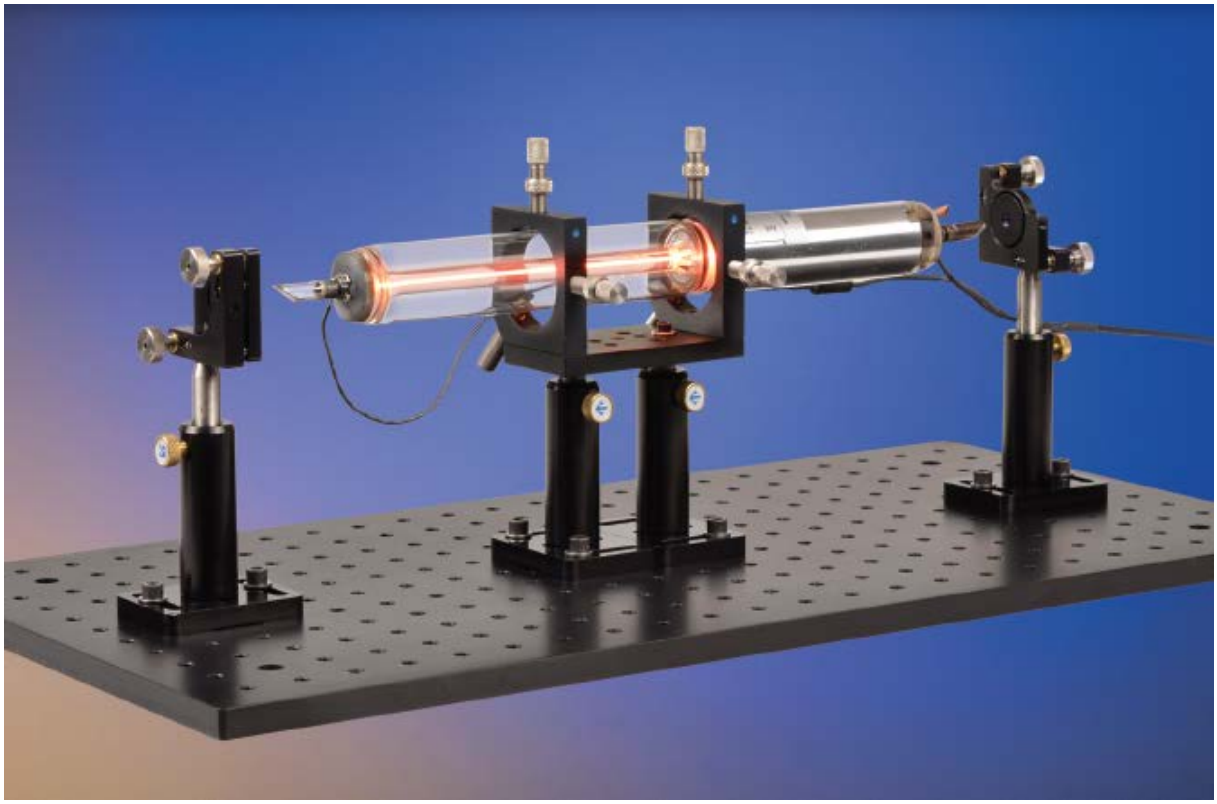
HeNe Laser Project Kit

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Images inside this manual may show slight deviation from the actual delivered system.
This does not affect function or operation.
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The manufacturer maintains the right to change information and technical equipment without notice.

1. Safety Rules & Introduction

1.1 Safety Rules

WARNING!

Read the safety rules in this section before installing, powering, operating or servicing this product.

Symbols used in this manual

The following symbols are used to identify important safety information

WARNING! Laser emission is possible. Assure laser safety precautions.

Caution! High Voltage, risk of electrical shock.

CAUTION: Special attention to this point is necessary to meet health regulations and to avoid damage.

An important note to ensure an unproblematic operation.

Important safety information

Before operating the laser system, read the manual carefully to prevent damages to human or animals, integrated devices and connected devices.

Always follow the local or EN (IEC) safety rules EN (IEC) 60825-1 during the operation of the system.

WARNING: The laser system emits visible or invisible continuous laser radiation depending on its configuration. The system may be variably equipped with different laser tubes and thus leads into different output power and wavelength.

The laser product classification is:

- **CLASS 3B laser product, up to 10mW output power.**

The classifications are evaluated and tested under worst case conditions.
Avoid exposure of the laser beam or stray laser light to the eyes and the skin!

Be aware of the laser safety rules and pay attention to the following points:

- Do not look at any laser light directly or through optical lenses.
- Installation of a special working area for the laser is recommended, which only gives access to instructed persons, trained in laser safety.
- Warning labels have to be perceptibly placed at all entries of the area the laser is installed and running.
- Wherever possible, the beam should be sheathed by a tube, to prevent direct access to the laser beam.
- The working area of the laser should be shielded to prevent uncontrolled escape of the laser beam. After passing the experimental / working area the beam must be blocked by an appropriate target, which absorbs the laser light.
- The laser beam should not run at eye level.
- Wear appropriate safety glasses to prevent light from entering the eye, even reflections from any surfaces.

Notes for the laser system about different laser tubes and wavelengths:

- The laser system is available in different wavelengths and power levels. The laser class has to be re-classified after any modification and changes to the system. Do not make any modification to the laser system.
- Beware of the different safety rules regarding the different safety classes.

Notes about the electrical safety:

- The laser system comes optionally together with the power supply. The electrical units should not be operated in hazardous environment.
- Always check for loosen connectors or wires.
- Do not touch any un-isolated (due to damage) electrical parts, beware of electrical shock.
- Always check fixed cable connections.

CAUTION for usage as a training and teaching kit:

The laser system is only for use as a teaching and training product. The power supply provides the ability to have remote access safety interlock, to be implemented by the user.

Laser warning and explanatory labels

ATTENTION: Do not look into the beam or into reflections of the beam from surfaces!

When operating the laser under open environment installation, it may emit stray-light, which is a health hazard for the eyes and skin.

Always wear protective eye-goggles according to the used laser wavelength. Avoid exposure of laser light to the skin and eye.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure!

The following laser warning and explanatory labels are attached to the laser head.

