FREQUENCY AND INTENSITY STABILIZED

HELIUM-NEON LASER SYSTEM

USER'S GUIDE TO OPERATION

Research Electro-Optics
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Fax: (303) 447-3279

PREFACE

This User's Guide is designed to assist you in the operation and maintenance of your stabilized Helium-Neon (HeNe) laser system.

This guide contains six sections:

Section I: UNPACKING

Section II: SAFETY INFORMATION

Section III: INSTALLATION AND OPERATING INSTRUCTIONS

Section IV: SYSTEM SPECIFICATIONS

Section V: TROUBLESHOOTING

Section VI: WARRANTY

SECTION I
UNPACKING

UNPACKING

- Inspect the packing container for any damage that may have occurred during shipment.
    - Contact the shipper immediately if the laser or control box has been damaged during shipping.
    - Packing materials are specifically designed to protect against shipping damage. Please keep this container and reuse if your system needs to be returned to REO for service or evaluation.
- Carefully remove the laser system from the packing container.
    - Inspect for damage including dents, scratches or broken glass within the laser housing.
- Contact REO immediately if the laser or control box appear to be damaged.

SHIPPING INVENTORY

The equipment included in this shipment should 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. If the shipment is incomplete or if an incorrect item was shipped to you, please notify REO immediately.

This package should contain:

1 – Cylindrical Laser Head
1 – Control Box
1 – Control Cable
1 – Key
1 – Remote Interlock Connector
1 – 115V and/or 230V Power Cord (depending on where your laser was purchased, both cords may be included with your system)
1 – Manual

SECTION II
SAFETY INFORMATION

The laser described in this User's Guide has visible light power. This laser 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.

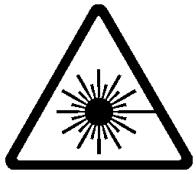
- Never look directly into the laser light source or at scattering laser light from reflective surfaces. Laser light is hazardous to the eyes. Never sight down the beam
  into the source.
- Install the laser so that the laser beam is not at eye level.
- Whenever the laser is operating and the beam is not in use, block the beam with the shutter on the output aperture. Avoid direct exposure to the laser beam.
- As a precaution against accidental exposure to either the laser beam or its reflection,
  operators should wear laser safety glasses designed for this type of laser.
- High voltage is present at all times when the key switch on the control box is in the “on” position.
- Ensure that the laser head is securely connected to the control box. To prevent faulty operation be sure that the male connector is fully seated in the back of the control box.
- 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 attempt to open the sealed laser housing or the control box. The control box and laser are not user accessible and service operations inside the enclosure must only be performed by authorized and trained personnel. Opening the laser or control box will result in loss of warranty.
- Do not perform any operating or maintenance procedure that is not described in the user’s manual.
- 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.
- Operating this product in the presence of flammable gases or fumes is extremely hazardous.
- Serial port (DB-9 connector on rear panel) not intended for end user.
- Disconnect power cord before replacing fuses
- Clean laser head and control box with 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 listed in the safety regulation guidelines 21 CFR Subchapter J 1040.10 and 1040.11. This federal regulation is administered by the National Center for Devices and Radiological Health under the Food and Drug Administration.

Each REO Helium-Neon laser system that is certified to be in compliance with the CDRH regulations, is equipped with a key-switch, remote interlock connector, laser radiation emission indicator (on the front of the control box), time delay relay (built into the control box), a beam

SECTION II
SAFETY INFORMATION (CONTINUED)

attenuator (or shutter, located in the front bezel of the laser housing), and all appropriate warning labels. To ensure continued compliance, verify on an annual basis or, if the product has been subjected to adverse environmental conditions such as fire, flood, mechanical mishandling, or solvent spillage that your systems' safety features listed above are available and operational.



SECTION III
INSTALLATION AND OPERATING INSTRUCTIONS

The cylindrical construction of the laser head allows for easy mounting in ring clamps, V-blocks, or similar mounting hardware without affecting the laser's alignment. Use caution when clamping onto the laser as too much pressure can damage the aluminum housing or cause misalignment. The front bezel has four each 4-40 Unified National Coarse Thread (UNC) holes to secure an optional accessory mounting ring. The ring (part number 30646), which is available for purchase from REO, has 1" diameter, 32 threads-per-inch (TPI) female threads.

