Pre-Aligned Arc Lamp Source

LHS300, LH300 and LHC300

User's Manual

Newport®

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1 Introduction

This manual covers the following Oriel 300 watt (W) Pre-Aligned Arc Lamp offerings:

- LHS300 300W Lighthouse Source
- LH300 300W Xenon Lamp House, PreAlign
- LHC300 300W Xenon Lamp Cartridge

An igniter is built into the top of the lamp housing. This reduces RF interference and eliminates the need for a separate igniter.

The LH300 lamp housing has been designed to operate with Oriel Arc Lamp Power Supply, Model OPS-A500, which provide all necessary power and control. LHS300 contains the following components:

- LH300 Quantity 1
- LHC300 Quantity 1
- OPS-A500 Quantity 1
- 70050 Quantity 1

These components, when used in conjunction with the appropriate Oriel power supply, are compliant with the European EMC and Low Voltage Directories and, therefore, carry the CE mark.

2 Safety Considerations

There are four hazards in the operation of these pre-aligned offerings. They are:

- Ultraviolet radiation
- Lamp explosion
- Electrical shock
- Heat

The interlock system is designed for your safety. Do not defeat the interlocks. During normal operation and in accordance with the precautions presented in this manual, none of these hazards present a problem.

2.1 Ultraviolet Radiation

The high intensity UV radiation of these lamps can permanently damage the cornea, lens, and retina of the eye, even causing blindness. This damage may not become apparent for hours or even days after the exposure. The deep UV is absorbed in the cornea of eye fluids; focused UV, VIS and NIR can damage the retina. Normal blink reaction of visible light may not be adequate protection, and a beam of invisible UV or NIR (produced by spectral filtering) can be most dangerous as the blink response is not induced. UV radiation can also cause painful sunburn, and with prolonged exposure, serious burns. As with sunlight, there is a risk of melanoma (skin cancer) as well as the formation of cataracts with repeated exposure.

Under normal operating conditions, the user receives minimal UV exposure even over long periods of operation. However, certain precautions should always be taken when operating this equipment:

- Never look directly into the output beam of the housing when operating a lamp.
- Never look at a specular (mirror) reflection of the beam, even for short periods of time.
- Always wear UV safety eyewear or face mask and protective clothing for exposed areas of skin.

For a list of Newport recommended UV protection solutions, please refer to Table 1.

2.2 Lamp Explosion

When cold Xenon arc lamps are under several atmospheres of pressure, they are subject to explosion due to internal strains or to physical abuse. When hot, all lamps are under a pressure close to 100 atmospheres and subject to violent explosion.

Recommendations:

- Do not handle the pre-aligned lamp cartridge without safety goggles and adequate protection for exposed areas of skin.
- Do not apply torque to the lamp envelope during installation or removal.
- Do not touch the lamp envelope with bare fingers. Fingerprints and other contaminations left on the lamp cause a deterioration of the envelope during operation and may lead to lamp explosion.
- If necessary, thoroughly clean the envelope with alcohol or a dilute solution of detergent and water after installation in the housing.

2.3 Electrical Shock

When this source is operated as intended, with an Oriel Model OPS-A500 Power Supply and Oriel Model 70050 cable, the interlock system and the package design eliminate the risk of electrical shock.

Use of this source with a power supply not manufactured by Oriel is not recommended.

Be aware that a high transitory voltage is used to ignite the lamp and, before ignition, the lamp terminals have a potential difference of up to 200V. These voltages are dangerous and it is wise always to approach the lamp housing as if the interlock system were not in place.

Recommendations:

- Keep personnel clear of all exposed terminals.
- Make sure all connections are securely made before starting a lamp.
- Do not handle the lamp leads during lamp ignition.
- Disconnect the AC power cord from the OPS-A500 before connecting or disconnecting the 70050 cable.
- Ensure covers and shields are in place before applying AC power.

2.4 Heat

These lamp cartridges become very hot after several minutes of operation, and remain in such state for many minutes after being shut off.