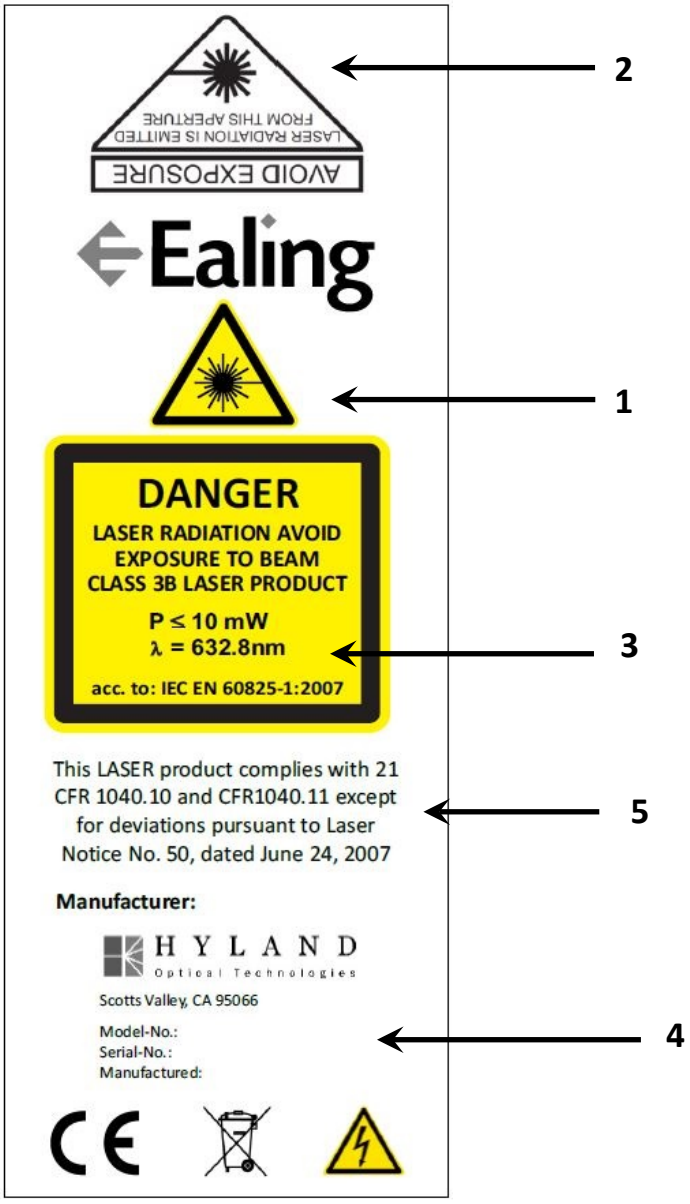

Figure 1: HeNe laser safety label view

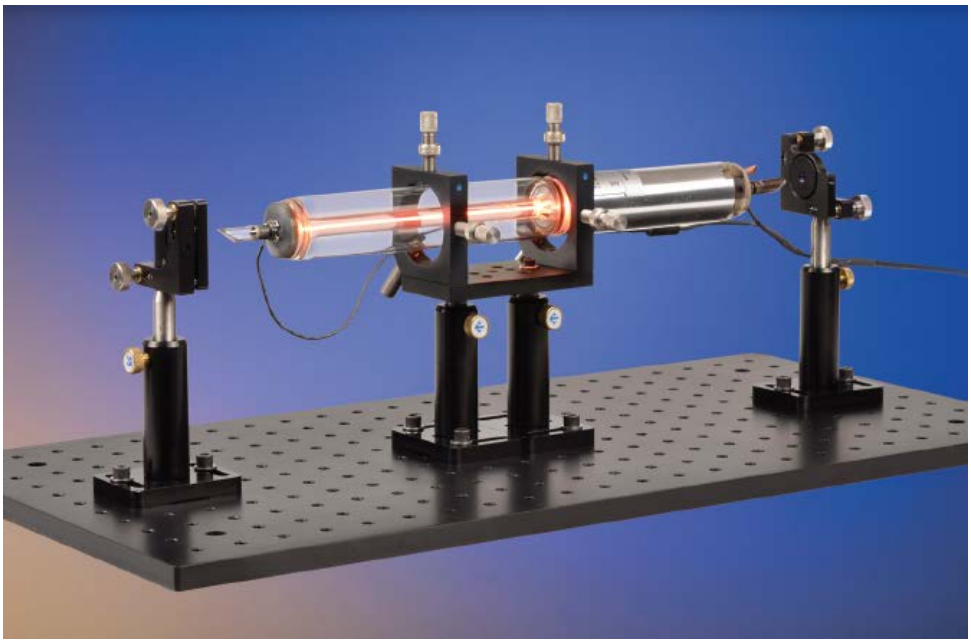

Figure 2: laser system main view

The following labels are attached to the laser head next to the aperture:

1. **Laser-warning sign (common):**

Size:	15 x 15mm
Colour:	yellow / black
Location:	front side, left side aperture

2. **Aperture for laser beam:**

Size:	20 x 20mm
Colour:	white / black
Location:	top cover, front side

Note: This label is the same for all wavelengths and different output power configurations of all HeNe kit laser products.

3. **Laser-warning and laser ray explanatory label:**

Class 3B:
For the **visible-range (VIS)**: Wavelength / output power:

Size:	52 x 52 mm
Colour:	yellow / black
Location:	top cover, backside

623[nm] / 10[mW]*

4. Identification of manufacturer explanatory label:

Scotts Valley, CA 95066

Model-No.:
Serial-No.:
Manufactured:

Size:	46 x 26mm
Colour:	white / black
Location:	top of the laser tube

Please note:

The model code of a laser is composed as follows:

HeNe Teaching kit □□□-□□□

Wavelength in nm — Power in mW

5. Statement for laser notice 50 label:

Size:	46 x 26mm
Colour:	white / black
Location:	top of the laser tube

1.2 HeNe Laser Project Kit general description

The Ealing HeNe Laser Project Kit contains everything you need to build your own helium-neon laser including a laser tube, power supply unit, aluminium breadboard, laser mount and mounting post assemblies, as well as a set of our high quality HeNe laser cavity mirrors.

