

HNL150L - November 1, 2017

Item # HNL150L was discontinued on November 1, 2017. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

HENE LASERS: RED

- ▶ Operating Lifetimes up to 40,000 Hours
- ▶ Output Powers from 0.8 mW to 22.5 mW
- ▶ Low-Intensity Noise

Application Idea

HNL150R Mounted in C1512 Clamps on Ø1.5" Posts



HNL020LB
2 mW, Linearly Polarized

HNL5008R
0.8 mW, Randomly Polarized



OVERVIEW

Features

- 632.8 nm Central Wavelength
- Linearly or Randomly Polarized Output Beams
- Includes External Power Supply
- Packages Available with Integrated Shutters and Remote Interlock Connections

Applications

- Polarization Experiments
- DNA Sequencing
- Metrology
- Hematology
- Semiconductor Inspection
- Confocal Microscopy
- Flow Cytometry

Thorlabs offers an extensive selection of CE compliant 632.8 nm (red) Helium-Neon (HeNe) Lasers with powers from 0.8 mW to 22.5 mW from stock. In addition to the applications listed to the right, HeNe lasers are widely used in education and as alignment tools due to their excellent beam quality and gas discharge laser characteristics. Depending upon the model, the output beam is either linearly polarized or randomly polarized (unpolarized). The polarization state of a randomly polarized HeNe changes on nanosecond timescales; when averaged over time, the light emitted from these lasers appears randomly polarized. However, any polarization optics in the path (intentional or unintentional) can cause large variations in the output power. Only polarized lasers should be used in applications that involve polarization optics. Due to the significant ASE background, a bandpass filter should be used for precision measurements.

Common Specifications

Common Specifications	
Mode Structure	TEM ₀₀ >95%
Static Alignment	HNL5008: Approximately 1.75" from Base Cylindrical Housings: ±0.01" (Center to Outer Cylinder) ±1 mrad (Parallel to Outer Cylinder)
Starting Voltage	<10,000 VDC
Storage Lifetime	Indefinite (Hard-Sealed)
Operating Temperature	HNL5008: -40 to 60 °C Cylindrical Housings: -40 to 70 °C
Storage Temperature	HNL5008: -40 to 100 °C Cylindrical Housings: -40 to 150 °C
Relative Humidity (Non-Condensing)	0 to 100%
Operating Altitude	0 to 10,000 ft
Storage Altitude	0 to 70,000 ft

Specifications common to all of the lasers featured on this page are listed in the table to the right, and model-dependent information is given in the tables

below. All but the self-contained packages feature remote interlock connections and integrated shutters. Please see the *Interlock Disassembly* tab for integrating the remote interlock connector into an interlock or lab safety system.

For specialized applications, Thorlabs offers a Stabilized Red HeNe Laser, which is capable of either ± 2 MHz stabilization in frequency stabilization mode, or $\pm 0.2\%$ power stabilization in intensity stabilization mode.

LASER SAFETY

Laser Safety and Classification

Safe practices and proper usage of safety equipment should be taken into consideration when operating lasers. The eye is susceptible to injury, even from very low levels of laser light. Thorlabs offers a range of laser safety accessories that can be used to reduce the risk of accidents or injuries. Laser emission in the visible and near infrared spectral ranges has the greatest potential for retinal injury, as the cornea and lens are transparent to those wavelengths, and the lens can focus the laser energy onto the retina.









Safe Practices and Light Safety Accessories

- Thorlabs recommends the use of safety eyewear whenever working with laser beams with non-negligible powers (i.e., > Class 1) since metallic tools such as screwdrivers can accidentally redirect a beam.
- Laser goggles designed for specific wavelengths should be clearly available near laser setups to protect the wearer from unintentional laser reflections.
- Goggles are marked with the wavelength range over which protection is afforded and the minimum optical density within that range.
- Laser Safety Curtains, Laser Barriers and Blackout Materials can prevent direct or reflected light from leaving the experimental setup area.
- Thorlabs' Enclosure Systems can be used to contain optical setups to isolate or minimize laser hazards.
- A fiber-pigtailed laser should always be turned off before connecting it to or disconnecting it from another fiber, especially when the laser is at power levels above 10 mW.
- All beams should be terminated at the edge of the table, and laboratory doors should be closed whenever a laser is in use.
- Do not place laser beams at eye level.
- Carry out experiments on an optical table such that all laser beams travel horizontally.
- Remove unnecessary reflective items such as reflective jewelry (e.g., rings, watches, etc.) while working near the beam path.
- Be aware that lenses and other optical devices may reflect a portion of the incident beam from the front or rear surface.
- Operate a laser at the minimum power necessary for any operation.
- If possible, reduce the output power of a laser during alignment procedures.
- Use beam shutters and filters to reduce the beam power.
- Post appropriate warning signs or labels near laser setups or rooms.
- Use a laser sign with a lightbox if operating Class 3R or 4 lasers (i.e., lasers requiring the use of a safety interlock).
- Do not use Laser Viewing Cards in place of a proper Laser Barrier or Beam Trap.



