



HPLS243, HPLS245

High Power Light Source with
Liquid Light Guide

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, Spinning Blades May Cause Harm

Chapter 2 Safety

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly.

Unit is supplied with a 115 VAC parallel blade line cord for North American use only. For all other applications use an IEC 320 compatible line cord fitted with a plug appropriate for your particular AC wall socket.

The unit is equipped with a switching power supply for voltages from 100 to 240 VAC. There is no need to change the fuse when selecting your regional mains voltage. The user may need to change the mains fuse located below the AC plug on the back of the unit, see Fuse Replacement on page 14. With the exception of the mains fuses, there are no user serviceable parts in this product.



WARNING



DO NOT OPEN HOUSING! The HPLS200 series has no user-serviceable parts. Service should only be performed by trained service personnel.



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



WARNING



Do Not Operate in Wet/Damp conditions.



WARNING



Mobile telephones, cellular phones or other radio transmitters should not be used within the range of three meters of this unit since the electromagnetic field intensity may exceed the maximum allowed disturbance values according to EN50082-1.



WARNING



Do NOT look directly at the light source beam during operation. Do NOT place hand or body part in the light beam as this may cause burning. NEVER place objects inside the LLG mount except the LLG tip, fully inserted. If the LLG tip is NOT fully inserted, LLG may OVERHEAT causing damage to the LLG.



WARNING



Do not obstruct the air-ventilation slots in the housing! Provide a clearance of at least 5" in the Rear and 12" on the front, left and right sides.

Insure that the IEC320 connector which the power cord plugs into is accessible at all times. Do not place the device in such an orientation as to impede access to this connector.

If this product is used in any manner not specified by this instruction manual, the protection provided by the equipment may be impaired

Chapter 3 Description

3.1. Product Overview

Thorlabs' HPLS200 series light sources combine the best features of solid-state electronics and full spectrum plasma emitters. The Luxim LiFi Light Emitting Plasma™ lamp source incorporates a dielectric resonant cavity to efficiently couple power from a solid-state power amplifier into a high-intensity discharge vessel, resulting in long life (>10,000 hours at 50% intensity) and a complete color spectrum. They are ideal for applications such as endoscopy, microscopy, and other medical lighting and inspection applications.

The HPLS200 series features a compact design that houses the power supply and lamp assembly in one enclosure. The display, controls, and power switch are located on the front of the unit. Lamp ON and intensity is controlled from the front panel, as well as with the control software. The USB interface, AC cord, and liquid light guide (LLG) mount are located in the rear of the unit.

This manual covers two models; HPLS243, and HPLS245. The HPLS243 uses a 3 mm LLG, and the HPLS245 uses a 5 mm LLG.