2. Technical Data

2.1 Mechanical and electrical specifications

Wavelength	632.8 nm
Power	Up to 5mW
Operating Voltage	1800V +/-100V
Operating Current	6.5 mA
Laser Tube Dimension	397 mm x 36 mm
Shipping Weight	31 lbs.
Additional (optional) emission lines	Visible Range: 730.5 nm, 640.1 nm, 635.2 nm, 632.8 nm, 629.3 nm, 611.8 nm, 604.6 nm, 594.1 nm Infrared Range: 3391.3 nm, 1523.1 nm, 1206.6 nm, 1198.5 nm, 1176.7 nm, 1161.4 nm, 1152.3 nm, 1140.9 nm, 1084.4 nm, 1079.8 nm

3. System components

3.1 Items Included in Kit.

The HeNe kit is shipped with the following parts (*shown in figure 3)*:

Part Description	Ealing Part Number	Qty
HeNe Mirror Set	02-200-001	1 set
1'x2' Breadboard	62-1904-000	1 ea.
Laser Mount	61-1483-000	1 ea.
Post Holder Base	53-1707-000	4 ea.
Mounting Posts	61-1756-000	4 ea.
Post Holders	61-2069-000	4 ea.
Mirror Mount	53-2218-000	2 ea.
Laser Tube	P801-00-001	1 ea.
Power Supply Unit (please see separate user manual for the power supply unit)	P3300-00-001	1 ea.
Optics Adapter	02-701-001	2 ea.
Cable Assembly	02-503-001	1 ea.
HeNe Laser Kit Hardware Packet	02-900-002	1 ea.

Note: A standard allen wrench set is required for assembly, but not provided.

Figure 3: parts

4. Installation and assembly

4.1 Unpacking

When you receive your HeNe Laser Kit please immediately inspect the shipping container. If there is any damage (holes or crushing, etc.) ask that a representative of your local carrier is present while you unpack the contents.

Carefully inspect your HeNe Laser Kit as you unpack it. If any damage is evident, such as dents or scratches on the covers or broken parts etc., immediately notify your carrier and Ealing.

For a better handling of the kit in the case of service, keep the shipping containers for sending back the kit. If you file a damage claim, you may need them to demonstrate that the damage occurred as a result of shipping.

4.2 General Installation

Step 1: Remove ¼-20 set screw from bottom of post holder (p/n 61-2069-000).
Step 2: Take p/n 50-OCC013025 and place through center hole of Post holder base (53-1707-000) and tighten until snug. *Shown in Figure 4.* Repeat for other 3 other post holder and base assemblies.

Figure 4: post holder

Step 3: Place posts (p/n 61-1756-00) into post holder assembies. Tighen thumb screw on post holder to ensure no movement of post. Once secure remove 8-32 set screw to enable mounting of laser mount assemblies (61-1483-000). *Shown in Figure 5.*

Figure 5

Step 4: For the two post holder assemblies that will be used with laser mount (p/n 61-1483-000), take a ¼-20 5/8 (p/n 50-OCC013031) with washer (p/n 52-SPN013000)and put through post holder base and align so hardware is positioned towards outside edge of base. *Shown in Figure 6.*

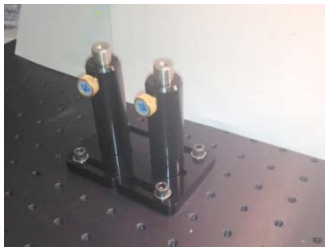

Figure 6

Step 5: Place other two post holder assemblies in desired positions on breadboard. (see section 5.2 for approximate distance)

Step 6: Place laser mount assembly (61-1483) on 2 post holder assemblies and secure with qty. 2, 8-32 screws (P/N 50-OCC008030). *Shown in Figure 7.*

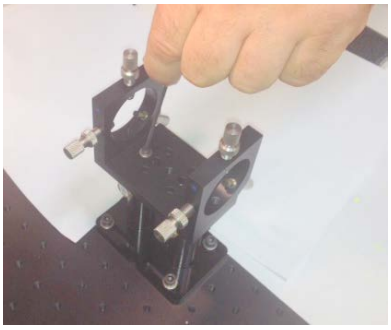

Figure 7

Step 7: Place HeNe mirrors in optic adapters (02-701-001) and tighten screw. *Shown in figures 8 & 9.*

Figure 8

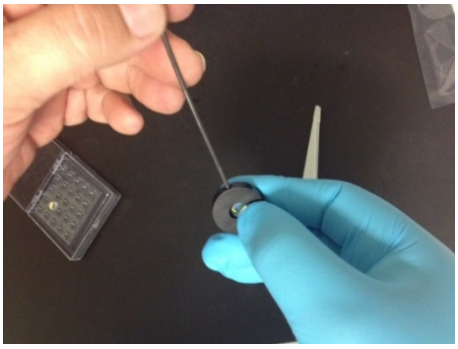

Figure 9

Step 8: Place optic adapters in mirror mounts (p/n 53-2218). *Shown in figure 10.* Tighten screw. *Shown in figure 11.*

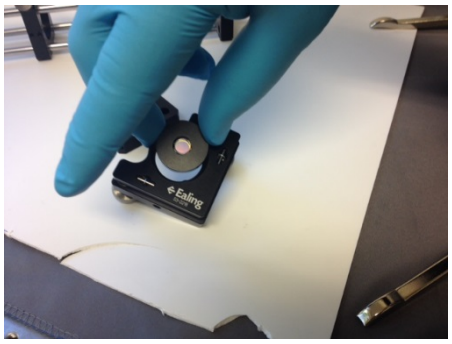

Figure 10

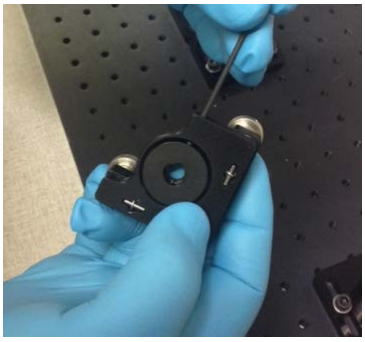

Figure 11

Step 9: Attach mirror mount assemblies to remaining two posts using 8-32 screw (p/n 50-OCC008019. Shown in figure 12. Place in post holder assemblies. Shown in figure 13.