Laser Classification

Lasers are categorized into different classes according to their ability to cause eye and other damage. The International Electrotechnical Commission (IEC) is a global organization that prepares and publishes international standards for all electrical, electronic, and related technologies. The IEC document 60825-1 outlines the safety of laser products. A description of each class of laser is given below:

Class	Description	Label
1	This class of laser is safe under all conditions of normal use, including use with optical instruments for intrabeam viewing. Lasers in this class do not emit radiation at levels that may cause injury during normal operation, and therefore the maximum permissible exposure (MPE) cannot be exceeded. Class 1 lasers can also include enclosed, high-power lasers where exposure to the radiation is not possible without opening or shutting down the laser.	
1M	Class 1M lasers are safe except when used in conjunction with optical components such as telescopes and microscopes. Lasers belonging to this class emit large-diameter or divergent beams, and the MPE cannot normally be exceeded unless focusing or imaging optics are used to narrow the beam. However, if the beam is refocused, the hazard may be increased and the class may be changed accordingly.	
2	Class 2 lasers, which are limited to 1 mW of visible continuous-wave radiation, are safe because the blink reflex will limit the exposure in the eye to 0.25 seconds. This category only applies to visible radiation (400 - 700 nm).	
2M	Because of the blink reflex, this class of laser is classified as safe as long as the beam is not viewed through optical instruments. This laser class also applies to larger-diameter or diverging laser beams.	
3R	Lasers in this class are considered safe as long as they are handled with restricted beam viewing. The MPE can be exceeded with this class of laser, however, this presents a low risk level to injury. Visible, continuous-wave lasers are limited to 5 mW of output power in this class.	
3B	Class 3B lasers are hazardous to the eye if exposed directly. However, diffuse reflections are not harmful. Safe handling of devices in this class includes wearing protective eyewear where direct viewing of the laser beam may occur. In addition, laser safety signs lightboxes should be used with lasers that require a safety interlock so that the laser cannot be used without the safety light turning on. Class-3B lasers must be equipped with a key switch and a safety interlock.	
4	This class of laser may cause damage to the skin, and also to the eye, even from the viewing of diffuse reflections. These hazards may also apply to indirect or non-specular reflections of the beam, even from apparently matte surfaces. Great care must be taken when handling these lasers. They also represent a fire risk, because they may ignite combustible material. Class 4 lasers must be equipped with a key switch and a safety interlock.	
All class 2 lasers (and higher) must display, in addition to the corresponding sign above, this triangular warning sign		

HENE ACCESSORIES

FiberPort and Thread Adapters

FiberPort and Thread Adapters for Self-Contained HeNe Lasers



[Click for Details](#)

The SM1A32 Thread Adapter allows externally SM05-threaded or internally SM1-threaded optomechanics to be attached to the output aperture of the HNLS008R(-EC)(-JP) or HNLS008L(-EC)(-JP) laser.

The HCL2 Adapter, which features external 5/8"-32 threading, allows a FiberPort coupler to be attached directly to the threaded aperture of our self-contained HeNe lasers or any other 5/8"-32 tapped hole. A slip-plate design allows the position of the fiberport to be shifted and locked to maximize coupling efficiency. FiberPort mounting screws are included.

FiberPort and Thread Adapters for Standard Cylindrical HeNe Lasers^a



[Click for Details](#)

The SM05AHN Thread Adapter allows SM05-threaded components to be attached directly to the front of a HeNe laser and is ideal for enclosing a HeNe beam path using SM05 Lens Tubes.

The HCL FiberPort Adapter allows a FiberPort coupler to be attached directly to the front of a HeNe laser. Both adapters can be attached to the laser via counterbored slots that fit industry-standard M3 and 4-40 four-bolt patterns. The HCL can also be mounted via the internal C-Mount-Threaded (1.00"-32) central bore.

- Note that these adapters are not compatible with the HNL008 Series of Cylindrical HeNe Lasers.

