



**35mW 633nm
HELIUM-NEON LASER SYSTEM
USER'S GUIDE TO OPERATION**

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UNPACKING

- Inspect the packing container for any damage that may have occurred during shipment.
- Contact the shipper immediately if the laser system has been damaged during shipping.
- Packing materials are specifically designed to protect against shipping damage.
- Carefully remove the laser system from the packing container.
- Inspect for damage including dents, scratches, or broken glass within the laser housing.
- Contact retailer immediately if the laser system appears to be damaged.

SHIPPING INVENTORY

The equipment included in this shipment will match the packing slip attached to the box. Verify that the correct product was shipped to you by matching the serial number(s) on the packing list. Notify retailer immediately if the shipment is incomplete or if an incorrect item was shipped.

Note: Please keep and store all packaging materials received with your product in case a return needs to be made.

This package contains:

- 1 – 35mW Laser System
- 2 – Keys
- 1 – Remote Interlock Connector
- 2 – 1/16" Hex Ball Driver
- 1 – 115V Power Cord
- 1 – 230V Power Cord

SAFETY INFORMATION

This laser system is safe to operate provided that the user complies with all safety warnings. It is recommended that all personnel who will operate or be in the vicinity of the laser during operation read and be familiar with this manual as well as be made aware of the following safety warnings.



- Alterations, modifications, or improper installation can result in shock, visible and/or infrared radiation exposure, and void of the warranty in part or entirety.
- Do not attempt to open the sealed laser system. The laser system is not user accessible and service operations inside the enclosure must only be performed by authorized and trained personnel. Opening the laser system will result in loss of warranty.



- Avoid direct exposure to the laser beam.
- Laser emissions can be hazardous to the eyes.
- Never look directly into the laser light source or at scattering laser light from reflective surfaces.
- Never sight down the beam into the source of the laser emissions.

- Install the laser so that the laser beam is not at eye level.
- Whenever the laser is operating and the beam is not in use, block the beam with the shutter on the output aperture.
- As a precaution against accidental exposure to either the laser beam or its reflection, operators need to wear laser safety glasses designed for this type of laser.

Table 1: Recommended Eyewear Optical Density, Maximum Permissible Exposure, and Nominal Ocular Hazard Distance by Part Number.

Part Number	Description	Recommended Eyewear Optical Density (OD)	Maximum Permissible Exposure (MPE) W/cm ²	Nominal Ocular Hazard Distance (NOHD) (m)
32734	LASER SYSTEM, 633nm, STBLZD, >1.5mW	0.28	0.0026	5.63
32172	LASER SYSTEM, 3.39µm, 2.0mW, POL	0	0.1	0
30990	LASER SYSTEM, 633nm, 5.0mW, RANDOM	0.74	0.0026	13
30025	LASER SYSTEM, 633nm, 1.5mW, POL, 9.5"	0.3	0.0026	5.63
30602/30603	TUNABLE LASER, 633nm, 4.0 mW, POL	0.74	0.0026	13
	TUNABLE LASER, 612nm, 2.5 mW, POL	0.48	0.0026	7.02
	TUNABLE LASER, 604nm, 0.5 mW, POL	0	0.0026	0
	TUNABLE LASER, 594nm, 0.6 mW, POL	0.18	0.0026	3.68
	TUNABLE LASER, 543nm, 0.3 mW, POL	0	0.0026	0
31007	LASER SYSTEM, 633nm, 0.8mW, POL	0	0.0026	0
31008	LASER SYSTEM, 633nm, 0.5mW, RAN	0	0.0026	0
30968	LASER SYSTEM, 543nm, 0.5mW, POL	0	0.0026	0
30993	LASER SYSTEM, 633nm, 12.0mW, POL	1.08	0.0026	19.3
33361	LASER SYSTEM, 543nm, 1.5mW, POL	0.3	0.0026	5.63
30967	LASER SYSTEM, 543nm, 0.5mW, RAN	0	0.0026	0
30988	LASER SYSTEM, 633nm, 2.0mW, RAN	0.48	0.0026	7.02
33141	LASER SYSTEM, 1.52UM, 1.0mW, POL	0	0.1	0
30992	LASER SYSTEM, 633nm, 12.0mW, RANDOM	1.08	0.0026	19.3
39582	LASER SYSTEM, 594nm, 2.0mW, POL	0.48	0.0026	7.02
39635	LASER SYSTEM, 633nm, 17.0mW, RANDOM	1.23	0.0026	24.8
38766	LASER SYSTEM, 633nm, STABILIZED, AP	0.26	0.0026	5.63
39727	LASER SYSTEM, 633nm, STBLZD, >1.2mW	0.15	0.0026	3.68
39581	LASER SYSTEM, 543nm, 1.0mW, POL	0.11	0.0026	3.68
40094	LASER SYSTEM, 594nm, 1.0mW, POL	0.18	0.0026	3.68
40138	Laser System, 1.15/3.39µm, 5.0mW, POL	0/0	0.0059/1	0/0
40137	Laser System, 1523/633nm, 1.0mW, POL	0/0	0.1/0.0026	0/3.68
40136	Laser System, 1.15µm, 1.0mW, Pol	0	0.0059	0
40141	Laser System, 543nm, 0.5mW, Multimode	0	0.0026	0
14309	LASER SYSTEM, 633nm, 35mW, POL	1.58	0.0026	36.4
14354	Laser System, 633nm, 3.0mW, ORTHOG POL, OPIS	0.54	0.0026	9.15
39568	Laser System, 543nm, 1.0mW, RAN	0.11	0.0026	3.68