Figure 12

Figure 13

Step 10: Attach cable assembly (02-503-001) to HeNe tube using c-clips. You must use the insulation covers (figure 14) on both ends of the tube to prevent the risk of an electrical shock.

Caution! When using the insulation covers, please disconnect the cable from power supply unit, make sure you wait for discharge any residual energy to avoid an electrical shock. Do not operate the tube without the insulation covers!

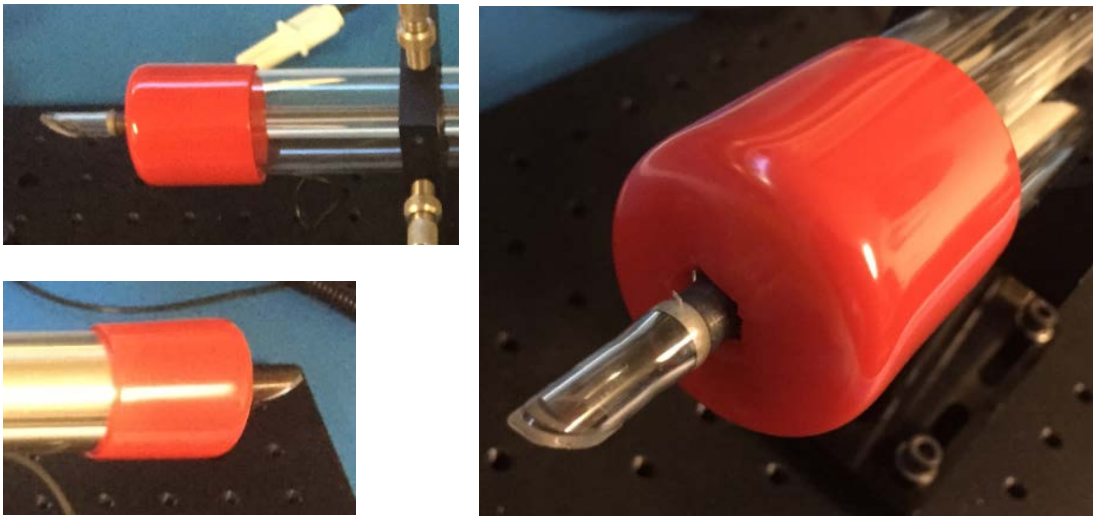

Figure 14

Step 11: Next, to place HeNe Laser tube (p/n P801-00-001) in laser mount, you must first remove post/mirror mount assembly from post holder to allow access to laser mount. Continue on by sliding the tube through the laser mount (loosening thumb screws for adequate clearance) making sure the tube is centered in laser mount assembly. *Shown in figure 15.*

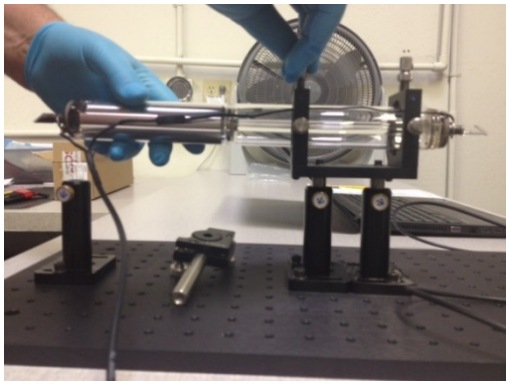

Figure 15

Step 12: Replace post/mirror mount assembly in post holder.
Shown in figure 13.

Step 13: Connect plug at end of cable assembly to power supply unit (P3300-00-001).

Caution! When disconnecting the cable from power supply unit, make sure you wait for discharge any residual energy to avoid an electrical shock. See chapter safety rules for more detailed information.

Step 14: Next, begin the laser alignment process outlined in section 5.

Please note: For operating the power supply, please see the separate user manual for the power supply unit.

5. Alignment procedure

5.1 Alignment tools

This procedure will require additional tools and cleaning supplies which are not included in the HeNe kit.

Tools needed:

- A laser for alignment
- Two pinholes or iris apertures
- Additional mounting equipment

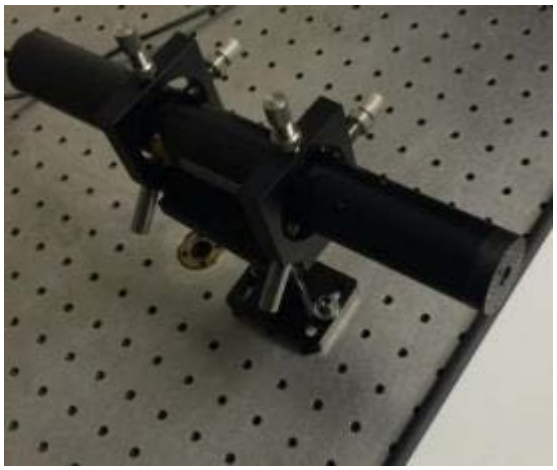

Figure 16

Figure 17

Cleaning supplies:
-Lens tissue
-Isopropyl alcohol
- tweezers
-compressed air

Figure 18

5.2 Setting up the alignment laser

Step 1: Mount the alignment laser such that the beam will be approximately 5.25 inches above the breadboard the HeNe tube will be placed on. Try to set the alignment laser a good distance from the HeNe setup.