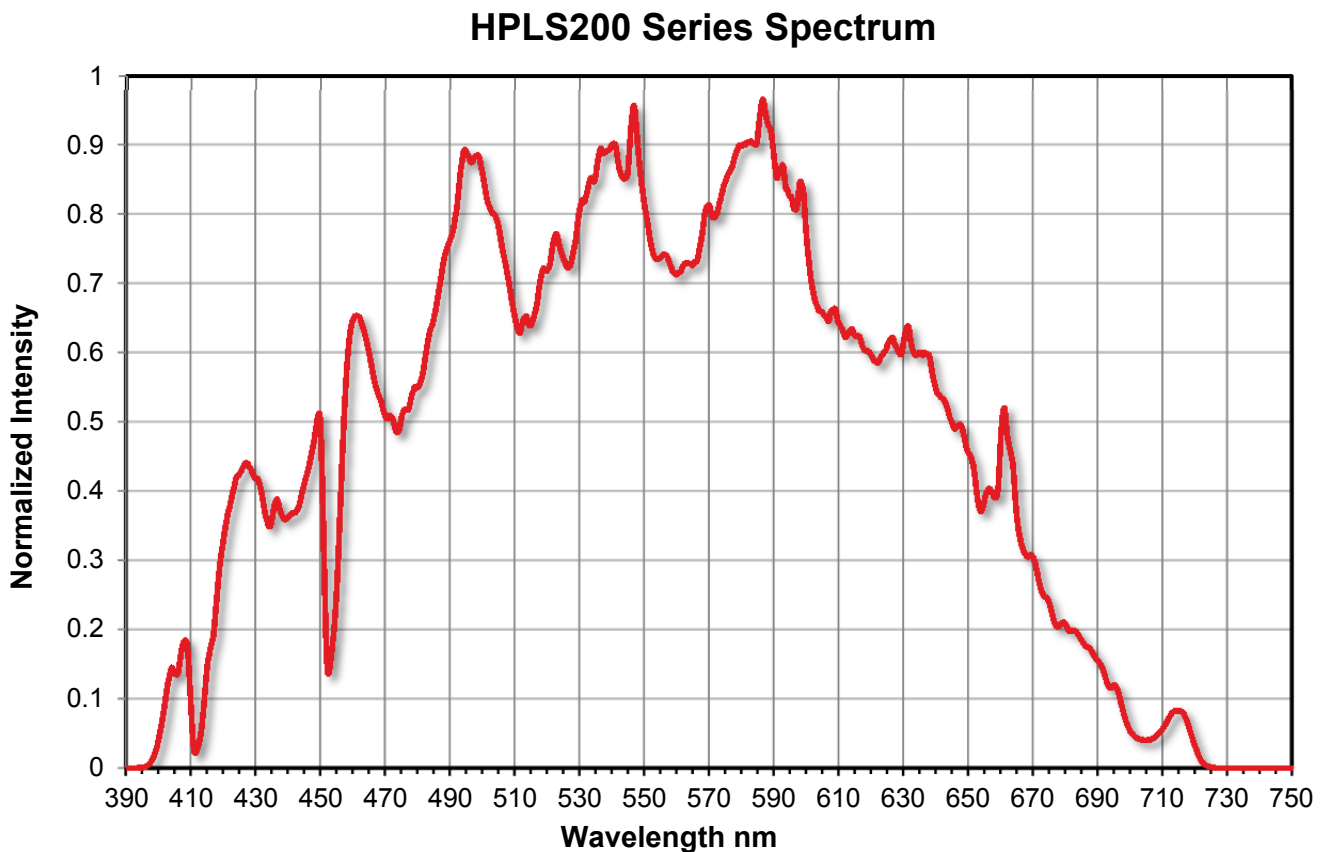


Figure 1 HPLS200 Spectrum

3.2. Control and Port Overview

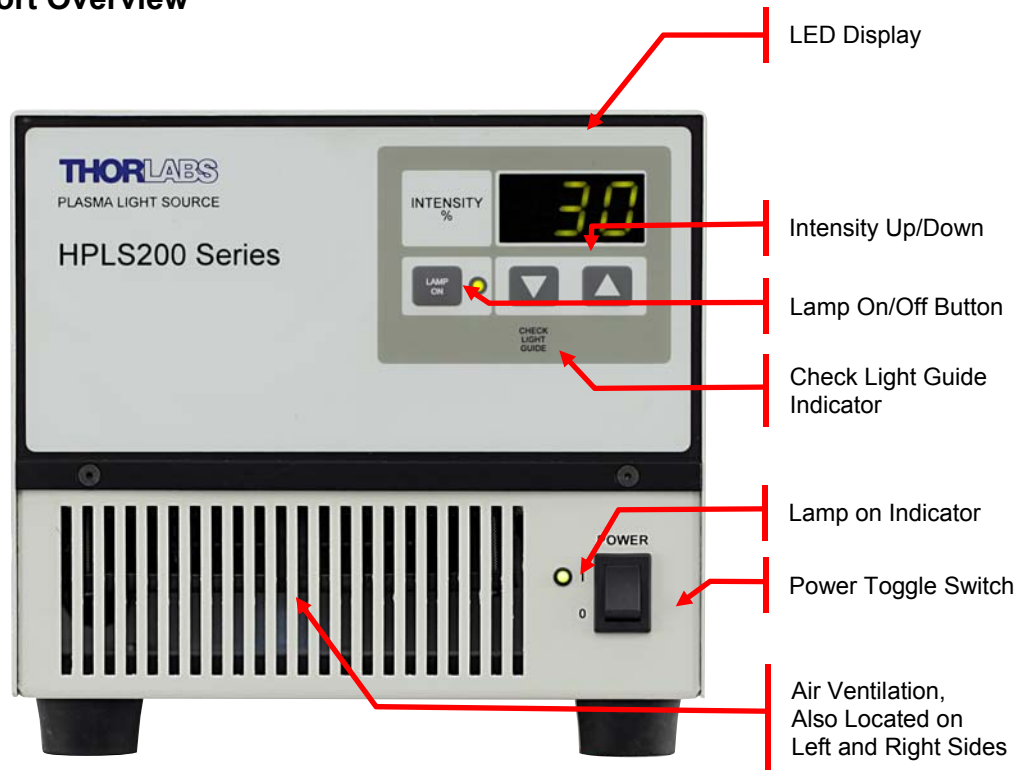


Figure 2 HPLS Front Panel



Figure 3 HPLS Rear Panel

Chapter 4 Setup

4.1. AC Line Voltage

The HPLS200 is designed to operate at 85 to 264 VAC. There is no line switch adjustment to be made. However it may be necessary to replace an open fuse. To do this you must perform the following procedure on page 14, Fuse Replacement.

4.2. Setup of the HPLS200

- On the front of the unit set the power switch to the OFF position. The green LED indicator should be OFF.
- Connect the appropriate power cord into the IEC AC receptacle on the rear of the unit and plug the unit into an AC outlet.
- Loosen the knurled locking knob counterclockwise to release the retaining clamp. Place the LLG (Liquid Light Guide) tip into the mount. Ensure the LLG tip is inserted completely. If the LLG is not fully seated, the tip will not cool properly and may cause the LLG to overheat. If the LLG cannot be inserted, turn the knurled knob more; do not force the LLG tip in.
- With the LLG fully seated, tighten nut snug to fasten LLG.



Caution



If the LLG is not fully seated, the LLG tip will not cool properly. This may cause the LLG to overheat and possibly damage the LLG. See attached LLG precautions for typical operation and use.

Chapter 5 Operation

5.1. Powering ON the HPLS200

- On the Front of the unit, set the power switch to the ON position. The green power ON LED indicator will light and the fans will start up.
- The lamp will display the last intensity setting used. Initially it will turn on at 100%.
- Prior to pressing Lamp ON, the intensity can be adjusted using the up and down arrows

5.2. Igniting the lamp

- To ignite the lamp, press the Lamp ON button. The green LED indicator will light and flash during the firing of the bulb.
- Once the Lamp ON button is pressed, an internal shutter will close¹ prior to the firing of the bulb. This blocks any light from entering the light guide.
- Next the lamp will fire. The lamp fully fires at 100% intensity, which allows the bulb to warm up (about 15 - 30 seconds).
