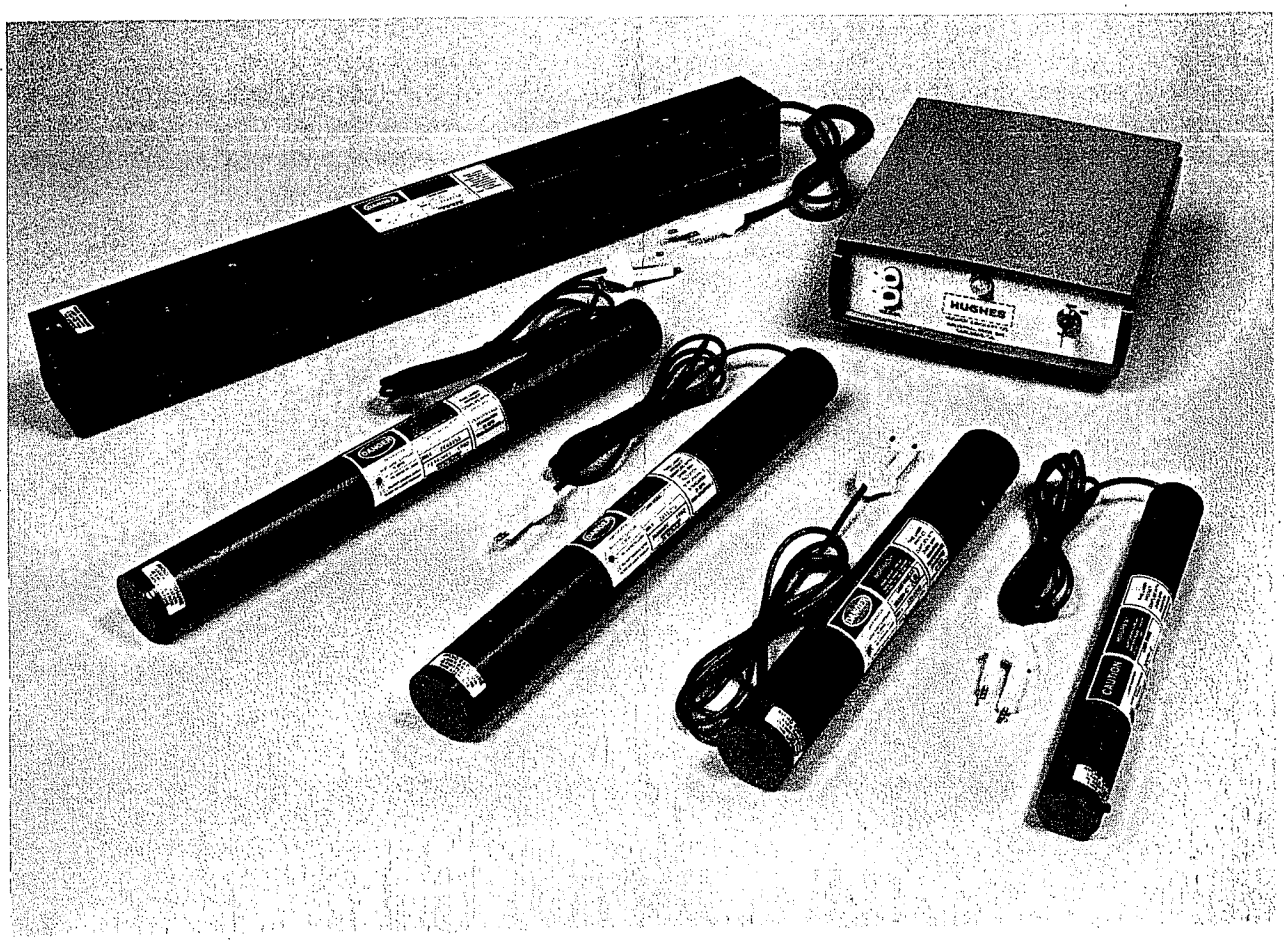
HUGHES
HUGHES AIRCRAFT COMPANY
INDUSTRIAL PRODUCTS DIVISION
CARLSBAD, CALIFORNIA



Operating Instructions

Hughes Series 3000
HELIUM-NEON LASER SYSTEMS

INTRODUCTION

Thank you for your purchase of a Hughes Series 3000 Helium-Neon Laser System.

We believe you will find this system to be of the highest quality and reliability available. To ensure that you have no difficulties, please read this short manual before applying power to your new system.