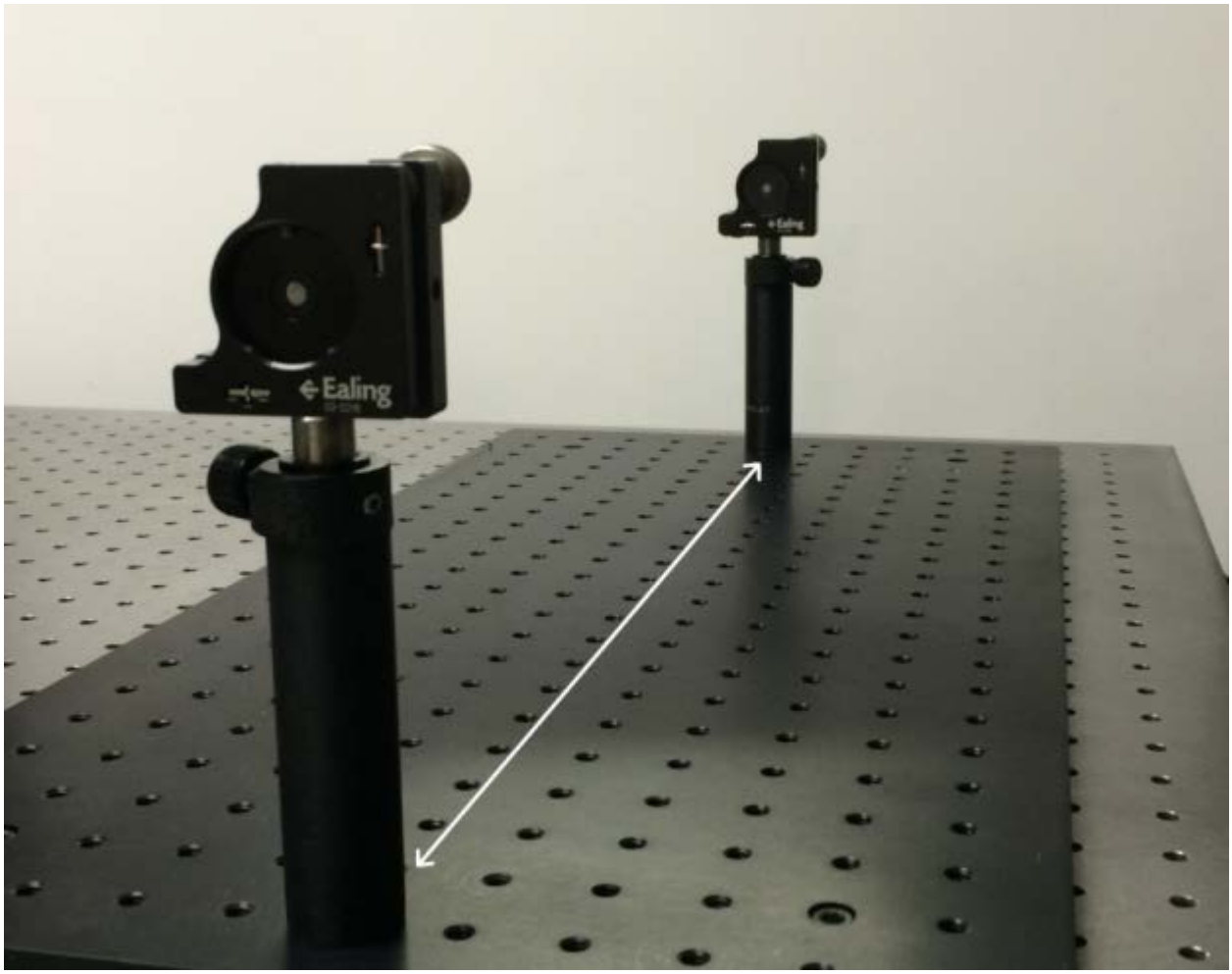

Figure 19

Step 2: Adjustment to the same height which will be within the height range of the HeNe tube and mount them at opposite ends of the breadboard. Keep them aligned on the same row of threaded holes on the breadboard as seen in the figure 19.

Step 3: To make the alignment laser parallel to the table make the necessary adjustment such that the laser beam passes through both the center of the pinholes.

Once this has been achived the HeNe tube is ready to be installed

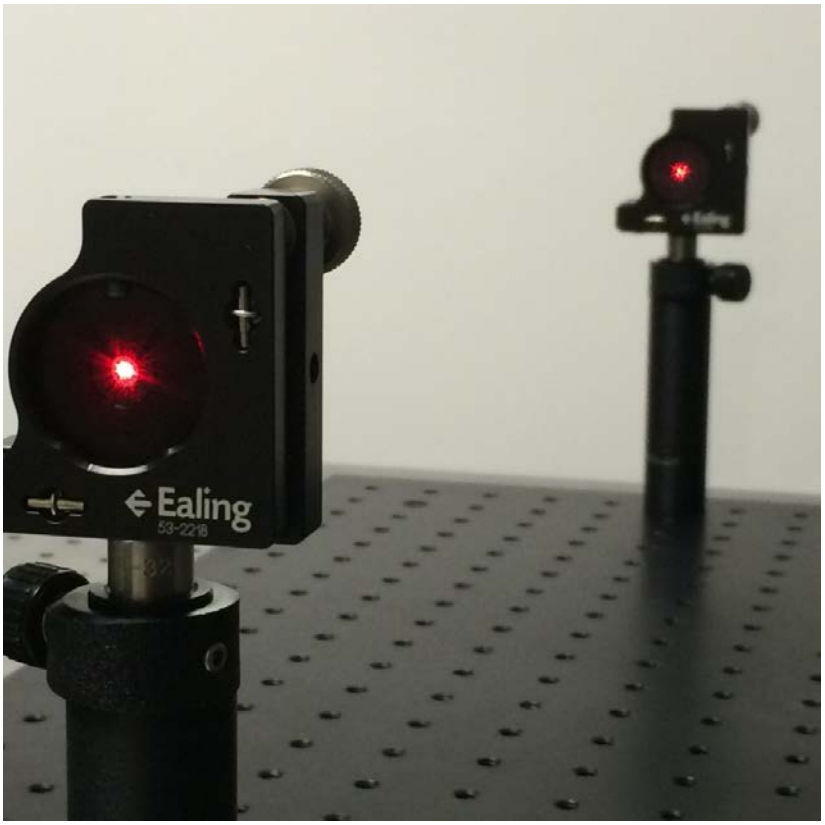

Figure 20

5.3 Setting up the HeNe tube

Figure 21

Step 1: Place the HeNe tube in between the alignment beam path and screw it in place.