INSTALLATION

- REO's stabilized laser system is AC universal input. The control box will automatically select for the appropriate operation at 115V or 230V. Connect the proper power cord to the back of the control box.
- Connect the control cable to the back of the control box using the AMP connector ensuring that it is locked by rotating the lock ring until rotation stops.
- Insert the two-prong remote interlock connector into the back of the control box.
- Plug the high voltage cable from the laser into the back of the control box. Confirm that the plug is well seated.
- Connect the control cable from the back of the control box into the rear bezel of the laser head using the Lemo connector end. Ensure that it is well seated and locked. A mechanical click indicates that the connector is properly engaged.
- Insert the key into the front panel of the control box.

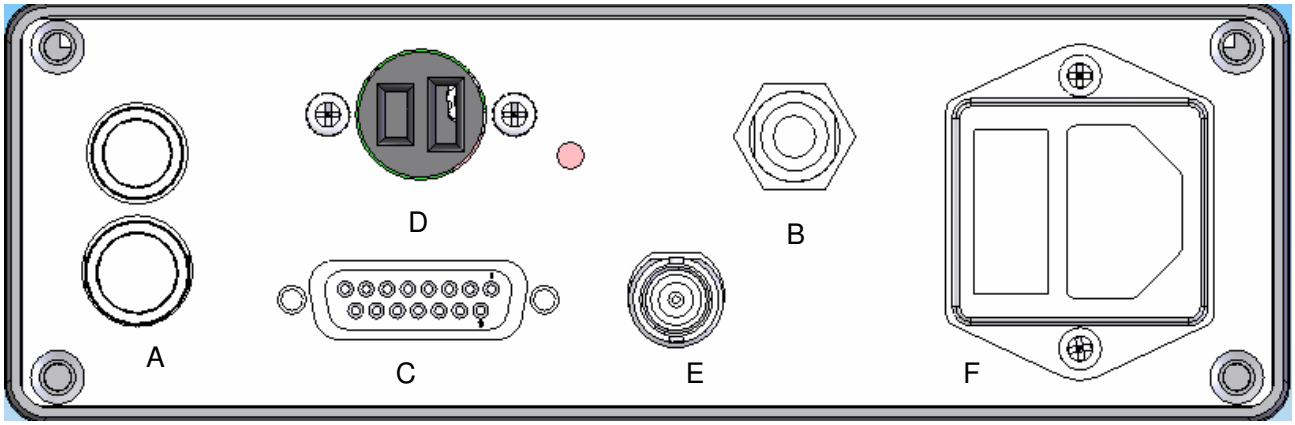
SECTION III
INSTALLATION AND OPERATING INSTRUCTIONS (CONTINUED)

OPERATION

- Confirm that all connections between the laser and control box are well seated and/or locked.
- Plug the power cord into an electrical outlet that is confirmed operational.
- Open the beam shutter located on the laser head at the output of the laser (indicated by the arrow on the aperture label)

- Determine which mode the laser will be operating in and move the switch on the left front panel to Frequency or Intensity stability mode. A yellow LED will indicate mode of operation.
- Apply power by switching the key to the on (vertical) position. The green emission indicator should glow at the top of the key switch indicating power to the control box.
- After a quick initial blink, the status LED will blink steadily once the control box recognizes the connection to the laser head. If the initializing LED does not come on immediately, check the signal cable connection from the laser head to the back of the control box.
- The status indicator LED notifies the following:
    - Starting (LED blinking in slow series) – waiting for laser emission
    - Acquiring (LED blinking rapid series) – warming up and/or attempting to lock
    - Stable (solid LED on) – laser is locked in selected mode of operation
- Ensure that no laser retroreflections enter the laser front bezel aperture during acquire.
- If the status LED fails to indicate the acquiring status after one minute, the laser tube is not igniting. Switch the control box off in this case, wait several minutes and retry.