Hughes Series 3000 Helium-Neon Laser Systems consist of selected laser heads with matched regulated power supplies. The laser heads feature a proprietary hardseal construction for environmental protection under adverse conditions and to provide long storage life. Extra ruggedness is achieved through cold-cathode coaxial construction — a patented concept developed by Hughes. The power supplies incorporate total fault protection circuitry and feature feedback regulated start voltage.

Your Hughes helium-neon laser system is listed in this manual according to model number. Specifications, characteristerics and dimensions for all Series 3000 model numbers are provided. Each laser undergoes a minimum of 48 hours burn-in prior to shipment. Units are then tested for power output, beam quality and output power stability.

Each system is warranted against defects in materials and workmanship as well as failure to meet operating specifications. The warranty applies when the system is operated within the environmental parameters set forth in this manual. The selected laser head should be used only with the power supply specified.

CAUTIONARY NOTES

CAUTION:
Do not allow laser beam or reflected laser beam to enter the eye. Care should be taken to avoid any direct or reflected exposure to the beam.

CAUTION:
Do not touch ends of HV connector immediately after the laser has been operated. Although the electric charge stored in the laser head begins to decrease as soon as the power supply is switched off and disconnected, sufficient charge remains up to five minutes after disconnection to cause an unpleasant shock.

After disconnecting, place a conductor across the exposed terminals of the laser head to dissipate the charge.

Specifications contained herein are subject to change without notice.

MODEL NUMBERS HUGHES SERIES 3000 LASER SYSTEMS

The following matched laser heads and power supplies are certified to Bureau of Radiological Health (BRH) laser safety standards. Laser head model numbers listed should be used only with the indicated power supply.

System	Laser Head	Minimum Output Power	Power Supply*	Operating Current
3009H	3209H-C	0.3 mW Random Polarization	4000	4.5 mA
3009H-P	3209H-PC	0.3 mW Linear Polarization	4000	4.5 mA
3021H	3221H-C	1.0 mW Random Polarization	4020	6.5 mA
3021H-P	3221H-PC	1.0 mW Linear Polarization	4020	6.5 mA
3022H	3222H-C	2.0 mW Random Polarization	4020	6.5 mA
3022H-P	3222H-PC	2.0 mW Linear Polarization	4020	6.5 mA
3023H	3223H-C	3.0 mW Random Polarization	4010	7.0 mA
3023H-P	3223H-PC	3.0 mW Linear Polarization	4010	7.0 mA
3024H	3224H-C	4.0 mW Random Polarization	4020	6.5 mA
3024H-P	3224H-PC	4.0 mW Linear Polarization	4020	6.5 mA
3025H	3225H-C	5.0 mW Random Polarization	4020	6.5 mA
3025H-P	3225H-PC	5.0 mW Linear Polarization	4020	6.5 mA
3027H	3227H-C	7.0 mW Random Polarization	4040	7.0 mA
3027H-P	3227H-PC	7.0 mW Linear Polarization	4040	7.0 mA
3035H	3235H-C	10.0 mW Random Polarization	4030	9.3 mA
3035H-P	3235H-PC	10.0 mW Linear Polarization	4030	9.3 mA

*An "F" suffix added to the power supply model number denotes that it has been wired for 230 Vac operation.

OPERATING INSTRUCTIONS

1. Unpack the laser head and power supply and inspect them for possible damage during shipment. If damaged, notify Hughes Aircraft Company, Industrial Products Division immediately, as outlined in Warranty Return Instructions on page 7.
2. Connect the power supply cord to the appropriate electrical outlet. Before connecting the power supply, make sure that the key switch is in the "OFF" position and ensure that the remote control connector plug is connected to the rear panel outlet. The key and remote connector are packaged in the power supply shipping carton.
3. Connect the laser head to the power supply outlet panel.
4. Activate the power supply using the key switch. The key cannot be removed when the switch is in the "ON" position.
5. The pilot light will illuminate when the key lock switch is turned to "ON". Operating power will be applied to the laser following an approximate three-second time delay.
6. To open laser head safety shutter, depress spring-loaded slotted screw and turn counterclockwise one quarter turn.

Maintenance Information

The 3000 Series Helium-Neon Laser Systems contain no user serviceable parts. Disassembly of the laser head or power supply can result in exposure to radiation hazards and high voltage. For assistance, contact your Hughes distributor or Laser Customer Service in Carlsbad, California, at (619) 438-9191, Ext. 590.

