



SM1L10H
Heated Lens Tube

Operating Manual



















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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
	Caution: Spinning Blades May Cause Harm

Chapter 2 Safety



CAUTION



Internal surface hot! Let cool before changing optics.

Chapter 3 Description

The SM1L10H is an actively heated lens tube that is compatible with all Thorlabs' SM1 series lens tubes and accessories, as well as Thorlabs' TC200 Heater Controller.

This device allows for mounting most of our 1" diameter optics and provides a heating capability that will prevent condensation from forming on the optic, or allow you to take advantage of various thermal effects inherent in some optics.

Chapter 4 Operation

Normal Operation and Use



Caution! Internal Lens tube temperatures will be very hot! Handle with care.

1. Install the 1" Optic into SM1L10H Heater as follows:
 - a) Loosen the three button head cap screws on the end cap with the internal threads. It is not necessary to completely remove these screws



- b) Holding the screws with your fingers, slide the end cap out of the heater.



- c) Place the optic into the lens tube so it is seated against the SM1 retaining ring that is already installed in the tube.



- d) Secure the optic by threading in a second SM1RR retaining ring (provided with the heater).
- e) Replace the end cap. Orient the grooved inner surface towards the inside of the heater and slide the screws into the slots.



- f) Tighten each screw until just snug. Do not over-tighten the screws



- g) NOTE: DO NOT attempt to install the optic without removing the end cap first. The SM1RR retaining ring will NOT thread correctly from the end cap threads to the lens tube threads.

2. Locate unit on a solid, dry working surface. Unit should be secured to a standard optical breadboard using a Thorlabs' post and base in conjunction with a Thorlabs' LMR1 adapter (not included).



3. Connect the heater to an appropriate heater controller. The Hirose connector is pin compatible with Thorlabs' TC200 Heater Controller. Please refer to Appendix A for pin designations if you are using a third party controller.
4. Operate the heater in accordance with the controller that is powering it.

IMPORTANT NOTE: The internal heating element is protected by a thermal switch that activates at 80 °C. At this temperature the thermal switch will open the connection to the heating element, causing the unit to cool down. The reset temperature on the switch is approximately 40 °C. Once the switch cools down to the reset point it will re-close and connect the heating element to the power source. The unit will then cycle on and off until the problem is corrected. Possible reasons for the heater to exceed 80°C include: a failed thermistor, open or broken thermistor wires or connections, or improperly set control temperature.

Additional SM1 compatible lens tubes and accessories can be installed onto the SM1L10H. Male and female threads are provided on each end of the unit. Please take care when threading extensions onto the SM1L10H as each end cap is made from Delrin and can easily cross thread or strip if over tightened.

4.1. General Maintenance

There are no user serviceable parts in the SM1L10H. If you suspect something has failed on the unit, please contact Thorlabs for advice on returning the unit for evaluation.

Cleaning

The unit can be cleaned using a soft, slightly damp cloth. Avoid using any solvents on or near the unit.