Mounting Adapters

V-Clamp Post Mount



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The C1512(/M) and C1513(/M) are designed specifically for fastening Ø0.56" (14 mm) to Ø2" (50 mm) cylindrical lasers to Thorlabs' rigid Ø1.5" Posts. One PM4(/M) Clamping Arm is included with each unit and additional clamping arms can be purchased as needed here.

Drop-In Post Clamp



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The C174TC is designed specifically for mounting Ø1.74" (44.2 mm) cylindrical lasers to Thorlabs optical posts with 8-32 (M4) taps. A captive screw with a 3/32" (2.5 mm) hex secures the laser in place.

Post and Cage Mount



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The HCM2 Cage Mount enables integration of a cylindrical HeNe laser with a diameter between 1.74" and 1.77" (44.2 mm and 45.0 mm) into a 60 mm cage system or SM2 (2.035"-40) lens tube system. The HCM2 provides ± 1.0 mm of coarse X and Y adjustment, and is compatible with Ø1/2" and Ø1" posts.

INTERLOCK DISASSEMBLY

Interlock Disassembly

Each of Thorlabs' HeNe laser sources includes an external power supply with a remote interlock connector. The interlock connector can be disassembled for integration into an interlock system. The interlock is at AC line potential, so proper care must be taken to use the correct connectors and hardware. Be sure to confirm compatibility between the AC line and the interlock system.

The 100 - 230 VAC external power supply that comes with select HeNe lasers uses a simplified interlock connector that comprises a black, plastic cover that can be unscrewed. Once unscrewed, the shorting conductor on the connector is removed prior to integration into the interlock system (see image to the right).

For our other HeNe lasers with a 100, 120, or 230 VAC power supply, the interlock connector can be disassembled using the following steps (shown in the images below). First, the metal pin needs to be removed, the top of plug taken out, and the shorting conductor from the connector removed. The connector may then be wired into the user's interlock system. Be sure to reinstall the plastic safety cover over the interlock before use.



Click to Enlarge
Remote Interlock Connector for 100 - 230 VAC
Power Supplies



Step 1
Click to Enlarge
Remote Interlock Connector Shown Assembled



Step 2
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First, remove the metal pin from the interlock connector using a pair of pliers.



Step 3
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Second, pull out the plug section of the assembly.

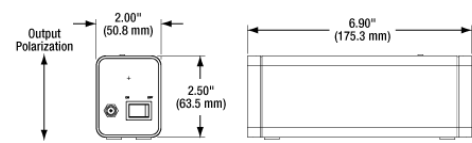


Step 4
Click to Enlarge
Third, remove the protective cap to expose the short wire, which can be unsoldered.

0.8 mW Self-Contained (632.8 nm) HeNe Lasers

- ▶ Self-Contained Laser with Internal High-Voltage Transformer
- ▶ Available with Linearly or Randomly Polarized Output Beam
- ▶ CE Compliant
- ▶ CDRH (IEC 60825-1) Laser Class: IIIa (3R)

Thorlabs' Self-Contained Helium-Neon Lasers integrate a red (632.8 nm) HeNe laser tube with a built-in voltage transformer. The rectangular housing incorporates a hard-sealed internal mirror and plasma tube design that maximizes the lifetime of the laser. The power



Note that the output polarization applies only to lasers linearly polarized.

Mounting Options



Click to Enlarge
Bottom Groove in Laser Housing with Two XE25T3 T-Nuts Inserted



Click to Enlarge
Two BA1L Bases Connected to Laser Housing via T-Nuts

cord and on/off rocker switch are located on the back of the housing. Please note that these self-contained lasers do not feature a remote interlock connector or an integrated shutter.

The HNLS008L lasers feature a linearly polarized output beam, which is vertically polarized with respect to the rectangular housing, while the HNLS008R features a randomly polarized output beam. These lasers are an ideal choice for applications that require low-power or ease of use, such as alignment or the classroom. The lasers have an external 120 V, 230 V (-EC), or 100 V (-JP) wall adapter that plugs into the back of the module. If you require a different adapter plug, please contact Tech Support before ordering.

Mounting Options

The output aperture is internally 5/8"-32 threaded. Our SM1A32 adapter (not included) connects to this aperture and accepts externally SM05-threaded (0.535"-40) or internally SM1-threaded (1.035"-40) optomechanics. Alternatively, the HCL2 FiberPort Adapter allows a FiberPort coupler to be attached directly to the front of the laser, as shown to the right.