The Oriel OPS-A500 Power Supplies will continue to operate the lamp housing fan to cool the lamp cartridge off after the lamp has been turned off from the power supply..

Recommendations:

- Use the power supply switch on the front panel to turn the lamp off. Do not use a switched mains receptacle since this will prevent the fan assisted lamp cartridge cool down.
- Wait for the housing fan to stop, or at least 10 minutes after turning off the lamp, before opening the lamp housing door. Do not open the lamp housing door unless the lamp cartridge needs replaced.
- Approach the lamp cartridge as if it were hot under any circumstances.

3 Product Description

These sources are lightweight but rugged. They are excellent choices for most low to medium power laboratory light source applications. You can mount them to optical tables, rails, or benches. With a complete line of optical accessories, you can filter, chop, and steer the output to fit your application.

3.1 Pre-Aligned Lamp Cartridge

The LHC300 is a 300W pre-aligned lamp cartridge containing a 300W Xenon, ozone free lamp. The cartridge allows for a simple, drop-in installation and is delivered pre-aligned by the factory.

3.2 Built-In Igniter

The LH300 has an igniter built into the top of the housing. Short arc lamps, like the type used in the LHC300, require a high voltage spike, up to 40 kV, to ignite. Having the igniter built into the lamp housing minimizes unwanted radiated or conducted EMI and reduces potential exposure to the high voltage ignition energy.

3.3 Lamp Cooling

The built-in fan and housing baffles maintain the proper operating temperature for the LHC300, when operated in typical laboratory conditions. The LH300 is designed to operate in a typical laboratory environment (15 to 40 degrees C, up to 30% relative humidity). Temperature and humidity outside of typical laboratory range can contribute to cooling and ignition faults. Cooling issues will cause the over temperature sensor to open and ignition problems are caused by high humidity. It is also not recommended to operate the source in an Argon purged environment as this can lead to ignition faults. Contact a Newport sales representative for more information if operating outside the suggested range.

Overheating due to blocking of the cooling vents or an inoperative fan activates a thermostat interlock which disables the power supply.

The fan is controlled to keep the lamp cartridge at a constant operating temperature. The fan does not turn on until the lamp anode reaches operating temperature, will run at a constant speed during operation, and will continue to run after the lamp has been turned off until the cartridge has cooled down.

The cooling fan receives its power directly from the OPS-A500 power supply.

3.4 Safety and Monitoring Features

This lamp housing incorporates safety interlocks. When used with an Oriel Power Supply, the lamp cartridge automatically shuts off if the housing door is opened or the housing overheats. If using a third party power supply, we strongly recommend utilizing this low voltage interlock system for safety.

3.5 Mounting

The LH300 lamp housing is mounted on a baseplate with both imperial and metric holes for ready installation onto an optical table or breadboard. The lamp housing mounting plate may be rotated 90^{o} to provide more mounting hole clearance when using metric tables.

If necessary, four adjustable feet can be ordered separately for free standing use, and allow for 0.63 inch (16 mm) height adjustment. See Figure 2 for base plate dimensions.