Calculations performed by "The Evaluator" From Laser Institute of America, INC. www.lia.org



- High voltage is present at all times when the key switch is in the "ON" position.
- The power cord and plug are provided with a ground line. To avoid possible shock ensure that the plug is properly connected to a ground point at the electrical connection.
- Do not perform any operating or maintenance procedure that is not described in the user's manual as shock or injury may result.
- Do not operate this product if the cover has been removed.
- This product is for indoor use only. To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.
- Disconnect power cord before replacing fuses.
- Clean exterior of laser system with a dry, soft cloth. Do not use liquids.

CAUTION: Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure. Avoid unnecessary exposure to laser or collateral radiation that exceeds the accessible emission limits as determined by the National Center for Devices and Radiological Health (CDRH). Unauthorized modifications to the laser or power supply may cause irreversible damage to the system, as well as result in possible hazardous radiation exposure. These modifications will void all warranties.

Each Helium-Neon laser system that is certified to be in compliance with the CDRH regulations, is equipped with a key-switch, remote interlock connector, emission indicator, time delay relay (built into the laser system), a beam attenuator (or shutter, located in the front bezel of the laser housing), and all appropriate warning labels.

Below are examples of compliance symbols and approximate placement on the body of the 35mW laser assembly.

A. Laser Head Manufacturing Label Includes the Following:

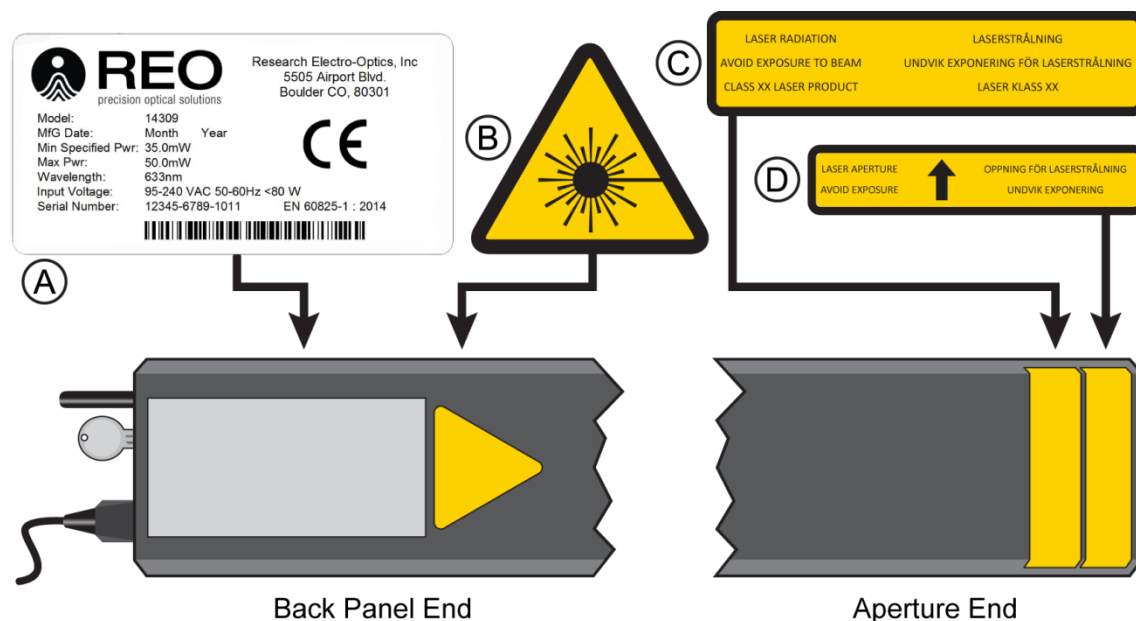
- Model Number
- Date of Manufacture
- Minimum Specified Power Rating
- Maximum Power Rating
- Wavelength
- Serial Number
- Mandatory Compliance Symbols and Conformance Labels