Click to Enlarge
Self-Contained HeNe Lasers can be fiber-coupled using a FiberPort Coupler and HCL2 FiberPort Adapter.

In addition, as shown to the left, the bottom of the laser contains a groove that accepts our XE25T3 (XE25T3/M) Low-Profile T-Nuts, providing an easy way to use standard optomechanical bases to mount the laser to a breadboard or optical table.

Item #	Power Supply	Polarization Ratio	Power ^a	1/e ² Beam Diameter	Divergence	LMS ^b	Noise (RMS) ^c	Laser Class ^d
HNLS008L	120 VAC	500:1	0.8 mW	0.48 mm	1.7 mrad	1090 MHz	<1.0%	3R
HNLS008L-EC	100 VAC							
HNLS008L-JP	230 VAC							
HNLS008R	120 VAC	Unpolarized	0.8 mW	0.48 mm	1.7 mrad	1090 MHz	<1.0%	3R
HNLS008R-EC	100 VAC							
HNLS008R-JP	230 VAC							

- Minimum Power Measured at 633 nm
- Longitudinal Mode Spacing
- 30 Hz to 10 MHz
- During normal operation, the cavity length, and hence the power, can vary. Thus, these class 3R lasers can exceed the specified minimum power.

Part Number	Description	Price	Availability
HNLS008L-EC	Self-Contained HeNe Laser, 632.8 nm, 0.8 mW, Polarized, 230 VAC Power Supply	\$872.00	Today
HNLS008R-EC	Self-Contained HeNe Laser, 632.8 nm, 0.8 mW, Random, 230 VAC Power Supply	\$812.00	Today

HNL020RB	100 - 240 VAC	Unpolarized	2.0 mW	0.63 mm	1.3 mrad	730 MHz	0.1%	1800 VDC	6.5 mA	3R
HNL020R-JP	100 VAC									

- TEM₀₀, 1/e² Points ±3% b. Longitudinal Mode Spacing c. 30 Hz to 10 MHz

Part Number	Description	Price	Availability
HNL020LB	NEW! Customer Inspired!HeNe Laser, 632.8 nm, 2 mW, Polarized, 100 - 240 VAC Power Supply Included	\$1,640.00	Today
HNL020RB	NEW! Customer Inspired!HeNe Laser, 632.8 nm, 2 mW, Random, 100 - 240 VAC Power Supply Included	\$1,590.00	Today
HNL020R-JP	HeNe Laser, 632.8 nm, 2 mW, Random, 100 VAC Power Supply Included	\$1,401.00	Today

5 mW Red (632.8 nm) HeNe Lasers

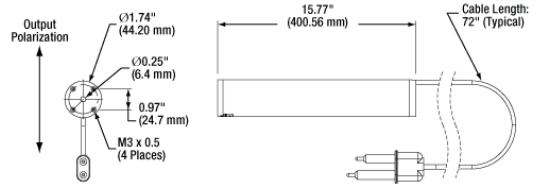


Click to Enlarge

- ▶ 5.0 mW Red (632.8 nm) Output
- ▶ Linear (500:1 Polarization Ratio) or Random Polarization
- ▶ External Power Supply Included

Thorlabs' cylindrical, 5.0 mW, red (632.8 nm) Helium-Neon lasers feature a tube design that makes them easy to mount

in nearly any optical system. These lasers are offered with either linear (500:1 polarization ratio) or random polarization. The linearly polarized beam is polarized vertically with respect to the cable at the rear of the laser's housing. A built-in interlock circuit is included that can be integrated with lab safety systems (see *Interlock Disassembly* tab for details). An external power supply and power cord are included.



Note that the output polarization applies only to lasers linearly polarized.

Item #	Power Supply	Polarization Ratio	Power	1/e ² Beam Diameter ^a	Divergence	LMS ^b	Noise (RMS) ^c	Operating Voltage	Operating Current	Laser Class
HNL050LB	100 - 240 VAC	500:1	5.0 mW	0.81 mm	1.0 mrad	435 MHz	0.2%	2300 VDC	6.0 mA	3B
HNL050RB	100 - 240 VAC	Unpolarized								
HNL050R-EC	230 VAC									
HNL050R-JP	100 VAC									

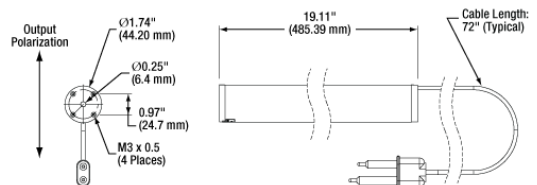
- TEM₀₀, 1/e² Points ±3% b. Longitudinal Mode Spacing c. 30 Hz to 10 MHz