Figure 1 Pre-Aligned Lamp Housing and Lamp Cartridge

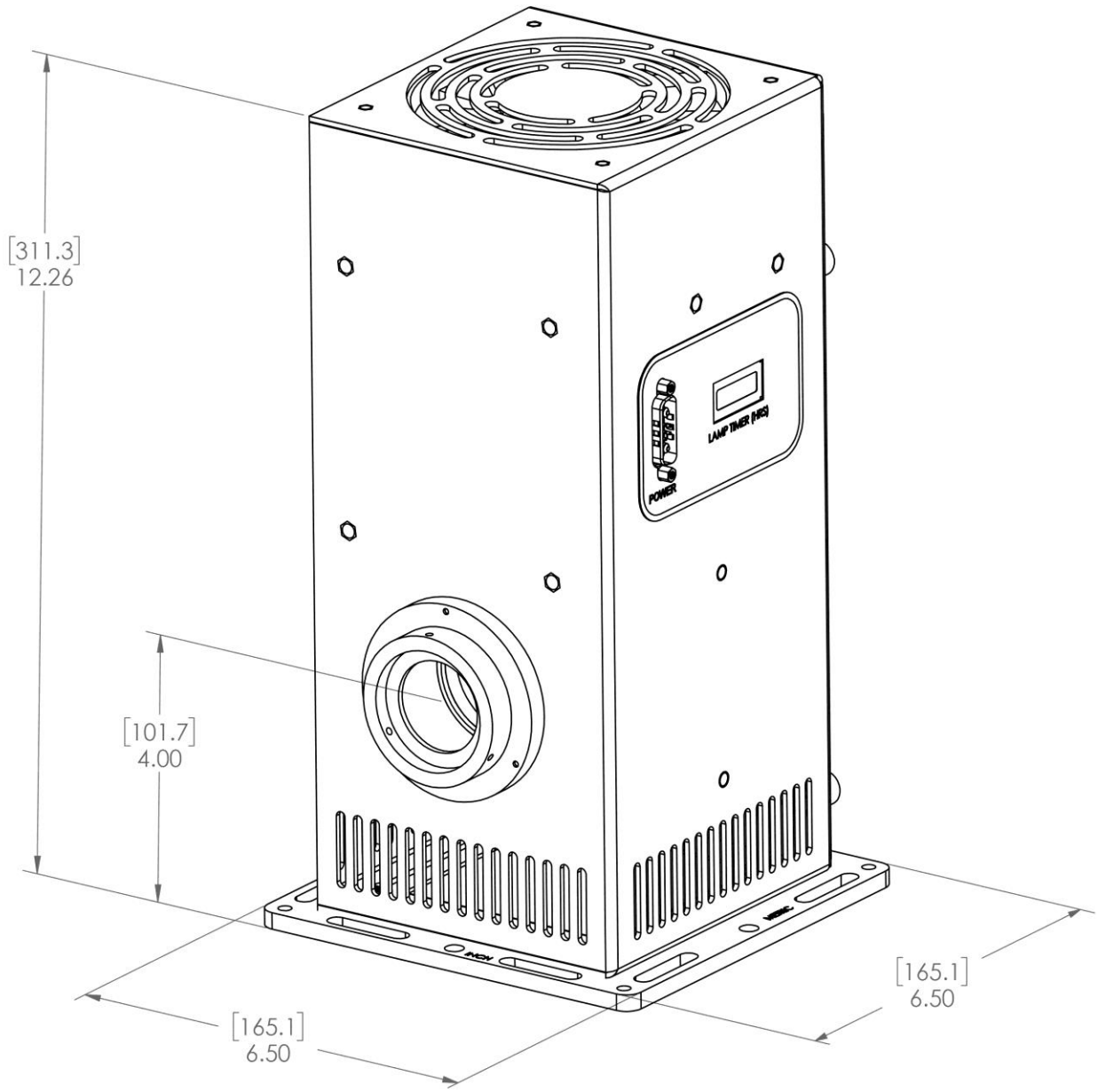

Figure 2 *Dimensional Diagram of LH300*

Part Number	Description
49121	UV Protective Gloves, Size 10, Quantity 3
49123	UV Protective Gloves, Size 8, Quantity 3
49125	UV Safety Spectacles
49126	UV Safety Goggles
49132	UV Protective Face Shield
USFW-100	Universal Filter Wheel
75160NF	Optical Chopper System
71445	Electronic Safety Shutter
71455	Electronic TTL Shutter

Table 1 Accessories

To obtain these products, please contact Newport. For more information, visit https://www.newport.com/b/oriel-instruments.