SPECIFICATIONS

LASER SYSTEM MODEL NUMBER Randomly Polarized Linearly Polarized (500:1 min)	3009H 3009H-P	3021H 3021H-P	3022H 3022H-P	3023H 3023H-P	3024H 3024H-P	3025H 3025H-P	3027H 3027H-P	3035H 3035H-P
OPTICAL CHARACTERISTICS								
Minimum Power Output (mW, 6328°A,TEM_{00}, CW)	0.3	1.0	2.0	3.0	4.0	5.0	7.0	10.0
Maximum Power Rating (BRH) (mW, 6328°A, TEM_{00}, CW)	1.0	5.0	5.0	6.5	10.0	10.0	15.0	30.0
Beam Diameter (mm @ $1/e^2$)	0.49	0.64	0.64	1.37	0.83	0.83	0.80	1.43
Beam Divergence (mrad)	1.7	1.3	1.3	0.7	1.0	1.0	1.1	0.6
Longitudinal Mode Spacing (c/2L) (MHz)	635	685	685	500	430	430	400	265
Amplitude Noise, rms (30 Hz – 10 MHz)	← 1% →							
Long Term (8 hr.) Drift	← ± 5% →							
Warm-up Time	← 5 minutes to 95% of specified power →							
Recommended Orientation	← Horizontal with labels on top →							
ELECTRICAL INTERFACE REQUIREMENT								
Laser Start Voltage (kVdc)	8	10	10	10	10	10	10	12
Laser Operating Voltage (Vdc) ±100	1650	1730	1730	1650	2350	2350	2700	3400
Operating Current (mA)	4.5 ±0.2	6.5 ±0.2	6.5 ±0.2	7.0 ±0.2	6.5 ±0.2	6.5 ±0.2	7.0 ±0.2	9.3 ±0.2
BRH CLASSIFICATION	II	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb	IIIb

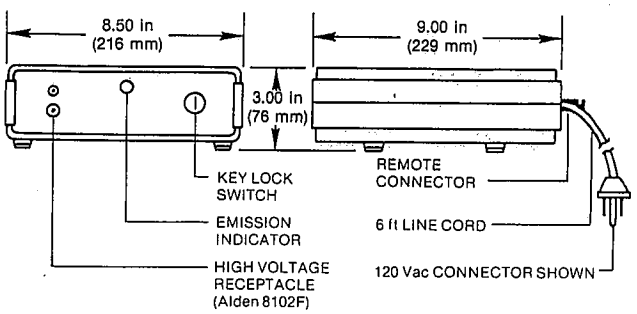
OPERATING SPECIFICATIONS FOR LASER HEADS AND POWER SUPPLIES

Temperature	– 20°C to 50°C
Altitude	Sea level to 10,000 ft
Relative Humidity	0 to 100% (without condensation)

NON-OPERATING SPECIFICATIONS FOR LASER HEADS AND POWER SUPPLIES

Temperature	– 40° to 80°C
Altitude	Sea level to 70,000 ft
Relative Humidity	0 to 100% (without condensation)
Shock	15 g to 11 ms, 50 g for 1 ms

4000 SERIES POWER SUPPLY DIMENSIONS



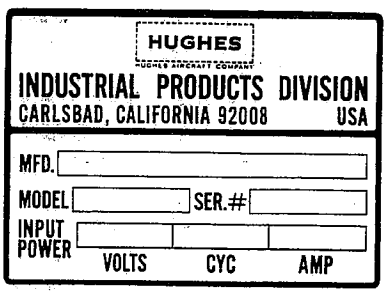
SPECIFICATIONS

- Time Delay Ignition: 3-5 seconds
- Mass: 7.9 lbs (3.5 kg)
- Frequency: 50-400 Hz

Models 4000 through 4049 have input voltage options of 115 Vac ±10% or 230 Vac ±15%.
The letter "F" denotes models wired for 230 Vac operation.