Part Number	Description	Price	Availability
HNL050R-EC	HeNe Laser, 632.8 nm, 5 mW, Random, 230 VAC Power Supply Included	\$1,401.00	Today
HNL050LB	NEW! Customer Inspired!HeNe Laser, 632.8 nm, 5 mW, Polarized, 100 - 240 VAC Power Supply Included	\$1,590.00	Today
HNL050RB	NEW! Customer Inspired!HeNe Laser, 632.8 nm, 5 mW, Random, 100 - 240 VAC Power Supply Included	\$1,540.00	Today
HNL050R-JP	HeNe Laser, 632.8 nm, 5 mW, Random, 100 VAC Power Supply Included	\$1,401.00	Lead Time

10 mW Red (632.8 nm) HeNe Lasers

- ▶ 10.0 mW Red (632.8 nm) Output
- ▶ Linear (500:1 Polarization Ratio) or Random Polarization
- ▶ 120 VAC, 230 VAC, or 100 VAC Power Supply Included

Thorlabs' cylindrical, 10.0 mW, red (632.8 nm) Helium-Neon lasers feature a tube design that makes them easy to mount in nearly any optical system. These lasers are offered with either linear (500:1 polarization ratio) or random polarization. The linearly polarized beam is polarized vertically with respect to the cable at the rear of the laser's housing. A built-in interlock circuit is included that can be integrated with lab safety systems (see *Interlock Disassembly* tab for details). The included external power supply is available in 120 VAC, 230 VAC, or 100 VAC versions for compatibility with international power sources.



Note that the output polarization applies only to lasers linearly polarized.

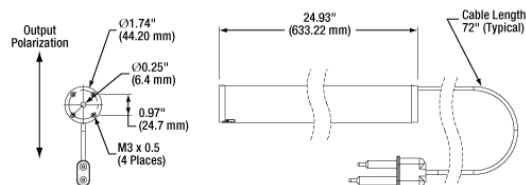
Item #	Power Supply	Polarization Ratio	Power	1/e ² Beam Diameter ^a	Divergence	LMS ^b	Noise (RMS) ^c	Operating Voltage	Operating Current	Laser Class
HNL100L	120 VAC	500:1	10.0 mW	0.68 mm	1.2 mrad	320 MHz	1.0%	3100 VDC	6.5 mA	3B
HNL100L-EC	230 VAC									
HNL100L-JP	100 VAC									
HNL100R	120 VAC	Unpolarized								
HNL100R-EC	230 VAC									
HNL100R-JP	120 VAC									

- TEM₀₀, 1/e² Points ±3% b. Longitudinal Mode Spacing c. 30 Hz to 10 MHz

Part Number	Description	Price	Availability
HNL100L-EC	HeNe Laser, 632.8 nm, 10 mW, Polarized, 230 VAC Power Supply Included	\$2,035.00	Today
HNL100R-EC	HeNe Laser, 632.8 nm, 10 mW, Random, 230 VAC	\$1,943.00	Today
HNL100L	HeNe Laser, 632.8 nm, 10 mW, Polarized, 120 VAC Power Supply Included	\$2,035.00	Today
HNL100R	HeNe Laser, 632.8 nm, 10 mW, Random, 120 VAC Power Supply Included	\$1,943.00	Today
HNL100L-JP	HeNe Laser, 632.8 nm, 10 mW, Polarized, 100 VAC Power Supply Included	\$2,035.00	Today
HNL100R-JP	HeNe Laser, 632.8 nm, 10 mW, Random, 100 VAC Power Supply Included	\$1,943.00	Today

15 mW Red (632.8 nm) HeNe Lasers

- ▶ 15.0 mW Red (632.8 nm) Output
- ▶ Linear (500:1 Polarization Ratio) or Random Polarization
- ▶ 120 VAC, 230 VAC, or 100 VAC Power Supply Included



Thorlabs' cylindrical, 15.0 mW, red (632.8 nm) Helium-Neon lasers feature a tube design that makes them easy to mount in nearly any optical system. These lasers are offered with either linear (500:1 polarization ratio) or random polarization. The linearly polarized beam is polarized vertically with respect to the cable at the rear of the laser's housing. A built-in interlock circuit is included that can be integrated with lab safety systems (see *Interlock Disassembly* tab for details). The included external power supply is available in 120 VAC, 230 VAC, or 100 VAC versions for compatibility with international power sources.