CONTROL BOX CONNECTOR DIAGRAM



A. High Voltage (to laser head)
B. Control signal (to laser head)
C. DB15 for service only
D. Remote interlock (short to enable laser output)
E. BNC Analog IN for service only
F. Power entry module

SECTION IV
SYSTEM SPECIFICATIONS

Wavelength	**633 nm**
Output Power	**>1.5 mW**
Polarization	**Linear >800:1**
Spatial Mode	**TEM_{00}**
Beam Diameter at 10 cm from Front Bezel:	**0.7 mm**
Beam Divergence (full angle)	**1.2mrad**
FREQUENCY STABILIZED MODE	
Frequency Stability	
1 minute	**±1 MHz**
1 hour	**±1 MHz**
8 hours	**±2 MHz**
Intensity Stability	**±1 %**
Frequency Shift with Temperature	**<2MHz/°C**
INTENSITY STABILIZED MODE	
Intensity Stability	
1 minute	**±0.1 %**
1 hour	**±0.2 %**
Frequency Stability	
1 minute	**±3 MHz**
1 hour	**±5 MHz**
GENERAL	
Temperature Range to Maintain Lock (Operating)	**15°C - 30°C**
Time to Lock	**<30 minutes**
Electrical Requirements:	
Power Input	**115/230VAC**
Power Consumption	**<40W**
Max Output Power	**3mW**
Dimensions	
Laser Head Length	**45mm Diameter X 381mm Length**
Control Box	**226mmL X 165mmW X 52mmH**

- Control box ratings:100-240VAC; Power <40W, 50/60Hz
- The system shall function within specification after being transported and/or stored at a temperature range of -20° C to +50° C.
- The system shall be capable of functioning within specification at a relative humidity of 15% RH to 90% RH, non-condensing.
- The system will achieve lock within 30 minutes and published specifications are guaranteed after one hour of operation from cold start.
- The laser will operate in Frequency or Intensity stabilized mode. Switching from one mode of operation to the other may require several minutes for the system to re-lock and published specifications are guaranteed after ten minutes after system re-locks.

SECTION V
BASIC TROUBLESHOOTING

Once the laser and control box have been properly connected, the REO stabilized laser system will operate without maintenance. Below are some guidelines if your system is not operating.

- No emission light above the key switch after key has been turned to the on position -
    - Verify that the power cord is connected to the back of the control box as well as a verified power source.
- System fails to enter acquire status -
    - Ensure that the remote interlock connector is well seated in the back of the control box.
- Status LED does not light -
    - Check the signal cable connection from the laser head to the back of the control box.
- No laser emission
    - Verify that the high voltage cable is connected and well seated to the back of the control box
    - If laser does not ignite within one minute switch the control box off, wait several minutes and retry.
- System moves in and out of lock status
    - Instability may be caused by retroreflections entering the aperture of the laser head. Close the shutter and verify whether the system re-locks. This will determine whether retroreflections are causing instability in the system. Avoid retroflections entering the aperture of the laser head as the system is trying to lock. Frequency or intensity lock attained under retroflection conditions may never gain a steady state. If the system does not stay in locked status, check for retroflections, remove the source if required and restart the system.
    - The specified temperature at which this system will operate is 15°C - 30°C. Performance will be affected if the system is operating at temperatures outside this range. Do not enclose the system in such a way that air-cooling of the system is blocked.

NOTE: DO NOT LOOK DIRECTLY INTO THE LASER, EVEN IF NO VISIBLE LIGHT IS BEING EMITTED.

SECTION V
WARRANTY INFORMATION

WARRANTY POLICY

REO lasers and power supplies are warranted to be free from defects in materials and workmanship for a period of 12 months from the date of the initial shipment. This warranty does not extend to damage caused by negligent or improper handling in use, storage, or transportation, nor for products from which the original identification markings or labels have been removed, defaced, or altered.

Special contracts or contracts for non-standard products may have modified terms of warranty and, in such cases; the terms as stated in the individual contract must be signed by the duly authorized officer of REO and will supersede the standard terms. REO reserves the right to change our
warranty policy without any prior notice. Please contact REO directly with any questions pertaining to your warranty.

REO will make the final determination as to the cause or existence of the defect and, at our discretion, repair or replace the products that prove to be defective during the warranty period. Products replaced under warranty will be warranted only for the balance of the warranty period of the originally supplied equipment.