Step 2: Remove both of the pinholes from the setup and begin to adjust the tube mount to let the alignment beam pass through

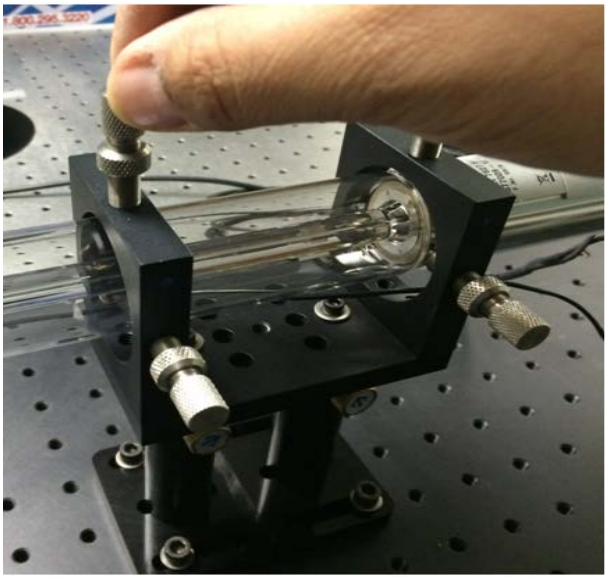

Figure 22

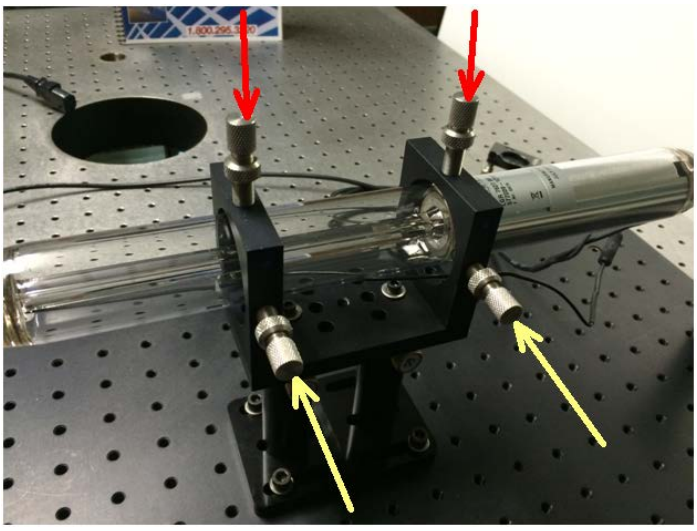

Figure 23

Step 3: Move the tube horizontally or vertically by adjusting the bottom or top adjustment screws simultaneously to get a better position for the alignment beam.

Step 4: Examine the output of the alignment beam as it goes through the tube

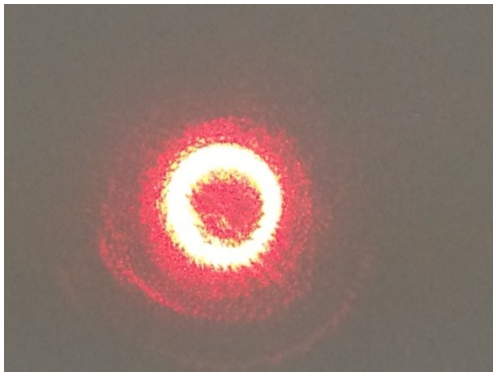

Figure 24

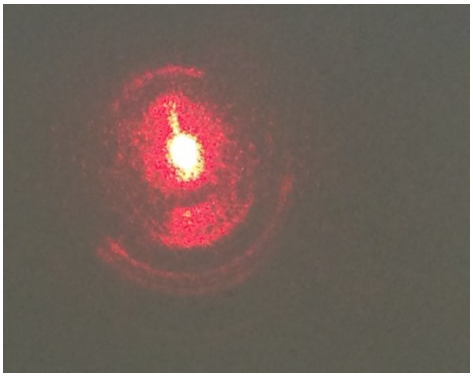

Figure 25

Caution: The laser tube is made of glass and is very fragile. Please handle carefully and take extra care when mounting in the holder.

Figure 26

Once it converges from a ring to a spot the back mirror is ready to setup.

5.4 Setting up the rear mirror

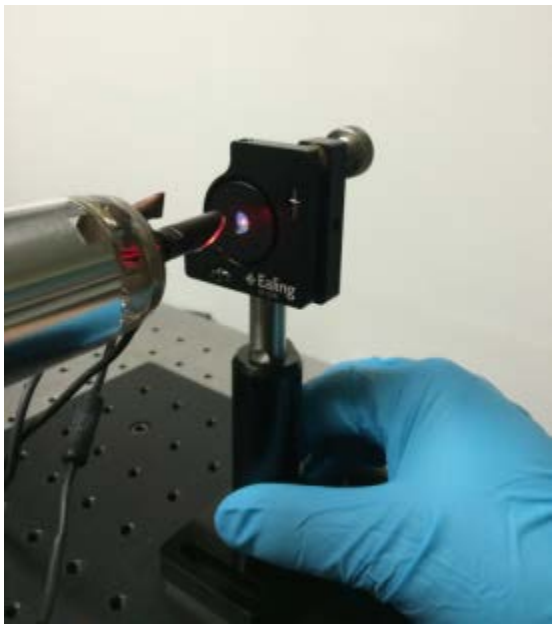

Figure 27

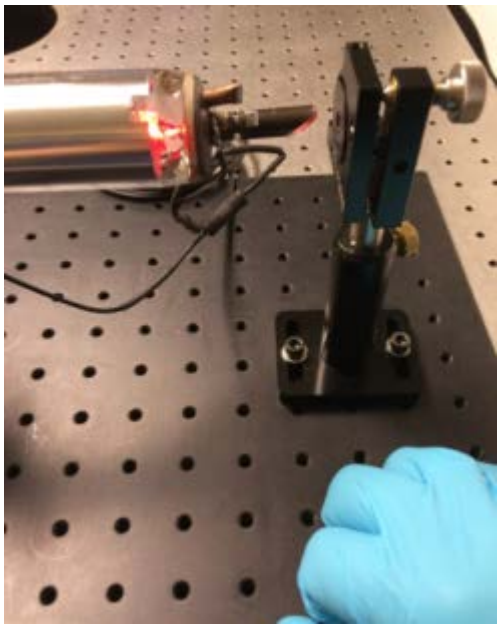

Figure 28

Step 1: Center the rear mirror to the alignment beam passing through the tube and screw it place within an inch or so away from the HeNe tube

Step 2: Use the adjustment screws on the mirror mount to reflect the alignment beam through the tube and back to the alignment laser.

Step 3: As in the previous section, the reflected beam should converge from a ring to a spot.

