THORLABS

SM1L10HR
Temperature-Controlled
Lens Tube

User Guide



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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: ESD Sensitive Components

Chapter 2 Description

CAUTION

Internal surface hot! Let cool before changing optics.

The *SM1L10HR* actively heated lens tube is compatible with all Thorlabs' SM1 series lens tubes and accessories, as well as Thorlabs' Heater Controllers. The heated lens tube ships with two SM1 retaining rings included; one is pre-installed in the lens tube.

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 the user to take advantage of various thermal effects inherent in some optics.

Using one retaining ring secures the optic against a mechanical stop on the side of the external SM1 threads. Using two retaining rings allows the user to position that optic at a particular depth, set by the first retaining ring threaded in as a stop.

Chapter 3 Safety

WARNING

WARNING: Do not connect unit to mains, turn on the power toggle switch, or turn up the temperature until all setup is complete. Failure to do so runs the risk of burning.

WARNING

Be sure to let device cool to room temperature before touching the device, altering the setup, or conductiong maintenance work.

Chapter 4 Operation

CAUTION

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

1. Install the Ø1" optic into *SM1L10HR* Heater with one of two methods:

   Using One Retaining Ring

   a) Remove the pre-installed *SM1RR* retaining ring.

   b) Place the optic into the lens tube so it is seated against the mechanical stop on the side of the external SM1 threads.

   c) Secure the optic by threading in the retaining ring against the optic.

   Using Two Retaining Rings

   a) Set the pre-installed *SM1RR* retaining ring to desired thread depth.

   b) Place the optic into the lens tube so it is seated against the retaining ring.

   c) Thread in the second included retaining ring until it is tight against the optic.

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 fixed lens mount with internal SM1 threads.

3. Connect the heater to an appropriate heater controller. The Hirose connector is pin compatible with Thorlabs' Heater Controller.
   Please refer to 5.2 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 85 °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 50 °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 85 °C include: +/- 5 °C tolerance of the thermal fuse, 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 *SM1L10HR*. External threads are available on one end of the unit, while internal threads are available on the opposite end.

4.1. General Maintenance

There are no user serviceable parts in the *SM1L10HR*. 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 Specifications

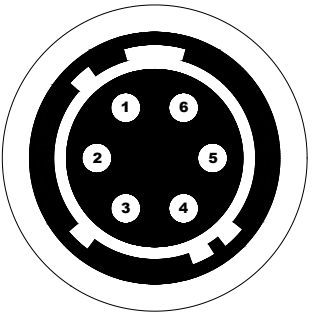
5.1. Specifications

Item #	SM1L10HR			
Parameter	Min	Typical	Max	Unit
Temperature Range[a]	Ambient	85	90	°C
DC Input Voltage	-	-	14	V
DC Input Current	-	-	0.7	A
Heater Resistance	-	19.7[b]	-	Ohms
Thermistor Resistance @ 25 °C[c]	-	10 000	-	Ohms
Thermistor Beta (β)	-	3750	-	-
Long Term Stability[d]	-	0.200	-	°C
Heating Capacity	-	-	30	Watts
Parameter	Specification			
Connector (Hirose P/N)	HR10A-7P-6PC			
Connector Mate	HR10A-7R-6S			
Mechanical Dimensions	Ø1.95" x 1.42" Long			

a) *SM1L10HR* only operates in heating mode and is protected by an 85 °C thermal switch.
b) ±10% or ±0.5 Ω, Whichever is Greater
c) Thermistor is a Negative Temperature Coefficient Type (NTC)
d) Conditions: Room ambient using *TC200* (obsolete) or *TC300* Thorlabs Temperature controller. Measured directly on thermistor – internal tube temperatures will differ.

5.2. Connector Pin Out Diagram

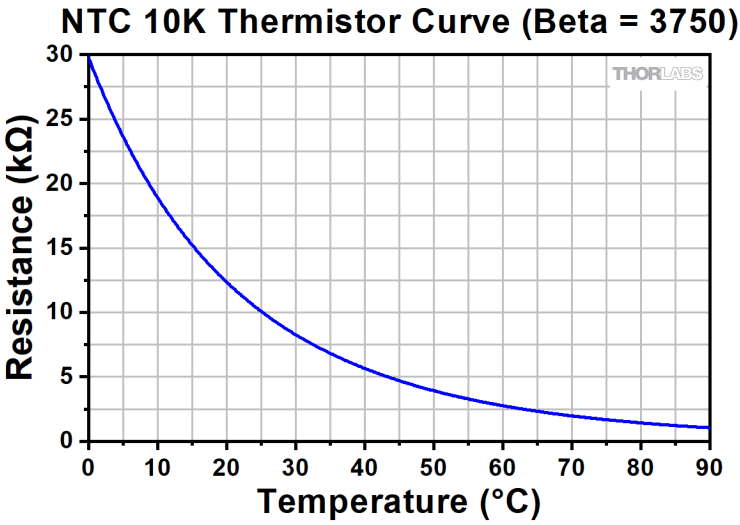
Pin	Description
1	Heater[a]
2	Heater[a]
3	Reserved (Do Not Connect to This Pin)
4	Thermistor[a]
5	Thermistor[a]
6	Reserved (Do Not Connect to This Pin)



Hirose HR10A-7P-6PC Connector

a) Heater and Thermistor Connections are Not Polarized

5.3. Thermistor Data



5.4. NTC 10K Thermistor Equation

$$R_T = 10\,000\, e^{\left(\beta\left(\frac{1}{T+273}-\frac{1}{298}\right)\right)}$$

Where:

R_T is the resistance in ohms (Ω) at temperature T.

T is the temperature in degrees Celsius (°C).

Beta, β, is the constant associated with the particular thermistor.

Chapter 6 Declaration of Conformity



EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs Inc.

Of: 56 Sparta Avenue, Newton, New Jersey, 07860, USA

in accordance with the following Directive(s):

2014/35/EU	Low Voltage Directive (LVD)
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)

hereby declare that:

Model: ***SM1L10HR***

Equipment: ***Temperature-Controlled Lens Tube***

is/are in conformity with the applicable requirements of the following documents:

EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.	2010
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements	2013

and which, issued under the sole responsibility of Thorlabs, is/are 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:

contains no 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 sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed: 

On: 26 October 2021

Name: Danielle Strong

Position: Director of Quality and Compliance

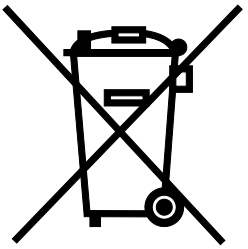
EDC - SM1L10HR -2021-10-26



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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