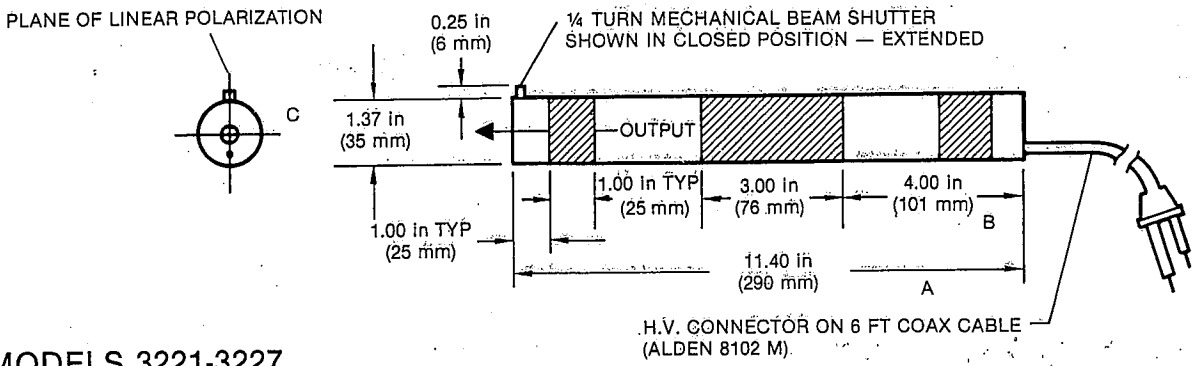
POWER SUPPLY IDENTIFICATION AND LABELING

All Hughes 4000 Series power supplies for operation of lasers are identified and labeled as shown here:

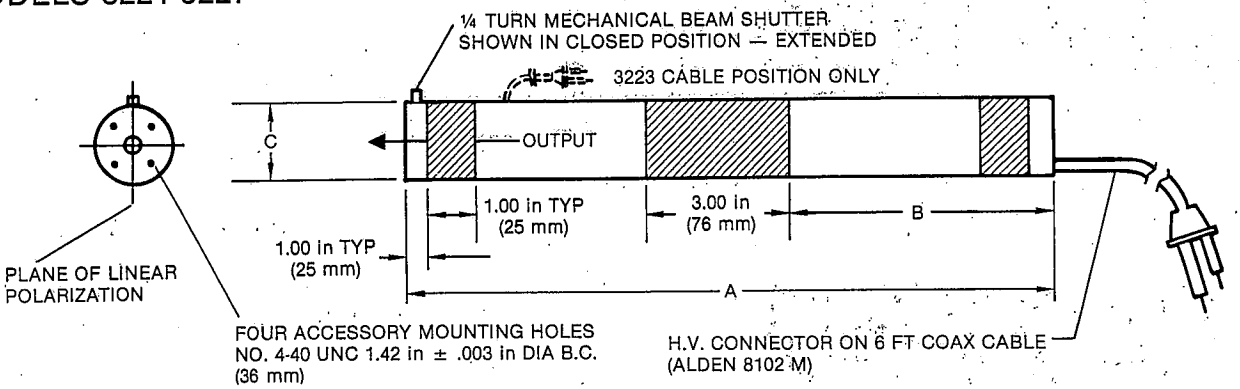


LASER HEAD DIMENSIONS

MODEL 3209



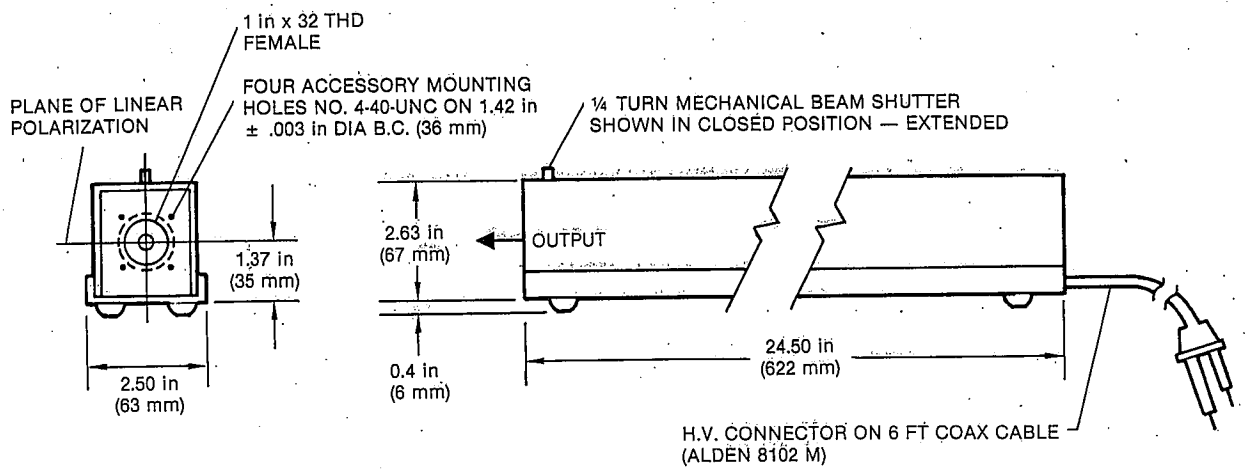
MODELS 3221-3227



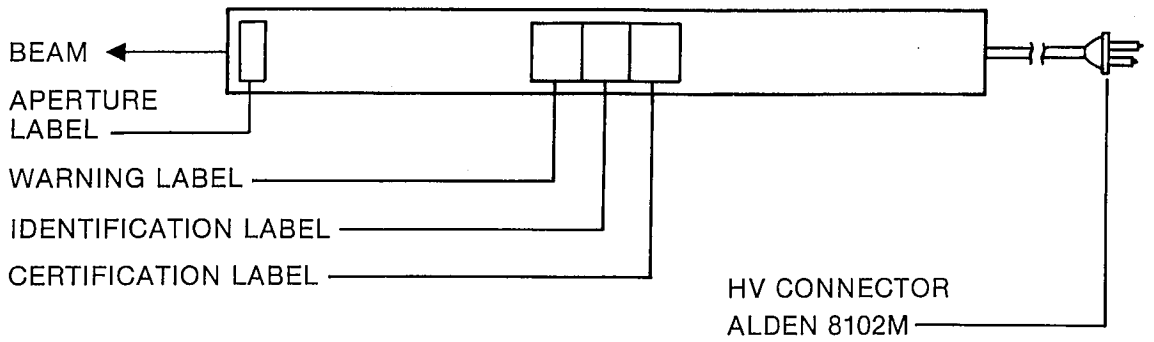
RECOMMENDED MOUNTING POSITIONS

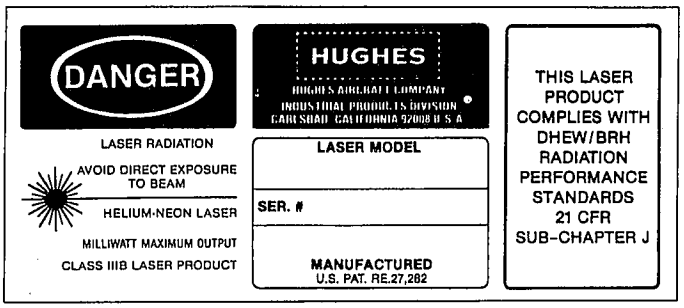
DIMEN-SION	3221H-C 3222H-C 3221H-PC 3222H-PC	3223H-C 3223H-PC	3224H-C 3225H-C 3224H-PC 3225H-PC	3227H-C 3227H-PC
A	10.71 in (272 mm)	12.60 in (320 mm)	15.79 in (401 mm)	17.22 in (437 mm)
B	3.75 in (95 mm)	4.80 in (122 mm)	6.30 in (160 mm)	7.11 in (180 mm)
C	1.74 in (44 mm)	1.74 in (44 mm)	1.74 in (44 mm)	1.74 in (44 mm)

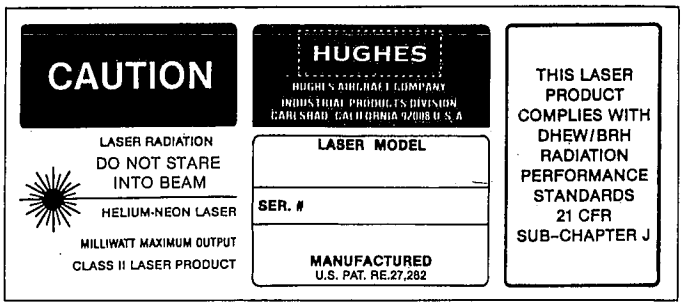
MODEL 3235



LASER HEAD IDENTIFICATION AND LABELING







Each laser is appropriately labeled to show the BRH classification and maximum output power. Refer to the specification table on pages 2 and 3 for additional information.