4 Installation and Operation

4.1 Installation of the Lamp Cartridge

To install the LHC300 lamp cartridge into the LH300 lamp housing:

- Check that there is no electrical service to the housing and that the power supply is turned off.
- Put on safety goggles and gloves.
- Unscrew the four captive screws on the side of the housing and remove the access door.
- Orient the lamp cartridge with the + endcap terminal of the lamp on top. This terminal can be identified by the inverted T-shaped enclosure surrounding the lamp terminal and the attached high voltage cable connector.
- Insert the cartridge into the housing by aligning the four posts into the corners of the cartridge and pushing through until contact with the mounting brackets inside the housing is made.
- Secure the cartridge to the two posts protruding completely through with the supplied knurled thumb screws. These can be hand tightened; there is no need to over torque these screws. Check to ensure the cartridge is secured and movement is minimal.
- Connect the high voltage cable from the + terminal of the cartridge to the connector mounted on the side of the housing. This connector is keyed such that polarity cannot be switched. Ensure a tight connection. Take not that this connector will snap into place when properly mated.
- Connect the thermistor cable from the cartridge to the electronics panel mounted on the side of the housing with the lamp hour counter. This connector is keyed such that polarity cannot be switched. Ensure a tight connection.
- Replace the side access door of the housing and tighten the captive screws.
- Connect the lamp power cable between the lamp housing and the rear of the power supply. Use the black cable, Model 70050, provide with the supply. The ends of this cable have opposite connectors such that polarity cannot be switched. Secure the female end of the cable to the port labeled “POWER” on the lamp housing and tighten the two screws.
- Read the OPS-A500 Power Supply Instruction Manual before operation.

4.2 Lamp Cartridge Operation and Cooling

The 300W LHC300 should be operated close to its rated power. Dropping the power below 80% of rated can lead to unusual lamp performance, eventual instability, and shortened life.

4.3 Cooling

The LH300 housing is fan cooled. The fan ensures that the lamp terminals are at an appropriate temperature and the outer panels of the lamp housing are safe to touch. The fan speed in the housing is thermostatically controlled so that the lamp top electrode is kept at a constant temperature as room temperature and lamp cooling requirements may vary.

This constant temperature operation minimizes the concern about over or under cooling the lamp unless there are other cooling mechanisms being used; most likely ducting and/or other blowers that are used to remove the ozone by-product that can either augment or restrict the normal cooling air. Before hooking up ducting or other blowers, note the operating voltage and current of the lamp. Check these parameters after adding any cooling mechanisms to your system.

If too much cooling air is provided, the lamp will be overcooled an overcooled lamp never reaches proper operating conditions, will run with low voltage / high current, and often with increasingly unstable light output. The high current operation will shorten the lamp life. The evidence of an under cooled lamp is less obvious. The lamp will warm up quickly, but the voltage and current will be similar to a normal lamp. Since excessive temperature can damage the lamp seals and lead to premature, sometime dramatic, failure, care has to be taken if the air flow around the housing is changed significantly.

A thermal interlock in this housing will activate and turn off the power supply in a grossly under cooled condition. In the event of a failure in the temperature control circuitry, the fan should run at full speed providing overcooled but safe operation.

5 Troubleshooting

This section deals with procedures to follow should you encounter specific difficulties in operating the pre-aligned lamp source.

5.1 Problems

Lamp will not light after several repeated presses of the LAMP START button.

The most common problem experienced when using these lamp sources is difficulty in starting the lamp. The problem may be in the lamp housing, in the power supply, or with the lamp cartridge. The following procedure should help you identify the problem area. If you cannot locate the source of the problem, and do not have other lamp housings or power supplies to interchange as a problem finding technique, we recommend you send the complete system: power supply, lamp housing and lamp cartridge to Oriel for diagnosis of the failure mode.