- When the lamp is fully ON, the lamp intensity will be set to the last adjusted setting and the internal shutter will open automatically. The Lamp ON LED will stay lit.
- The lamp intensity may now be adjusted. Use the up and down arrows to set the desired intensity from 30% to 100%.
- To shut down the lamp, press the Lamp ON button. The lamp LED indicator will go OFF and the Lamp will go OFF. The last intensity setting will be saved.
- After the lamp has been turned OFF, please wait 30 seconds before lamp is turned back ON.

5.3. GUI

The software included with your high power lamp features a Graphical User Interface (GUI) to control the lamp and to provide feedback of some of the lamps operating conditions as well as any errors or warnings that may occur. The application can be found on the included CD-ROM. To install the application, insert the CD into your computer's CD-ROM drive and run setup.exe. Once installation is complete, connect the lamp to your PC with the USB cable and run the application. The software will automatically locate the correct COM Port to Communicate with the lamp.

¹ The shutter when closing will create a clunk sound within the lamp; also when opening a similar sound will be heard, this is normal operation.

5.4. Computer Controlled Operation

The HPLS200 may also be controlled by a command line language through the USB port. This is offered to enable operation through a terminal interface or for those who may want to write their own program to control the unit. The command language is described below. The drivers required to communicate with the HPLS200 are installed when the GUI described above is installed. Prior to running the command line interface, the unit should be powered on, and a USB cable should be connected between the HPLS200 and the host.

The terminal emulator should be set as follows:

- Baud Rate: 115.2 kb/s (bits per second)
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None

If you are using HyperTerminal, be sure to check the option “Append line feeds to incoming line ends”. You can access it by navigating to “File” > “Properties”, selecting the “Settings” tab and clicking “ASCII Setup...” button. It is the first option in the “ASCII Receiving” box.