This warranty extends only to the original purchaser of the equipment from REO, and is not transferable. The purchaser must notify REO within 15 days of first noticing the defect and promptly return the defective product before the expiration of the warranty period. Products returned from persons not employed by the original purchaser will not be evaluated without prior consent from the original buyer.

Products believed by the purchaser to be defective shall be returned to REO. Transportation, insurance, duties, etc., are to be paid by the purchaser. Repaired or replaced products will be returned to the purchaser by REO, F.O.B. city of destination, domestic as well as foreign territories. REO will not be responsible for any duties, levies, taxes, etc., on returned items.

WARRANTY PROCEDURE

Review the terms of your purchase and the date of shipment to determine the validity of your warranty claim. Warranty claims should only be made for products that are within the terms of the warranty policy.

Prior to returning any unit for repair or evaluation, please contact REO either by phone at (303) 938-1960 or by fax at (303) 447-3279 to obtain authorization to return the unit in the form of a Return Authorization number. This number is valid for 30 days for domestic customers, 45 days for foreign customers. If the unit is not received within this time frame, the authorization number will be closed out and you will need to call to obtain a new authorization number. For returns in foreign countries where representation is present, please contact your distributor. For customers in the U.S.A. and countries where distributorships and/or representation are not available, all claims and correspondence should be addressed to:

SECTION V
WARRANTY INFORMATION (CONTINUED)

Research Electro-Optics
Attn: Laser Service Department
5505 Airport Boulevard
Boulder, Colorado 80301
Ref: Return Authorization Number

Please be prepared to furnish the following information when requesting an authorization number:

a. Product model number and serial number
b. Date of shipment/purchase
c. Brief description of problem/failure
d. Name and phone number of contact person at your organization.

Obtain REO instructions for transportation and packaging, and ship the product (freight and insurance prepaid) with the proper documentation containing the authorization number and the information specified above. Please ensure the authorization number is visible on the front of the shipping container.

REO will advise the purchaser of its evaluation results at the earliest possible time. Providing complete information as requested will help to expedite this process. For products outside of their warranty period, an evaluation will be made at no charge and a cost estimate for repair/replacement will be issued. Only after receiving authorization (in the form of a Purchase Order) will any repair/replacement work be performed. Charges for repair work will be billed at the current repair rate (available upon request from REO) plus the cost of any additional required parts. Repair work will be warranted for a period of 6 months from the date of shipment.

Newport Addendum to REO Laser User Documentation

The information in this document supersedes information contained in the Research Electro Optics, Inc. documentation supplied with your laser.

NOTE

The REO Model 3xxxx-Series lasers are intended for use in an industrial laboratory environment. Use of these products in other environments, such as residential, may result in electromagnetic compatibility difficulties due to conducted as well as radiated disturbances.

NOTE

The REO Model 3xxxx-Series lasers are designed to operate in a controlled electromagnetic environment; i.e., where R.F. transmitters such as mobile telephones may not be used in close proximity.

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

This symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. Instead, 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 information about where the user can drop off the waste equipment for recycling, please contact your local Newport Corporation representative.

EUROPEAN UNION CE MARK

CE

The presence of the CE Mark on a product means that this instrument has been designed, tested and certified compliant to all applicable European Union (CE) regulations and recommendations.

Newport Addendum to REO Laser User Documentation

EU Declaration of Conformity

We declare that the accompanying product, identified with the CE mark, complies with requirements of the Electromagnetic Compatibility Directive, 2004/108/EC and the Low Voltage Directive 2006/95/EC.

Model Numbers: 3xxxx Series Non-Stabilized HeNe LASERs

Year CE mark affixed: 2012

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

Importer: Newport Corporation

1791 Deere Avenue
Irvine, CA 92606
United States of America

Standards Applied:

Compliance was demonstrated to the following standards to the extent applicable:

BS EN61326-1: 2006 “Electrical equipment for measurement, control and laboratory use – EMC requirements” (Laboratory)

This equipment meets the CISPR 11:2009+A1:2010 Class A Group 1 radiated and conducted emission limits.

BS EN 61010-1:2010, “Safety requirements for electrical equipment for measurement, control and laboratory use”.

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1791 Deere Ave, Irvine, CA 92606 USA

Newport Addendum to REO Laser User Documentation

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Service Information

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.