Recommended Procedures:

1. Check that the power supply is operating. Visually inspect the power breaker and fuse(s), and make sure the fan is operating.
2. OPS Power Supplies: check for fault codes on the front panel of the power supply. Recommended corrective actions are contained in the power supply manual.
3. Check the cable connection between the lamp housing and power supply. Make sure the cable is firmly attached on both ends.
4. Ensure that the operating environmental specifications listed in Section 6 are being adhered to. Attempting to operate the light source outside of these specifications is known to impact ignition of the lamp cartridge.
5. Check for ignition.
    a. If all the connections are properly made and the lamp cartridge seems fine visually, then place a piece of paper near the output port of the housing, and if possible, darken the room. Use safety goggles and view the paper while pressing the LAMP START button. What you see will help isolate the problem.
    b. A dim flash and a brief snapping noise indicates that the igniter is breaking down the lamp, but that the main capacitor in the power supply is not dumping. This indicates that the power supply igniter drive circuit is working but there is inadequate break down, due either to a problem with the DC output section of the power supply, or a lamp problem.
    c. A brighter flash indicates that the igniter is breaking down the lamp and the power supply is dumping the output capacitor, but that the power supply is

failing to sustain the discharge. The igniter is operating properly, the lamp or power supply are suspect.

d. No flash and no "snap" at all indicate the igniter or the power supply igniter circuitry is not working. The igniter itself, the cabling to the power supply or the drive circuitry in the power supply is at fault.
e. Depending on the test results, either the lamp housing or the power supply should be returned to Oriel for repair or replacement.

Lamp housing fan does not operate properly.

The lamp housing fan is driven by the lamp's operating temperature and does not start immediately when power is applied. The fan will run until the lamp has cooled off as long as the power supply is plugged in. In most cases, running the lamp housing without fan operation can be dangerous. Any malfunction of the fan circuit should be remedied immediately.

Recommended Procedure:

1. Check that the lamp housing cable is connected correctly and that the power supply is connected to an active mains and/or is turned on. If the fan still fails to operate properly, contact Oriel for further assistance.

Alternatively if the lamp housing fan continues to run indefinitely long after the lamp has cooled off, check that the thermistor cable is securely connected to the electronics panel inside the housing. If the fan still continues to operate, contact Oriel for further assistance.

5.2 Input Connector

Pin assignments for this connector are as follows:

Pin A1	Power to the bottom of the lamp. Negative voltage for Xe and Hg(Xe) lamps .
Pin A2	Power to the top of the lamp. Positive voltage for Xe lamps.
Pin 1	Ground for lamp housing circuitry
Pin 2	INTERLOCK (+). Connection to +12V required to enable Oriel power supply output. The lamp housing provides this connection through an interlock switch that is closed when the housing door is in place. Oriel power supply operation requires that both INTERLOCK (+) and INTERLOCK (-) be satisfied.
Pin 3	Power (+12V) for lamp housing circuitry (including fan)
Pin 4	Igniter Drive. A ground level (nominal) that activates the lamp ignition circuit in an Oriel lamp housing and the "boost" voltage in the power supply when the LAMP START button is pushed. Floating when button not pushed.
Pin 5	Interlock (-). Connection to GND required to enable Oriel power supply output. The lamp housing provides this connection through an interlock switch that is closed when the housing door is in place. An over temperature thermostat is included in the lamp housing circuit to break the interlock and disable the power supply if the housing temperature is too high. Oriel power supply operation requires that both INTERLOCK (+) and INTERLOCK (-) be satisfied.

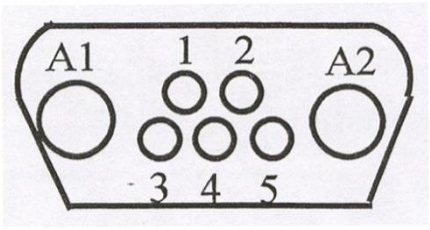

Figure 3 *Lamp Housing Connector Pin Assignment*

MATING CONNECTOR:

Body:	ITT# DAM-7W2S-A197 (includes pins 1-5)
Pins:	ITT# DM 53744-1 (requires 2 per connector, A1 and A2)
Backshell:	Standard 15-pin D-SUB