If the connection is correct you will see the following after pressing the “Enter” key.

```
Command error CMD_NOT_DEFINED
```

Followed immediately by the prompt:

```
>
```

The basic structure of the interface is a keyword followed by either an equals sign “=” or a question mark “?”. The “=” or “?” will determine if the string is a command or a query. All strings (commands and queries) must be terminated by a carriage return (CR) or pressing the ENTER key on the computer.

The command structure is as follows:

```
Keyword = argument (CR)
```

Where “keyword” defines the function and “argument” is a numerical value followed by a carriage return (CR). See listing below.

The query structure is as follows:

```
Keyword? (CR)
```

The “keyword” defines the function and the question mark (?) indicates a query. The string is terminated with a carriage return (CR). See listing below. There are a few exceptions to this which are noted below.

The prompt symbol “>” will appear on power up and after a command is accepted by the system indicating it is ready to receive another command line.

5.5. Command Set

Command	Syntax*	Description
Get Commands	?	List the available commands.
Get Identification	id?	Returns the model number and firmware version.
Get Lamp Intensity	inten?	Gets the current lamp intensity.
Set Lamp Intensity	inten= <i>n</i>	Set the lamp intensity (<i>n</i> is number between 20 and 100).
Toggle Lamp	toggle	Toggles the lamp on/off.
Lamp Version	vers	Return the Lamp version number.
Enable Lamp	lamp= <i>n</i>	Turns Lamp on or off (<i>n</i> = 1 is on, <i>n</i> = 0 is off).
Get Lamp Status	lamp?	Returns Lamp status (1 = on, 0 = off).
Get Last Command	statword?	Retrieves last command for shutdown.
Get Hours	hours?	Returns accumulated lamp hours.

* All commands and queries are in lower case letters.

Chapter 6 Specifications

Parameter	Conditions	Min	Typ.	Max	Unit
Standard Operating Conditions					
Dimming Range	As a percentage of the original output	30		100	%
Time to Brightness	From turn on command to 90% brightness		10	30	s
Re-Strike Time	Time before lamp can be turned back on	40			s
Lumen Maintenance	As time to 50% of original output		10,000		hr
Operating Temperature	Normal Operating Temperature Range	15	-	28	°C
Lamp Temperature Warning	Temp at which a warning flag will appear on GUI.		70		°C
Lamp Thermal Trip Temperature	Temp at which lamp will shut down to protect from overheating.		80		°C
HPLS200 Parameters					
Output Power Measured from LLG Output	Output tip of 3mm LLG	1.75	-	3.0	W
	Output tip of 5mm LLG	5.0	-	6.0	W
Correlated Color Temp, CCT	Note ²		7650		K
1931 CIE Color Coordinate	Note ²	0.281	0.301	0.321	CIEx
1931 CIE Color Coordinate	Note ²	0.305	0.325	0.345	CIEy
Color Rendering Index			94		CRI
Numerical Aperture NA			0.59		NA
Power Supply					
AC Line Voltage	Input line voltage range	85		264	VAC
DC Output Voltage	Rated at 8.5 A		28		VDC
Fuse, User Replaceable	5x20 mm, 250 V, Slow Blow, Type T		5		A
Altitude	Operating			12,000	ft
	Non-Operating			36,000	ft
Physical Features – Lamp Enclosure					
Power ON Indicator	Green LED				
Power ON	Rocker Switch				
Lamp ON Indicator	Green LED				
Lamp ON	Tactile Switch				
Intensity Adjustment	Tactile Switch UP / DOWN				
Display, Intensity	3 Digit, 7 Segment LED, Green				
USB interface	USB 2.0 Standard B Plug				
LLG Mount	Collet with Thumb Nut				
Feet	Rubber				
Dimensions (L,W,H)	9.76" x 6.67" x 7.21"				
Weight	11.10 lbs. Boxed Weight				

Note ²: Measured directly from the lamp into 5 mm diameter circular aperture.