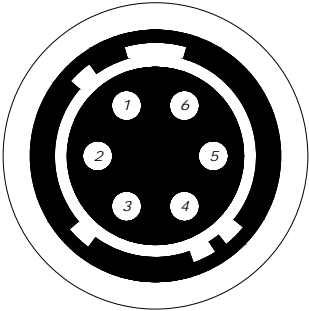
Chapter 5 Performance Specifications

5.1. Specifications

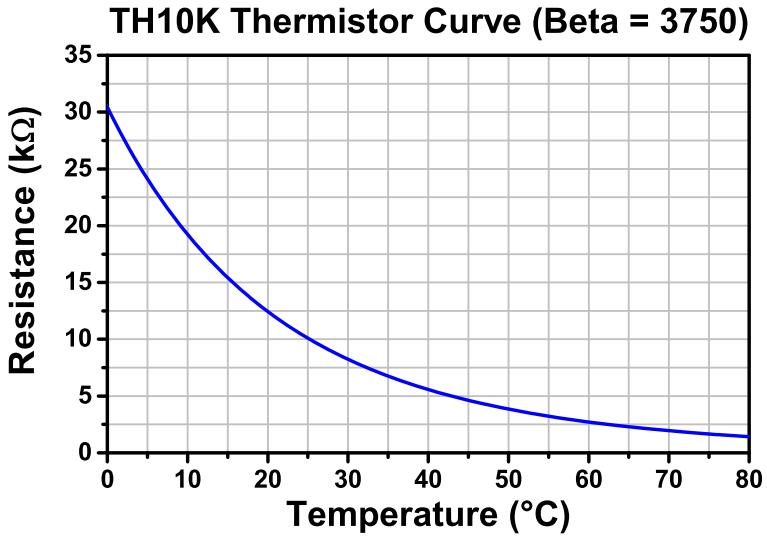
Specifications				
Parameter	Min	Typical	Max	Unit
Temperature Range	Ambient	-	75	°C
DC Input				
Input Voltage		-	14	V
Input Current	-	-	0.7	A
Heater Resistance	-	19.7	-	Ohms
Thermistor Resistance @ 25°Cb	-	10K	-	Ohms
Thermistor Beta	-	3750	-	
Long Term Stabilityc	-	0.200		°C
Heating Capacity	-	-	30	Watts
Parameter		Specifications		
Connector (Hirose P/N)		HR10A-7P-6PC		
Connector mate		HR10A-7R-6S		
Mechanical Dimensions		Ø1.85" x 1.43" Long		

- a) SM1L10H only operates in heating mode and is protected by an 80 °C thermal switch.
 b) Thermistor is a Negative Temperature Coefficient Type (NTC)
 c) Conditions: Room Ambient using TC200 Controller. Measured directly on thermistor – internal tube temperatures will differ.

5.2. Connector Pin-outs

PIN	Description	
1	Heater Output	
2	Heater Output Return	
3	Reserved on TC200 (Do not Connect to this Pin)	
4	Sensor Input (+)	
5	Sensor Input (Ground)	
6	Reserved on TC200 (Do not Connect to this Pin)	Hirose HR10A-7P-6PC Connector

5.3. Thermistor Data



5.4. NTC10K

$$R_T = 1,000e^{\left(\beta\left(\frac{1}{T} - \frac{1}{298}\right)\right)}$$

Where:

R_T is the resistance in Ω at temperature T .

T is the temperature in $^{\circ}\text{K}$.

Beta is the constant associated with the particular thermistor.

Chapter 6 Warranty

Thorlabs, Inc. warrants the material and production of the SM1L10H for a period of 24 months from the date of shipment. During this warranty period Thorlabs, Inc. will repair or exchange any units found to be defective in material or workmanship.

For warranty repairs or service the unit must be returned to Thorlabs, Inc or one of our worldwide offices. All returns must be accompanied by a Returned Material Authorization number (RMA) issued by Thorlabs. The customer is responsible for all costs incurred to ship the unit back to Thorlabs; in the case of warranty repairs Thorlabs will cover the cost of shipment back to the customer.

In the case of shipments from outside the USA, duties, taxes etc. shall be the responsibility of the customer.

Thorlabs, Inc does not guarantee that this manual is error free, and reserves the right to change this manual, the specifications, or the data of the described unit at anytime, without notice.

Thorlabs, Inc. is not liable for any incidental damage caused by failure of this unit.

This warranty does not cover errors in operation, defects, or damage caused by the use of third party controllers, modifications or misuse, or if the unit is used outside the operating parameters specified in this manual.

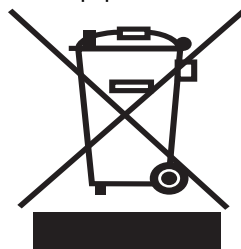
This warranty does not cover failure due to incorrectly connected heater and/or sensor elements.

The SM1L10H is not intended for use in medical and/or life support situations.

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.

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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