6 Specifications

6.1 Specifications for the LH300

- Output beam size: 27mm at 1m
- Optical Beam Height: 4 inches
- Lens transmittance wavelength range: 200 – 2500nm
- Light ripple: <1% rms
- Flange series size: 1.5 inch, Female
- Operating temperature: 15 – 400^{o}C
- Operating humidity: Non-condensing, up to 30%
- Operating Environment: Typical Laboratory Conditions or N2 purged (Argon purge not recommended)
- Storage Temperature & Humidity: 10 – 500^{o}C, non-condensing up to 45%
- Dimensions: 5.25 W x 7 D x 12 H (without base)
- Weight: 5.80 lbs. (2.63 kg) (6.55 lbs. total)
- Collimation angle: +/- 1 degree at 587 nm
- Lens material: UV Fused Silica
- Output beam Power: greater than or equal to 20mW*

  * measured at 550 nm through 10 nm FWHM bandpass filter

6.2 Specifications for the LHC300

- Average life: 900 hours
- Lamp Type: Xe, Ozone Free
- Lamp Current: 15 A
- Lamp voltage: 20 V
- Lamp wattage: 300 W
- Weight: 0.75 lbs. (0.34 kg)
- Dimensions: 4.125 W x 3.05 D x 7.5 H
- Storage Temperature & Humidity: 10 – 500C, non-condensing up to 45%
- Lamp warm up time: 1 hour
- Arc Gap: 2.6 mm

7 Warranty and Returns

7.1 Contacting Oriel

Thanks to a steadfast commitment to quality, innovation, hard work and customer care, Newport is trusted the world over as the complete source for all photonics and laser technology and equipment.

Founded in 1969, Newport is a pioneering single-source solutions provider of laser and photonics components to the leaders in scientific research, life and health sciences, photovoltaics, microelectronics, industrial manufacturing and homeland security markets.

Newport Corporation proudly serves customers across Canada, Europe, Asia and the United States through 9 international subsidiaries and 24 sales offices worldwide. Every year, the Newport Resource catalog is hailed as the premier sourcebook for those in need of advanced technology products and services. It is available by mail request or through Newport's website. The website is where one will find product updates, interactive demonstrations, specification charts and more.

To obtain information regarding sales, technical support, or factory service, United States and Canadian customers should contact Oriel Instruments directly.

Newport-Oriel Instruments
31950 E. Frontage Rd.
Bozeman, MT 59715 USA

Telephone: 877-835-9620 (toll-free in United States)
949-863-3144

Fax: 949-253-1680

Sales: sales@newport.com

Technical Assistance & Repair Service: https://www.newport.com/service-and-returns

Customers outside of the United States must contact their regional representative for all sales, technical support and service inquiries. A list of worldwide representatives can be found on Oriel's website: https://www.newport.com/b/oriel-instruments.

7.2 Request for Assistance / Service

Please have the following information available when requesting assistance or service:

- Contact information for the owner of the product
- Instrument model number (located on the product label)
- Product serial number and date of manufacture (located on the product label)
- Description of the problem

To help Oriel's technical support representatives diagnose the problem, please note the following:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Had this problem occurred before? Is so, when and how frequently?
- Can the system continue to operate with this problem or is it non-operational?
- Were there any differences in the application or environment before the problem occurred?

7.3 Repair Service

This section contains information regarding factory service for this product. The user should not attempt any maintenance or service of the system beyond the procedures outlined in this manual. This product contains no user serviceable parts other than what is noted in this manual. Any problem that cannot be resolved should be referred to Oriel.

If the instrument needs to be returned for service, a Return Material Authorization (RMA) number must be obtained prior to shipment to Oriel. This RMA number must appear on both the shipping container and the package documents.

Return the product to Oriel, freight prepaid and clearly marked with the RMA number. It will either be repaired or replaced at Oriel's discretion.

Oriel is not responsible for damage occurring in transit. The owner of the product bears all risk of loss or damage to the returned products until delivery at Oriel's facility. Oriel is not responsible for product damage once it has left the facility after repair or replacement has been completed.

Oriel is not obligated to accept products returned without an RMA number. Any return shipment received by Oriel without an RMA number may be reshipped by Newport, freight collect, to the owner of the product.