Chapter 7 Mechanical Drawing

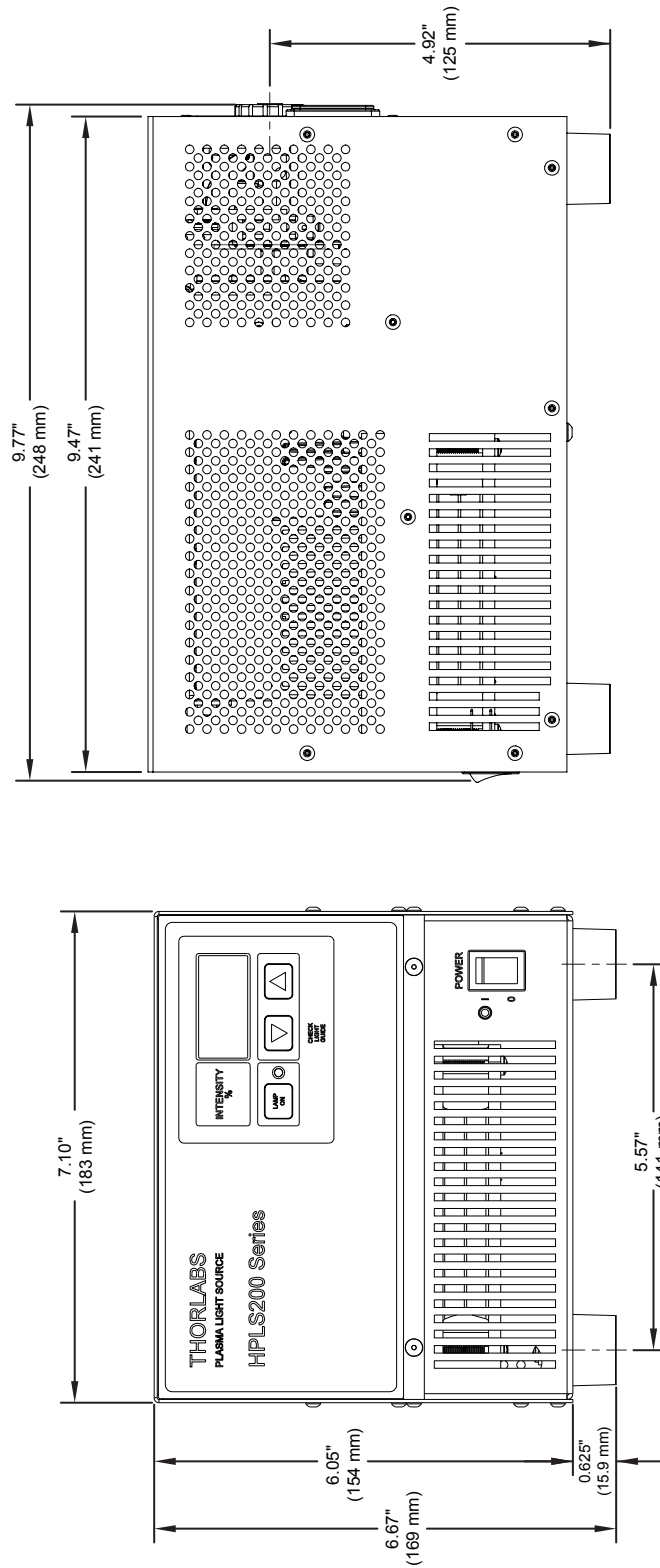


Figure 4 Mechanical Drawing

Chapter 8 Maintenance

The HPLS200 needs very little maintenance under normal operating conditions. The enclosure may be cleaned by wiping with a soft damp cloth.

There are no serviceable parts in the HPLS200 and no reason to open the unit. If you suspect a problem with your HPLS200 please call Thorlabs and technical support will be happy to assist you.

8.1.1. Fuse Replacement

The AC input is protected by a fuse located in a pull out compartment drawer on the rear panel of the Power Supply Enclosure.

If replacement is required:

- Remove the AC power cord if it is connected to the unit.
- Locate the fuse tray directly above the AC power cord connection on the rear panel of the unit.
- Carefully use a flat blade screwdriver to open the fuse tray.
- Remove the existing fuse and install the appropriate 5.0 A fuse. The replacement fuse must be a **5 mm x 20 mm SLO-BLO - 218 series Littlefuse or equivalent**
- Push the fuse tray back into place making sure that it snaps and seats correctly.
- Connect the appropriate power cord into the AC receptacle and plug the unit in.

Replace the fuse with the correct rating. Do not use a fuse with a current rating higher than the unit is rated for.

8.1.2. Ventilation

- For proper operation and protection, it is important to allow proper ventilation of the cooling fans.
- Provide a clearance of at least 5" in the rear and 12" on the front, left and right sides.
- Enclosure should not be obstructed from free airflow.

Chapter 9 Troubleshooting

The table lists possible problems and recommended solutions. If these solutions cannot correct the problem please contact Thorlabs Technical support.