Note that the output polarization applies only to lasers linearly polarized.

Item #	Power Supply	Polarization Ratio	Power	1/e ² Beam Diameter ^a	Divergence	LMS ^b	Noise (RMS) ^c	Operating Voltage	Operating Current	Laser Class
HNL150L	120 VAC	500:1	15.0 mW	0.70 mm	1.15 mrad	257 MHz	0.5%	3800 VDC	6.5 mA	3B
HNL150L-EC	230 VAC									
HNL150L-JP	100 VAC									
HNL150R	120 VAC	Unpolarized								
HNL150R-EC	230 VAC									
HNL150R-JP	100 VAC									

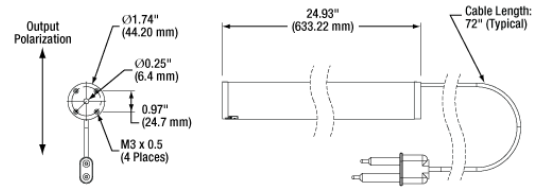
- TEM₀₀, 1/e² Points ±3% b. Longitudinal Mode Spacing c. 30 Hz to 10 MHz

Part Number	Description	Price	Availability
HNL150L-EC	HeNe Laser, 632.8 nm, 15 mW, Polarized, 230 VAC Power Supply Included	\$2,383.00	Today
HNL150R-EC	HeNe Laser, 632.8 nm, 15 mW, Random, 230 VAC Power Supply Included	\$2,332.00	Today
HNL150L	HeNe Laser, 632.8 nm, 15 mW, Polarized, 120 VAC Power Supply Included	\$2,383.00	Lead Time
HNL150R	HeNe Laser, 632.8 nm, 15 mW, Random, 120 VAC Power Supply Included	\$2,332.00	Today
HNL150L-JP	HeNe Laser, 632.8 nm, 15 mW, Polarized, 100 VAC Power Supply Included	\$2,383.00	Today

21 mW - 22.5 mW Red (632.8 nm) HeNe Lasers

- ▶ 21.0 mW or 22.5 mW Red (632.8 nm) Output with Respective Linear or Random Polarization
- ▶ 120 VAC, 230 VAC, or 100 VAC Power Supply Included

Thorlabs' cylindrical red (632.8 nm) Helium-Neon lasers feature a tube design that makes them easy to mount in nearly any optical system. The HNL210L models offer a 21.0 mW, linearly polarized output (500:1 polarization ratio), while the HNL225 models offer a 22.5 mW, randomly polarized output. The linearly polarized beam is polarized vertically with respect to the cable at the rear of the laser's housing. A built-in interlock circuit can be integrated with lab safety systems (see *Interlock Disassembly* tab for details). The included external power supply for randomly polarized lasers is available in 120 VAC, 230 VAC, or 100 VAC versions for compatibility with international power sources. Linearly polarized lasers include 120 VAC or 230 VAC power supplies.



Note that the output polarization applies only to lasers linearly polarized.

Item #	Power Supply	Polarization Ratio	Power	1/e ² Beam Diameter ^a	Divergence	LMS ^b	Noise (RMS) ^c	Operating Voltage	Operating Current	Laser Class
HNL210L	120 VAC	500:1	21.0 mW	0.70 mm	1.15 mrad	257 MHz	0.5%	3800 VDC	6.5 mA	3B
HNL210L-EC	230 VAC									
HNL225R	120 VAC	Unpolarized	22.5 mW							
HNL225R-EC	230 VAC									
HNL225R-JP	100 VAC									

- TEM₀₀, 1/e² Points ±3% b. Longitudinal Mode Spacing c. 30 Hz to 10 MHz

Part Number	Description	Price	Availability
HNL210L-EC	HeNe Laser, 632.8 nm, 21 mW, Polarized, 230 VAC Power Supply Included	\$2,598.00	Today
HNL225R-EC	HeNe Laser, 632.8 nm, 22.5 mW, Random, 230 VAC Power Supply Included	\$2,547.00	Today
HNL210L	HeNe Laser, 632.8 nm, 21 mW, Polarized, 120 VAC Power Supply Included	\$2,598.00	3-5 Days
HNL225R	HeNe Laser, 632.8 nm, 22.5 mW, Random, 120 VAC Power Supply Included	\$2,547.00	Today
HNL225R-JP	HeNe Laser, 632.8 nm, 22.5 mW, Random, 100 VAC Power Supply Included	\$2,547.00	Today