lowering*** the temperature). A graph of a typical 10 kΩ NTC thermistor is provided for reference at the end of this user's guide.

6. Using a second multimeter (if available) monitor the TACT test point with respect to the GND test point. This test point provides a voltage proportional to the actual thermistor resistance. The transfer function is the same as above (1 V = 10 kΩ).

7. Once power is applied to the unit TACT should start to move in the direction of TSET. There may be a slight overshoot or undershoot before the resistance (and therefore temperature) stabilizes to the set point, this is normal.

8. You may want to monitor the status relay either using an Ohmmeter or simply by listening to them. It will be closed across the N.C. to COM terminals until the temperature has settled at which time it will be closed across the N.O. to COM terminals.

Chapter 6 Troubleshooting

The TACT test point moves away from the TSET setting:

1. Turn power off and double check the TEC connections, they may be reversed or the thermistor may be shorted (wrong connection to case).

2. The PGAIN adjustment is too low. With the power ON slowly adjust the P pot clockwise until the system reverses direction. Increase the P pot approximately 2 turns beyond this point to insure some margin in the adjustment.

The TACT test point is oscillating to the high and low side of the set point:

1. The IGAIN adjustment is too low. Slowly adjust the I pot clockwise until the system stabilizes, or

2. The PGAIN adjustment is too high. Slowly adjust the P pot counterclockwise, or

3. The TEC is mounted improperly resulting in inconsistent thermal conduction.

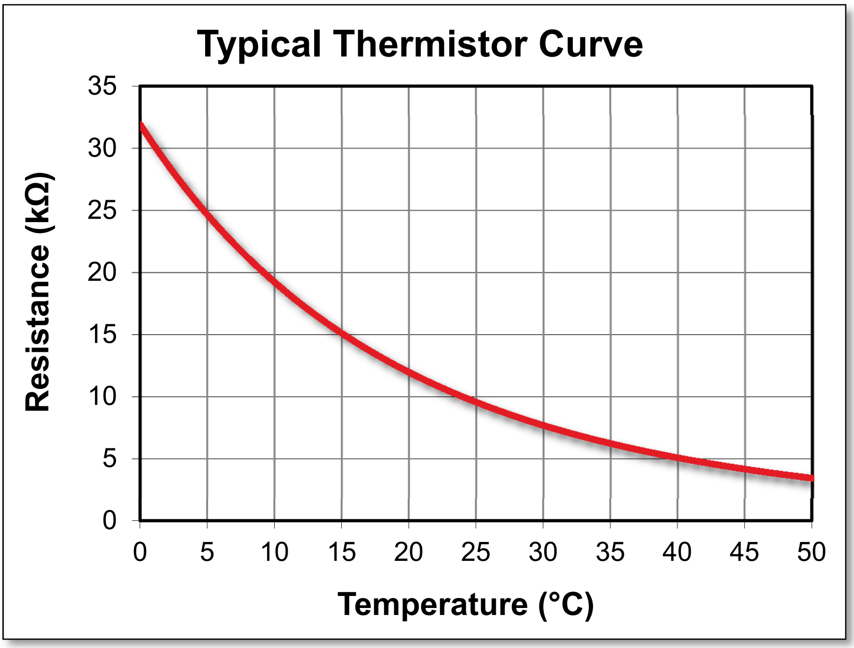
The TSET to TACT difference is greater than 20Ω:

1. Let the system completely settle then slowly adjust the I pot counterclockwise until the TACT measurement just starts to change. Let the system settle before readjusting in small increments.

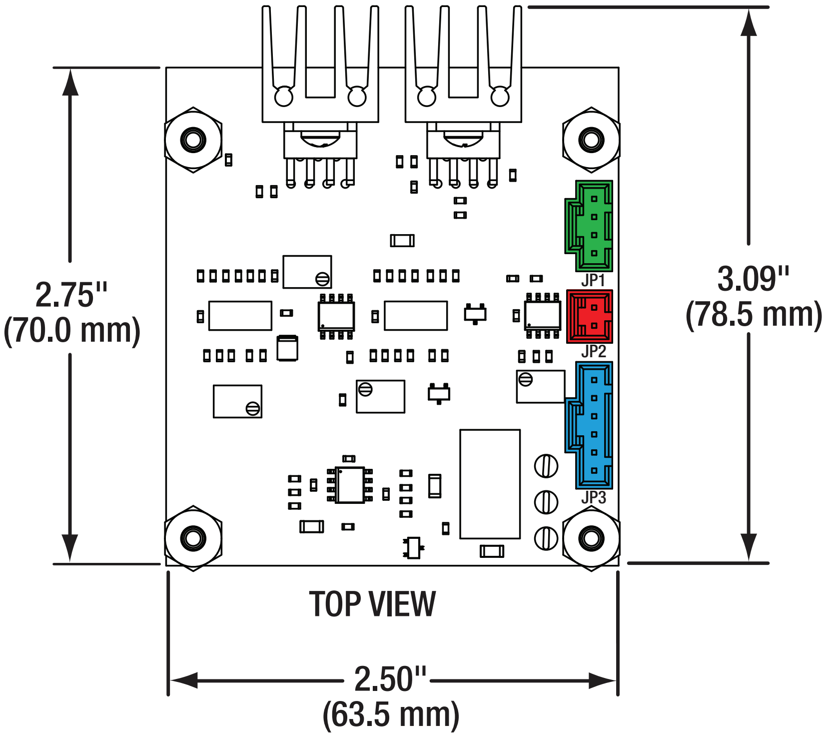
The Status relay may change states a number of times during TSET adjustments and while the system settles. This is especially true for very fast responding thermal loads and is normal.

Chapter 7 Specifications

Specification	Value
Input Power	+5 VDC @ 1.25 A Max
Output Power	3 Watts (3 V Max TEC voltage @ 1A Max TEC current)
Feedback Element	10 kΩ NTC type thermistor
Control Range	5 to 25 kΩ (approximately 40 to 10 °C)
Set point Accuracy	<20 Ω in 25 °C Operating Environment
Long Term Drift (24 hrs)	<1 Ω in 25 °C Operating Environment



Chapter 8 Mechanical Drawing



Chapter 9 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.

9.1. 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.

9.2. 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.

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