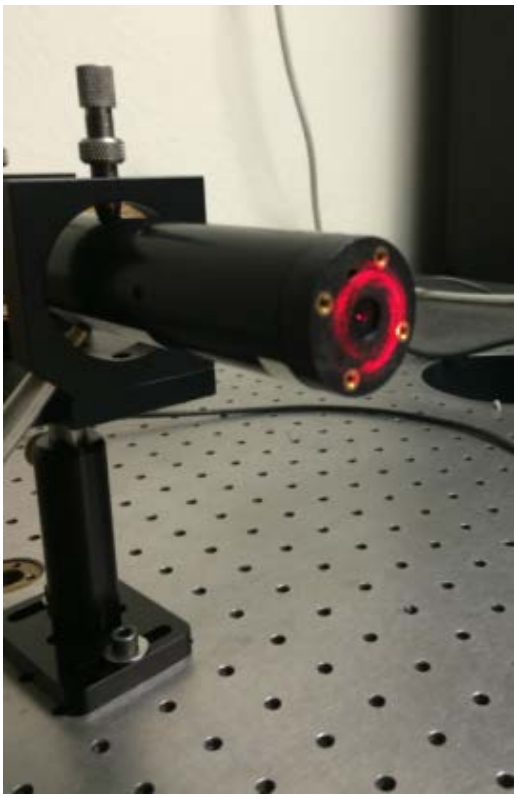

Figure 29

Figure 30

Once the beam is properly reflected back the fron mirror can be installed

5.5 Setting up the front mirror

Step 1: Center the back of the front mirror to the alignment beam and screw the mirror in place within and inch or so from the HeNe tube.

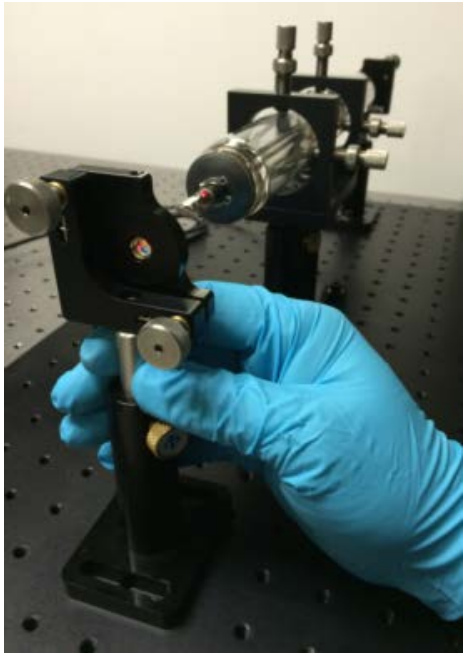

Figure 31

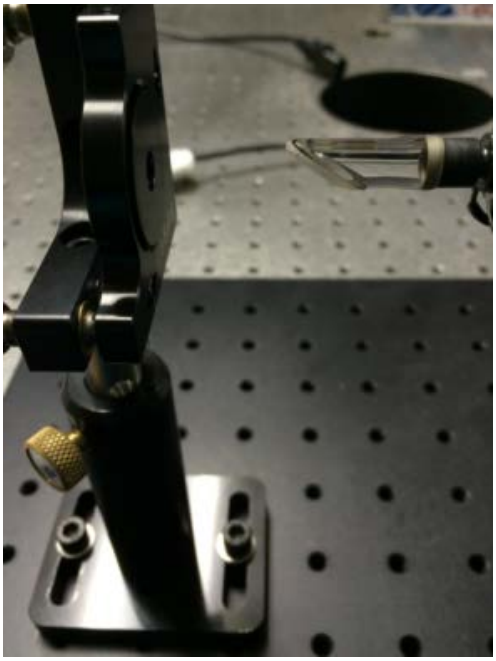

Figure 32

Step 2: Adjust the mirror to direct the reflected alignment beam back to the laser's output.

Figure 33

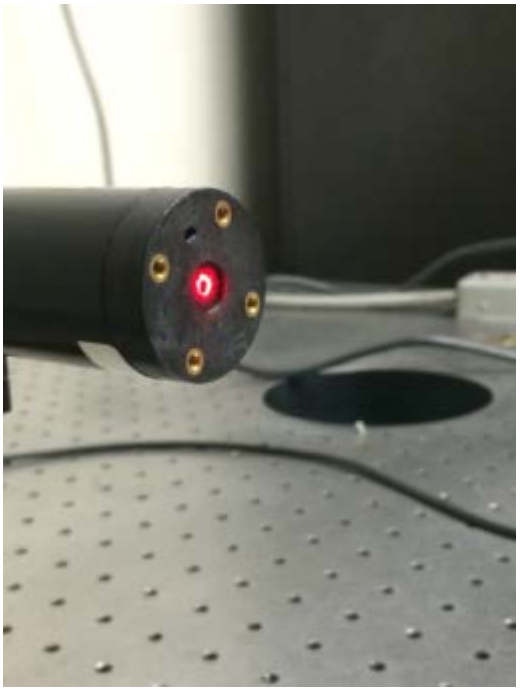

Figure 34

5.6 Cleaning the Brewster windows

Step 1: Before starting the HeNe tube, the Brewster windows will need to be cleaned.

Step 2: Use a set of tweezers to hold a piece of lens tissue damped with isopropyl alcohol and apply single stroke to wipe on the Brewster windows.