LASER SAFETY

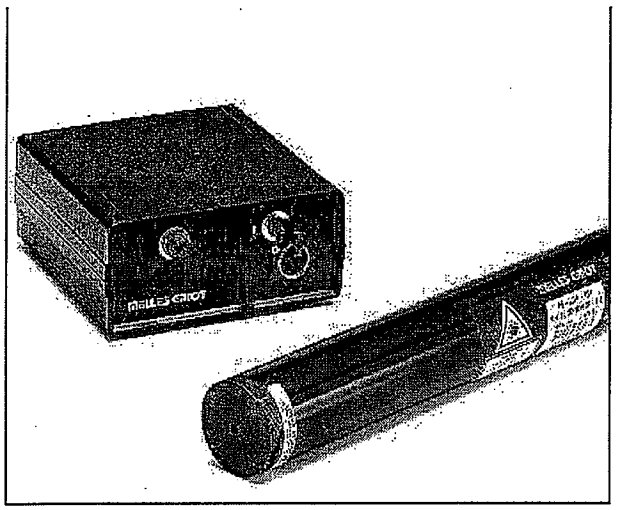
The elements of the Series 3000 laser system listed in this manual comply with the Radiation Performance Standards, 21 CFR sub-chapter J established by the Bureau of Radiological Health effective August 2, 1976. The laser products in this manual have been certified as Class II or Class IIIb and contain the safety features required by BRH regulations.

Reasonable care should be exercised in handling the system, and the cautionary warnings should be observed. Any modification made to the equipment may void the certification on the laser system. Additional information on laser safety may be obtained from:

Bureau of Radiological Health (HFX-430)
5600 Fishers Lane
Rockville, Maryland 20857

Laser Institute of America
5151 Monroe Street
Toledo, Ohio 43623

ANSi
Standard for the Safe Use of Lasers
ANSi Z 136.1
1430 Broadway
New York, NY 10018



Available in:
✓ Production Quantities
✓ Custom Configurations

Cylindrical Helium Neon Laser Systems

- Red, green, yellow, orange, or near infrared output
- Complete systems, including power supply
- CDRH and CE (230 Vac only) compliant

Melles Griot manufactures a wide variety of cylindrical HeNe laser systems, only a few of which are represented here. All laser heads are mounted in rugged aluminum housings and come with a matched power supply. All systems meet CDRH requirements for laser equipment and -230 volt versions are CE compliant. Lasers are available in randomly polarized or linearly polarized versions (with >500:1 extinction ratio).

SPECIFICATIONS: CYLINDRICAL HELIUM NEON LASER SYSTEMS

Output Mode: TEM_{00} (>95%)
Quality Factor (M^2): <1.05 (TEM_{00}, typical)
Angular Drift: <0.03 mrad after 15 min

Static Alignment:
Centered to outer cylinder within 0.25 mm
Bore sighted to <0.1 mrad

Amplitude Stability:
Noise (30 Hz to 10 MHz):** <0.5% rms
Long-Term Drift: ±2%

Electrical Specifications:
Input Voltage: 100, 115, or 230 Vac ±10%
Input Frequency: 50–60 Hz

General Specifications:
Temperature:
Operating: −20°C to +40°C
Nonoperating: −40°C to +80°C
Humidity:
Operating: 0–90%, Nonoperating: 0–100%
Shock: 25 g for 11 msec