Problem	Solutions
System Power LED will not light and fans do not run.	Check the power switch is in the ON position, the mains connection is correct, and the fuse has not been damaged.
Lamp will not ignite.	Check to see if LLG is fully inserted and "CHECK LIGHT GUIDE" is not lit.
CHECK LIGHT GUIDE is lit, lamp will not ignite	LLG is not inserted, lamp will not fire. Insert LLG.

Error Codes	Code Description
ERROR CODE: E 1 – Front panel	LLG exceeded 35 °C for a period of 24 hours. Warning is to prevent damage to LLG. See Note 1 below.
ERROR CODE: E 2 – Front panel	LLG exceeded 35 °C for a period of 36 hours, Lamp shuts down. See Note 3 below.
ERROR CODE: E 3 – Front panel	LLG exceeded 50 °C, lamp shut down preventing damage to LLG. See Note 3 below.
ERROR CODE: E 4 – Front panel	Alarm: Bulb failed to ignite.
ERROR CODE: E 5 – Front panel	Alarm: Lamp temperature over 80 °C. Lamp shuts down. See Note 3 below.
ERROR CODE: E 6 – Front panel	Alarm: Lamp failed while running
ERROR CODE: E 7 – Front panel	Warning: Internal component failure
ERROR CODE: E 8 – Front panel	Warning: Lamp temperature over 70 °C. See Note 3 below.
ERROR CODE: E 9 – Front panel	Warning: DC voltage under limit
ERROR CODE: E10 – Front panel	Alarm: Lamp failed due to low DC voltage
ERROR CODE: E11 – Front panel	Alarm: Lamp failed due to low current
ERROR CODE: E12 – Front panel	Alarm: Shutter stuck in closed position when attempting to start lamp.
ERROR CODE: E13 – Front panel	Alarm: Shutter failed to close when starting lamp.
ERROR CODE: E14 – Front panel	Alarm: Shutter failed to open after lamp turn on.
ERROR CODE: E15 – Front panel	Alarm: Lamp intensity failed to stabilize within timeout period, starting from ignition of bulb to a max time of 100 seconds.

Note 3:

- Check and reduce ambient temperature. Maximum ambient is specified at 28 °C.
- Check Ventilation, ensure vents are not blocked. See page 14.
- Error code: E 8 is a warning at 70 °C; however lamp will continue to operate.

Chapter 10 Declaration of Conformity

Konformitätserklärung Declaration of Conformity Déclaration de Conformité

**Thorlabs Inc
435 Rt 206
Newton, NJ
USA**

erklärt in alleiniger Verantwortung, dass das Produkt:
declares under it's own responsibility, that the product:
declare sous notre seule responsabilité, que le produit:

HPLS200 Series

mit den Anforderungen der Normen
fulfills the requirements of the standard
satisfait aux exigences des normes

2006/95 EC	Low Voltage Directive 12.Dec. 2006
EMC 2004/108/EC	Electromagnetic Compatibility Directive
EN 61010-1:2001	Safety of Test and Measurement Equipment
EN 61326-1:2006	EMC of Test and Measurement Equipment
CISPR 11 Edition 4:2003	Conducted Emissions
CISPR 11 Edition 4:2003	Radiated Emissions
IEC 61000-3-2,	Harmonics
IEC 61000-3-3	Voltage Fluctuation and Flicker
IEC 61000-4-2	Electrostatic Discharge
IEC 61000-4-3	Radiated Immunity
IEC 61000-4-4	Electrical Fast Transient/Burst, Power Leads
IEC 61000-4-4	Electrical Fast Transient/Burst, I/O Leads
IEC 61000-4-5	Surge Immunity, Power Leads
IEC 61000-4-6	Conducted Immunity, Power Leads
IEC 61000-4-6	Conducted Immunity, I/O Leads
IEC 61000-4-11	Voltage Dips, Interrupts and Variations

übereinstimmt und damit den Bedingungen entspricht.
and therefore corresponds to the regulations of the directive.
et répond ainsi aux dispositions de la directive.

Dachau, 1. September 2011


.....

Ort und Datum der Ausstellung
Place and date of issue
Lieu et date d'établissement

Name und Unterschrift des Befugten
Name and signature of authorized person
Nom et signature de la personne autorisée

Chapter 11 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.

11.1. 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.

11.2. 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.

Chapter 12 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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