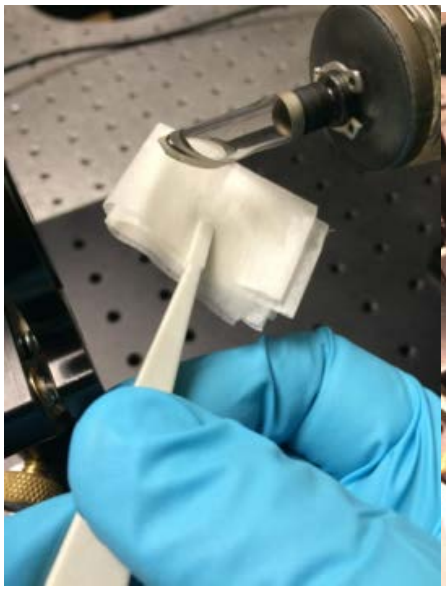

Figure 35

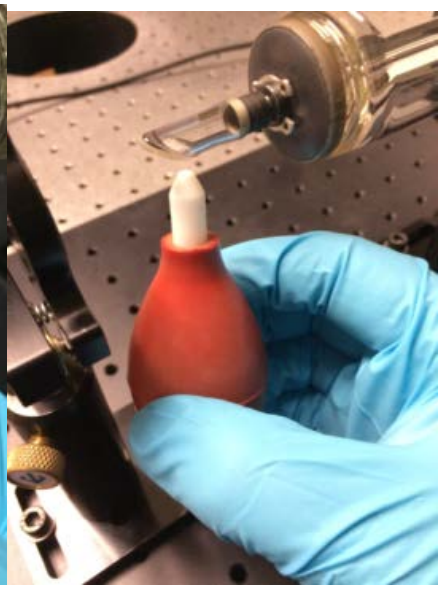

Figure 36

Step 3: Dry off the windows using compressed air

5.7 Completing the alignment

Step 1: Plug in the HeNe tube and switch on the power supply

Step 2: To get the HeNe tube to laser make small adjustments to the front mirror and sweep across the Brewster window. The tube and the rear mirror should be left alone as they are more sensitive to the alignment.

Step 3: Use the alignment laser as a reference to the origin.

Step 4: After several minutes a beam will appear a in the Brewster window

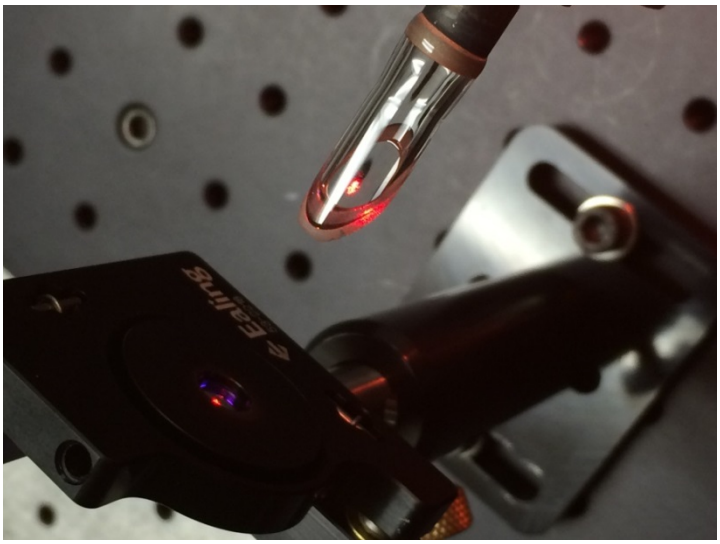

Figure 37

Step 5: Switch off the alignment laser and begin to optimize the output of the HeNe laser

5.8 Optimizing the output power

Step 1: To optimize the HeNe laser, use a power meter at the output and begin to make adjustments to all the fixtures

Step 2: Be sure to keep the Brester Windows clean as the ouput can be very sensitive to dust in the beam path way

Step 3: Typical output powers of this HeNe laser is >5mW

Figure 38

6. Troubleshooting

The HeNe tube does not lase when adjusting the front mirror

- If the HeNe tube does not start lasing during the front mirror adjustment the alignment procedure may need to be repeted. Be sure to have the alignment laser a good distance away from the HeNe setup. That way the alignment beam is much more sensitive to adjustments when the front and rear mirror is set into place.

Low output power

- Low output power can indicate two thing: 1) the tube is not centered with the mirrors 2) the brewster windows need to be cleaned.

- The tube may need to be adjusted to a different position either vertically or horizontally. To do this adjust the top or bottom pairs of adjustment screws on the tube mount simultaneously. Monitor the output power to prevent misalignment.

- If the Brewster windows need to be cleaned switch off the laser and follow the cleaning procedure.

7. Maintenance

- During operation keep the HeNe kit away from dusty environments which can impede on the lasers performance.
- When finished using the HeNe laser, be sure to unplug and discharge the power connector on a metal surface.

Caution! The HeNe laser will behave as a capacitor when the power is switch off! To avoid an electrical shock please be sure to discharge the tube properly .

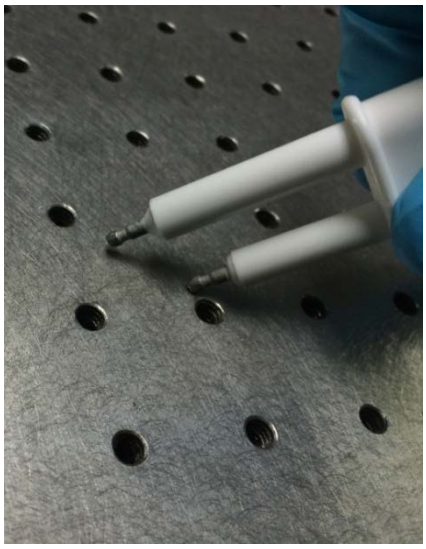

Figure 39

- When storing the tube keep the Brewster windows protected with the rubber caps it was shipped with or cover them with a few layers of lens tissue. Also, be sure to have the tube cover with packaging as it is fragile.

8. Warranty

The warranty is limited by the following:

- Unauthorized modification or misuse.
- Improper or inadequate maintenance by the buyer.
- Operation outside the environmental specifications of the product.

9. Waste disposal

WEEE (Waste of Electrical and Electronic Equipment)

Recycling of Electronic Products, disposing of this product.

In 2012 the European Union introduced regulations (WEEE – 2012/19/EG) for the collection and recycling of all waste electrical and electronic equipment. It is no longer allowable to simply throw away electrical and electronic equipment. Instead, these products must enter the recycling process.
This product must not be disposed in normal garbage!

When this Ealing product is no longer used or out of order and should be disposed please refer to the service address indicated in the scope of delivery to send back the device in its original package to the manufacturer to enter the recycling process.

We thank you for your understanding!

10. Spare parts and service

More detailed specifications, declarations of conformity for the EU, the USA, and help in your solutions for applications on demand.

Please contact service at:

Hyland Optical Technologies

e_mail: tech@ealingcatalog.com

website: www.ealingcatalog.com

Tel.: 831-461-1930

Fax.: 831-461-1136