Red (632.8 nm) Cylindrical Helium Neon Laser Systems

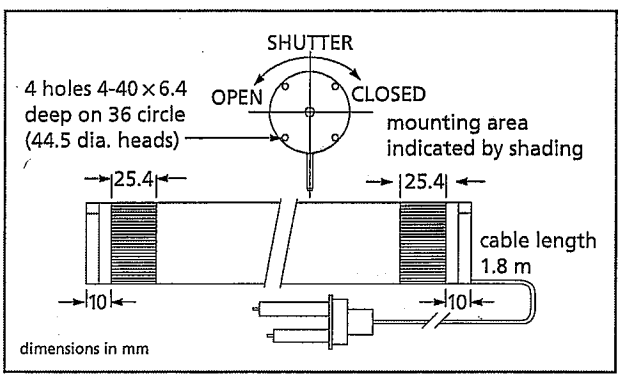
CW Output Power (mW)	Beam Diameter 1/e² (mm)	Beam Divergence (mrad)	Max Mode Sweep (%)	Polarization	Longitudinal Mode Spacing (MHz)	Laser Head Dimensions Length × Diameter (mm)	Power Supply Style	Safety Classification CDRH	Safety Classification IEC	PRODUCT NUMBER*
0.5	0.46	1.77	10	Random	1063	177.8×31.8	A	II	2	25 LHR 213
0.5	0.46	1.77	10	Linear	1063	177.8×31.8	A	II	2	25 LHP 213
1.0	0.59	1.35	5	Random	687	271.8×44.5	A	IIIa	3B	25 LHR 111
1.0	0.59	1.35	5	Linear	687	271.8×44.5	A	IIIa	3B	25 LHP 111
2.0	0.76	1.06	5	Random	636	279.9×35.1	A	IIIa	3B	25 LHR 073
2.0	0.76	1.06	5	Linear	636	279.9×35.1	A	IIIa	3B	25 LHP 073
2.0	0.59	1.35	5	Random	687	271.8×44.5	A	IIIa	3B	25 LHR 121
2.0	0.59	1.35	5	Linear	687	271.8×44.5	A	IIIa	3B	25 LHP 121 ←
2.5	0.52	1.53	10	Random	822	224.8×31.8	A	IIIa	3B	25 LHR 691
2.5	0.52	1.53	10	Linear	822	224.8×31.8	A	IIIa	3B	25 LHP 691
5.0	0.80	1.00	2	Random	438	396.2×44.5	A	IIIb	3B	25 LHR 151
5.0	0.80	1.00	2	Linear	438	396.2×44.5	A	IIIb	3B	25 LHP 151
7.0	1.02	0.79	2	Random	373	455.9×44.5	B	IIIb	3B	25 LHR 171
7.0	1.02	0.79	2	Linear	373	455.9×44.5	B	IIIb	3B	25 LHP 171
10.0	0.65	1.24	2	Random	341	483.9×44.5	B	IIIb	3B	25 LHR 991
10.0	0.65	1.24	2	Linear	341	483.9×44.5	B	IIIb	3B	25 LHP 991
17.0	0.96	0.84	2	Random	257	637.3×44.5	B	IIIb	3B	25 LHR 925
17.0	0.96	0.84	2	Linear	257	637.3×44.5	B	IIIb	3B	25 LHP 925

**Add the appropriate dash number to indicate input voltage: -249 for 115 Vac, -230 for 230 Vac, or -461 for 100 Vac.*

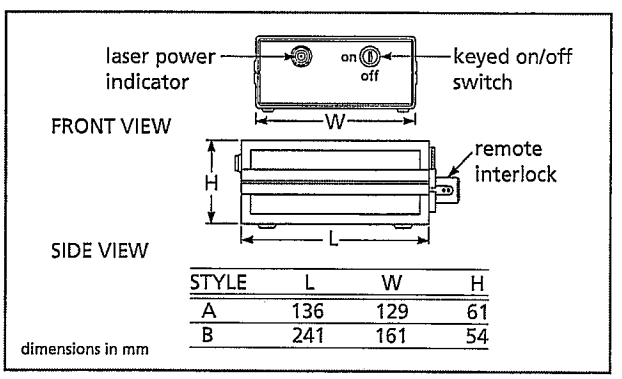
Green, Yellow, Orange, and Near Infrared Cylindrical HeNe Laser Systems

Output Power (mW)	Beam Diameter $1/e^2$ (mm)	Beam Divergence (mrad)	Max Mode Sweep (%)	Polarization	Longitudinal Mode Spacing (MHz)	Laser Head Dimensions Length × Diameter (mm)	Power Supply Style	Safety Classification CDRH	Safety Classification IEC	PRODUCT NUMBER*
Wavelength: 543.5 nm (green)										
0.20	0.63	1.26	14	Random	732	240.9 × 35.1	A	II	2	25 LGR 025
0.30	0.77	0.90	10	Linear	438	396.2 × 44.5	A	IIIa	3B	25 LGP 151
0.30	0.79	0.89	5	Linear	373	455.9 × 44.5	A	IIIa	3B	25 LGP 173
0.50	0.80	1.01	10	Random	438	396.2 × 44.5	A	IIIa	3B	25 LGR 151
0.80	0.79	0.88	5	Random	373	455.9 × 44.5	A	IIIa	3B	25 LGR 173
1.00	0.88	0.81	5	Linear	328	510.3 × 44.5	B	IIIa	3B	25 LGP 193
1.50	0.86	0.81	5	Random	328	510.3 × 44.5	B	IIIa	3B	25 LGR 193
2.00	0.86	0.81	5	Random	328	510.3 × 44.5	B	IIIa	3B	25 LGR 393
Wavelength: 594.1 (yellow)										
0.35	0.63	1.26	14	Random	732	240.9 × 35.1	A	II	2	25 LYR 025
0.75	0.80	1.01	10	Random	438	396.2 × 44.5	A	IIIa	3B	25 LYR 151
1.00	0.75	0.92	5	Linear	373	455.9 × 44.5	A	IIIa	3B	25 LYP 173
2.00	0.75	0.92	5	Random	373	455.9 × 44.5	A	IIIa	3B	25 LYR 173
Wavelength: 611.9 nm (orange)										
0.50	0.63	1.26	14	Random	732	240.9 × 35.1	A	II	2	25 LOR 025
2.00	0.75	1.05	10	Random	438	396.2 × 44.5	A	IIIb	3B	25 LOR 151
Wavelength: 1.523 μm (infrared)**										
0.80	1.26	1.59	10	Linear	438	396.2 × 44.5	A	IIIb	3B	25 LIP 151
0.80	1.33	1.48	10	Linear	373	455.9 × 44.5	B	IIIb	3B	25 LIP 171
1.00	1.26	1.59	10	Random	438	455.9 × 44.5	A	IIIb	3B	25 LIR 151
1.00	1.33	1.48	10	Random	373	455.9 × 44.5	B	IIIb	3B	25 LIR 171