B. International Laser Beam Hazard Symbol

C. Safety Warning and Laser Class Call-Out

D. Laser Aperture Identification/Warning

Figure 1: 35mW Laser Label Placement Diagram



COMPLIANCE

Research Electro-Optics (REO) certifies that our laser system meets the appropriate CE requirements. For the CE regulations to be met, all lab power supplies must be used with an input line cord with a length of less than 3 meters.



The below symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. It is the user responsibility to dispose of waste equipment according to the local laws. The separate collection and recycling of the waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For further information about where the user can drop off the waste equipment for recycling, please email REO at: henelaser@reoinc.com.



LASER SYSTEM

This laser head comes equipped with a beam shutter installed in the front bezel of the laser housing. The front bezel has four each 4-40 Unified National Coarse Thread (UNC) holes to secure the optional accessory mounting ring. The ring (part number 30646), which is available for purchase from Research Electro-Optics Inc., incorporates 1" diameter, 32 threads-per-inch (TPI) female threads. The construction of the laser head allows for easy mounting on table-top and flat surfaces, provided that the laser head remains in a horizontal position.

There are four plastic feet on the base of the laser assembly that can be removed. The tapped holes can be used in conjunction with 4 x ½-20 screws to mount the laser assembly to a platform if desired (Figure 2). Never remove the screws next to the tapped screw holes for the feet.

Figure 2: Tapped Screw Hole Locations for Manual Mounting

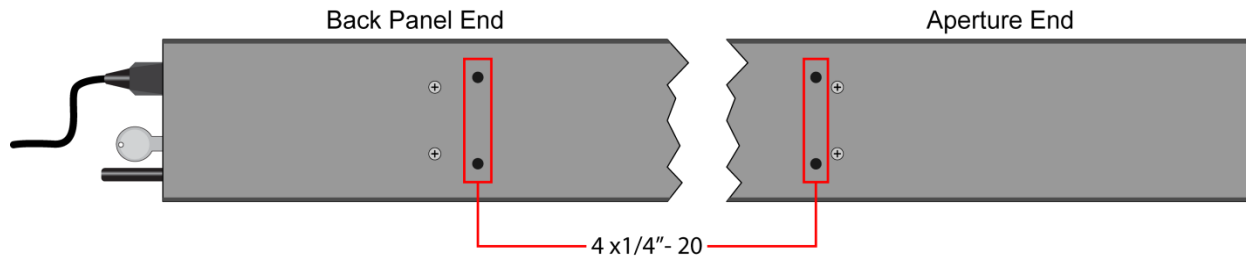


Figure 3: Back Panel of Laser System



Assembly of Laser System

- Plug the laser AC power cord into the power connector on the back panel.
- With the key switch in the “OFF” (vertical) position, plug the AC power cord into a power source (95-255 V AC, 50-60 Hz).
- Plug the interlock connector into the interlock set.

OPERATION

- When the laser system has been properly connected, open the shutter located at the front of the laser housing. This is done by pushing the shutter slide fully to the left (when looking head-on at the laser: Figure 5).

- Apply power to the laser system. This is done by turning the key switch to the “ON” position. The emission indicator light will immediately illuminate, indicating that power has been applied to the power supplies and laser emission can be expected in approximately 7-10 seconds.