7.4 Non-Warranty Repair

For products returned for repair that are not covered under warranty, Newport's standard repair charges shall be applicable in addition to all shipping expenses. Unless otherwise stated in Newport's repair quote, any such out of warranty repairs are warranted for ninety (90) days from the date of shipment of the repaired product.

Oriel will charge an evaluation fee to examine the product and determine the most appropriate course of action. Payment information must be obtained prior to having an RMA number assigned. Customers may use a valid credit card, and those who have an existing account with Newport may use a purchase order.

When the evaluation has been completed, the owner of the product will be contacted and notified of the final cost to repair or replace the item. If the decision is made to not proceed with the repair, only the evaluation fee will be billed. If authorization to perform the repair or provide a replacement is obtained, the evaluation fee will be applied to the final cost. A revised purchase order must be submitted for the final cost. If paying by credit card, written authorization must be provided that will allow the full repair cost to be charged to the card.

7.5 Warranty Repair

If there are any defects in material or workmanship or a failure to meet specification, notify Oriel promptly prior to the expiration of the warranty.

Except as otherwise expressly stated in Oriel's quote or in the current operating manual or other written guarantee for any of the products, Oriel warrants that, for the period of time set forth below with respect to each product or component type (the "Warranty Period"), the products sold hereunder will be free from defects in material and workmanship, and will confirm to the applicable specification, under normal use and service when correctly installed and maintained. Oriel shall repair or replace, at Oriel's sole option, any defective or nonconforming product or part thereof which is returned at the buyer's expense to the Oriel facility, provided, that the buyer notifies Oriel in writing promptly after discovery of the defect or nonconformity and within the Warranty Period. Products may only be returned by the buyer when accompanied by a return material authorization number ("RMA number") issued by Oriel, with freight prepaid by the buyer. Oriel shall not be responsible for any damage occurring in transit or obligated to accept products returned for warranty repair without an RMA number. Buyer bears all risk of loss or damage to the products until delivery at Oriel's facility. Oriel shall pay for shipment back to the buyer for products repaired under warranty.

WARRANTY PERIOD

All products (except consumables such as lamps, filters, etc.) described here are warranted for a period of twelve (12) months from the date of shipment.

Lamps, gratings, optical filters and other consumables / spare parts (whether sold as separate products or constituting components of other products) are warranted for a period of ninety (90) days from the date of shipment.

WARRANTY EXCLUSIONS

The above warranty does not apply to products which are (a) repaired, modified or altered by any party other than Oriel; (b) used in conjunction with equipment not provided or authorized by Oriel; (c) subjected to unusual physical, thermal, or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling, alteration,

or tampering, or (d) considered a consumable item or an item requiring repair or replacement due to normal wear and tear.

DISCLAIMER OF WARRANTIES; EXCLUSIVE REMEDY
THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXCEPT AS EXPRESSLY PROVIDED HEREIN, ORIEL MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, SOFTWARE OR SERVICES. NEWPORT EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE FOR THE PRODUCTS, SOFTWARE OR SERVICES. THE OBLIGATIONS OF ORIEL SET FORTH IN THIS SECTION SHALL BE ORIEL'S SOLE LIABILITY, AND BUYER'S SOLE REMEGY, FOR BREACH OF THE FOREGOING WARRANTY. Representations and warranties made by any person including distributors, dealers and representatives of Oriel / Newport which are inconsistent or in conflict with the terms of this warranty shall not be binding on Oriel unless reduces to writing and approved by an expressly authorized officer of Newport.

7.6 Loaner / Demo Material

Persons receiving goods for demonstrations or temporary use or in any manner in which title is not transferred from Newport shall assume full responsibility for any and all damage while in their care, custody and control. If damage occurs, unrelated to the proper and warranted use and performance of the goods, recipient of the goods accepts full responsibility for restoring the goods to their original condition upon delivery, and for assuming all costs and charges.

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This manual has been provided for information only and product specifications are subject to change without notice.
Any change will be reflected in future printings.

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