**Add the appropriate suffix to the product number to indicate input voltage: -249 for 115 Vac, -230 for 230 Vac, or -461 for 100 Vac.*
*** Noise unspecified for 1.523 μm 25 LIR/P series.*



Cylindrical helium neon Laser head

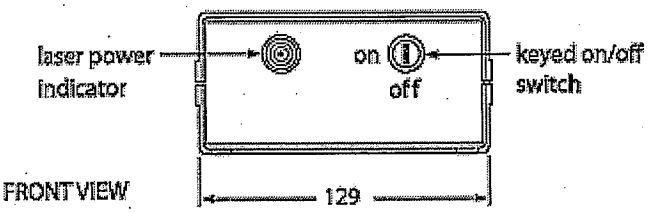


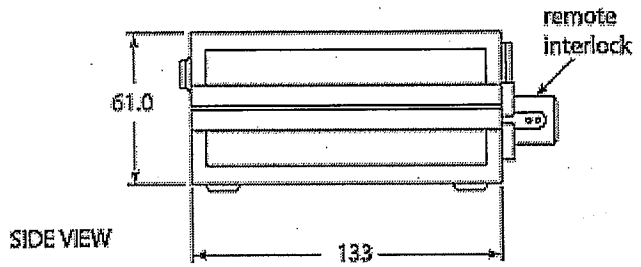
Cylindrical helium neon laser power supplies

25 LHP 121-249

Laser Head

Power Supply





dimensions in mm

25 LHP 121-249

Cylindrical HeNe Laser System, Linear Polarization

Add to cart

Unit Price: **$719.00**

See Mechanical Drawings

Download Print Catalog Page (PDF)
Requires Adobe Acrobat Reader to view. Click here for a free copy.

Detailed Specifications:

Optical Specifications	
Output Wavelength:	633 nm
Output Power:	2 mW
Mode Spacing:	687 MHz
M^2:	<1.05
Beam Dimension ($1/e^2$):	0.59 mm
Far-Field Divergence ($1/e^2$):	1.35 mrad
Polarization:	Linear
Angular Drift:	<0.03 mrad after 15 min
Maximum Mode Sweeping:	5%
Long-Term Drift:	± 2%
Noise Range:	30 Hz to 10 MHz
Noise:	<5% rms
Mode:	TEM_{00}
Electrical Requirements	
Input Voltage:	115 Vac
Input Frequency:	50?0 Hz
Wall Plug:	2 prong US w/ground Nema 5-15P, C13, 10 A/125 Vac
General Characteristics	
Nonoperating Humidity:	0?00%
Environmental Requirements	
Shock:	25 G for 11 msec
Operating Temperature:	?0°C to +40°C
Nonoperating Temperature:	?0°C to +80°C
Operating Humidity:	0?0%
Safety Information	
CDRH Class:	IIIa
IEC Class:	3B
Dimensions	
Length (mm):	271.8

Laser Diameter (mm):	44.5
Power Supply	
Included Power Supply:	05 LPL 911-065
Certification	
CE Certification	Yes
Warranty	
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Lab Accessories | Forensics