Fine Alignment Instructions

During shipment, the laser system may become slightly misaligned and suffer a reduction in output power. The following instructions will be used to optimize the laser alignment:

Tools Required

2x 1/16” Hex Ball Driver- Included with Packaging

1x Optical Power Meter- Not Included

Instructions

- Locate the two access holes for the alignment screws. These are located on the side of the laser housing approximately 175mm from the back of the unit at the top edge of the side label.
- Insert one 1/16” hex ball driver into each access hole and set up the optical power meter to monitor the laser output levels.
- Carefully turn one of the adjustment screws enough to produce a measurable change in the laser output power. If the laser power increases, continue to turn the screw until a maximum power output is achieved. If the laser power decreases, turn the screw in the opposite direction until a maximum power output is achieved.
- Repeat the above steps for the second adjustment screw.
- Continue adjusting drivers iteratively until maximum power is reached.

Figure 4: Hex Ball Drivers in Access Holes

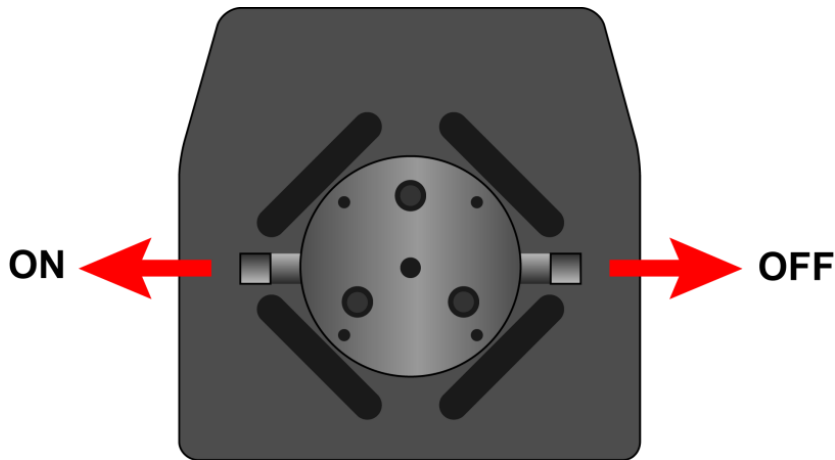


BASIC TROUBLESHOOTING

If there is no laser emission within 7-10 seconds, the following are some quick checks that can be performed to troubleshoot the laser system:

- Check that the laser system is plugged in.
- Make sure that the remote interlock is installed in the back panel (Figure 3).
- The laser “ON” indicator LED illuminates when the key switch is in the “ON” position.
- Make sure that the shutter is in the “ON” position according to Figure 5.

Figure 5: Two Position Shutter Adjustment



- Fuse Replacement.
 - Fuses are located in the AC Input housing. Fuses can be accessed by pushing in release mechanism and pulling out the fuse assembly (Figure 6). Fuses can be replaced with 1.25A/250V standard fuses.

Figure 6: Fuse Replacement



PRODUCT WARRANTY STATEMENT

Research Electro-Optics (REO) lasers and power supplies are warranted for twelve (12) months from the date of shipment. Items will be free from defects in material and workmanship, and will conform to the specifications provided on the REO website and published specification sheets, under normal use and service when correctly installed and maintained. REO will either repair or replace (at REO's sole option) any defective or nonconforming Product or part thereof which is returned at Buyer's expense to REO's facility, provided, that Buyer notifies REO in writing promptly after discovery of the defect or nonconformity and within the Warranty Period.

Repairs made or Products or components replaced under warranty are warranted for the remaining unexpired duration of the original Warranty Period for such Products or components. REO's standard repair charges shall be applicable for products returned for repair that are not covered under warranty. Out-of-warranty repairs are warranted for ninety (90) days from date of shipment of the repaired Product.

The foregoing warranty does not apply to Products or components thereof which are (a) repaired, modified or altered by any party other than REO; (b) used in conjunction with equipment not provided or authorized by REO; (c) subjected to unusual physical, thermal, electrical or optical stress, improper installation, misuse, abuse, tampering, accident, contamination, or negligence in use, storage, transportation or handling; or (d) considered a consumable item or an item requiring repair or replacement due to normal wear and tear. The foregoing warranty will also not apply if the "Warranty Void If Broken" seal located on any Product has been removed, broken or otherwise tampered with. On-site warranty repair is not covered under the foregoing warranty.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES. EXCEPT AS EXPRESSLY PROVIDED HEREIN, REO MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, SOFTWARE OR SERVICES. REO EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE FOR THE PRODUCTS, OR SERVICES. THE OBLIGATIONS OF REO SET FORTH IN THIS PARAGRAPH SHALL BE REO'S SOLE LIABILITY, AND BUYER'S SOLE REMEDY, FOR BREACH OF THE FOREGOING WARRANTY. End

Warranty Procedure

Products may only be returned by Buyer when accompanied by a return material authorization number ("RMA#") issued by REO's Customer Support Center, with freight prepaid by Buyer. REO will not be responsible for any damage occurring in transit or obligated to accept Products returned for warranty repair without a RMA#. Buyer bears all risk of loss or damage to the Products until delivery at REO's designated facility. REO will pay for shipment back to Buyer for Products repaired under warranty.

Note: HeNe lasers are constructed from glass vacuum tubes and are very fragile. REO strongly recommends taking appropriate precautions in preparing your laser for shipment. Make sure the tube is well padded (equivalent to 3 inch thick high density foam on all sides) and insure that the power supply and tube are secured within the box so they do not move during shipment. REO will not assume responsibility for any shipping damages unless the laser is sent in REO-supplied packaging. REO will provide appropriate shipping materials at cost if you do not have the original shipping materials.



To request a RMA#, contact REO's Customer Support Center at:

Phone- (303) 938-1960

Fax- (303-447-3279)

Email- CustomerSupportCenter@reoinc.com

Following the receipt of your assigned RMA number return the product to Research Electro-Optics in the proper packaging with freight prepaid. Please, clearly mark the assigned RMA number on the outside of the packaging with the address as follows:

**Research Electro-Optics, INCRMA# (Assigned RMA Number)
5505 Airport Blvd Boulder, CO 80301 USA**

EU DECLARATION OF CONFOMITY

CE Compliance refers to following model numbers:

Part Number	Description
32734	LASER SYSTEM, 633NM, STBLZD, >1.5MW
32172	LASER SYSTEM, 3.39UM, 2.0MW, POL
30990	LASER SYSTEM, 633NM, 5.0MW, RANDOM
30025	LASER SYSTEM, 633NM, 1.5MW, POL, 9.5"
31007	LASER SYSTEM, 633NM, 0.8MW, POL
31008	LASER SYSTEM, 633NM, 0.5MW, RAN
30968	LASER SYSTEM, 543NM, 0.5MW, POL
30993	LASER SYSTEM, 633NM, 12.0MW, POL
33361	LASER SYSTEM, 543NM, 1.5MW, POL
30967	LASER SYSTEM, 543NM, 0.5MW, RAN
30988	LASER SYSTEM, 633NM, 2.0MW, RAN
33141	LASER SYSTEM, 1.52UM, 1.0MW, POL
30992	LASER SYSTEM, 633NM, 12.0MW, RANDOM
39582	LASER SYSTEM, 594NM, 2.0MW, POL
39635	LASER SYSTEM, 633NM, 17.0MW, RANDOM
38766	LASER SYSTEM, 633NM, STABILIZED, AP
39727	LASER SYSTEM, 633NM, STBLZD, >1.2MW
39581	LASER SYSTEM, 543NM, 1.0MW, POL
40094	LASER SYSTEM, 594NM, 1.0MW, POL
40138	Laser System, 1.15/3.39um, 5.0mW, POL
40137	Laser System, 1523/633nm, 1.0mW, POL
40136	Laser System, 1.15um, 1.0mW, Pol
40141	Laser System, 543nm, 0.5mW, Multimode
14309	LASER SYSTEM, 633NM, 35MW, POL
14354	Laser System, 633nm, 3.0mW, ORTHOG POL, OPIS
39568	Laser System, 543nm, 1.0mW, RAN

Year  mark verified: 2016

Type of Equipment: Electrical equipment for measurement, control and laboratory use in industrial locations.

Manufacturer: Research Electro-Optics, Inc.
5505 Airport Blvd.
Boulder, CO, 80301
United States of America



Compliance was demonstrated to the following standards:

- IEC/EN 60825-1 | Laser Safety
- IEC/EN 61010-1 | Electrical Safety
- IEC/EN61326 | EMC

Note: The lasers listed in the table are designed to operate in a controlled electromagnetic environment; i.e., industrial laboratory settings. Lasers may interfere with R.F. communications such as mobile telephones and wireless networks.

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