

# Model IQE-LIGHT-BIAS

## IQE Light Biasing System



## User's Manual

**Oriel<sup>®</sup>**  
**INSTRUMENTS**  
A Newport Corporation Brand

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## 1 INTRODUCTION

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The IQE-LIGHT-BIAS kit is used with Oriel's IQE System when either white or colored biasing illumination is needed. The light biasing source is adjusted manually.

This kit provides a light source with adjustable intensity levels and the means to install up to three different colored filters when needed to bias a junction.

The kit includes an external quartz tungsten halogen light source, mounting flange, bifurcated fiber optic cable and filter holder. A wide selection of filters are available from Oriel to meet a variety of testing needs. These filters are purchased separately.

Prior to installation, read this instruction manual and all other documentation that came with this kit. Check to ensure that all parts have been included with the kit. If there are any questions or concerns, contact Oriel Instruments before installing this kit into the IQE system.

Included items:

- 66088 Light Source, with power cord and manual
- 90031273 Filter Assembly
- 77533 Bifurcated Fiber Bundle
- 77646 Focusing Beam Probe, with instruction sheet
- Mounting and Light Adapters
- 77371-2-2900 Filter Wrench

## 2 INSTALLATION

Read all included documentation to understand the handling and care required for each of the system's components prior to beginning the installation.

1. Place the fiber light source in a convenient location where the power cord can reach the electrical mains and the interface cord can reach the IQE system. This location must be less than 36 inches from the IQE System beam splitter assembly.
2. Attach the power cord to the fiber light source and complete all electrical connections.
3. Affix the filter assembly, minus the filter slide, to the front of the fiber light source by tightening the thumb screw.
4. Install the mounting adapter onto the bottom output port of the beamsplitter on the IQE system. When using with the IQE-200B system, it is necessary to first install the 71310 adjustable light shield on the V-flange output port of the system before installing the mounting adapter. Tighten the mounting adapter's (3) set screws [A] to hold it in place. Refer to Figure 1.
5. The mounting adapter assembly includes two holders where the bifurcated fiber bundle's legs are installed. Each holder is secured to the mounting adapter with a set screw. Loosen the set screws [B] so that the holders can swing freely. Refer to Figure 1.

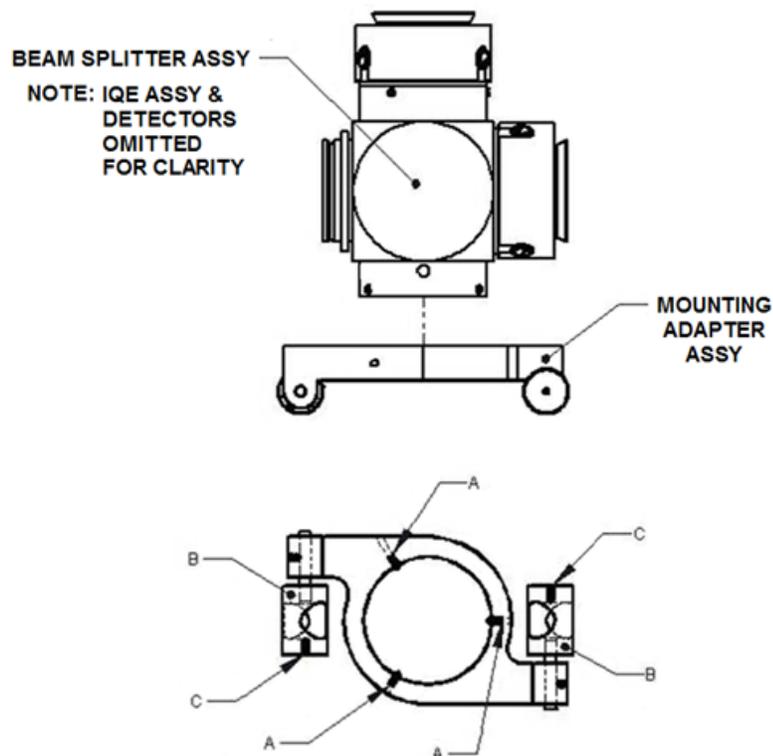
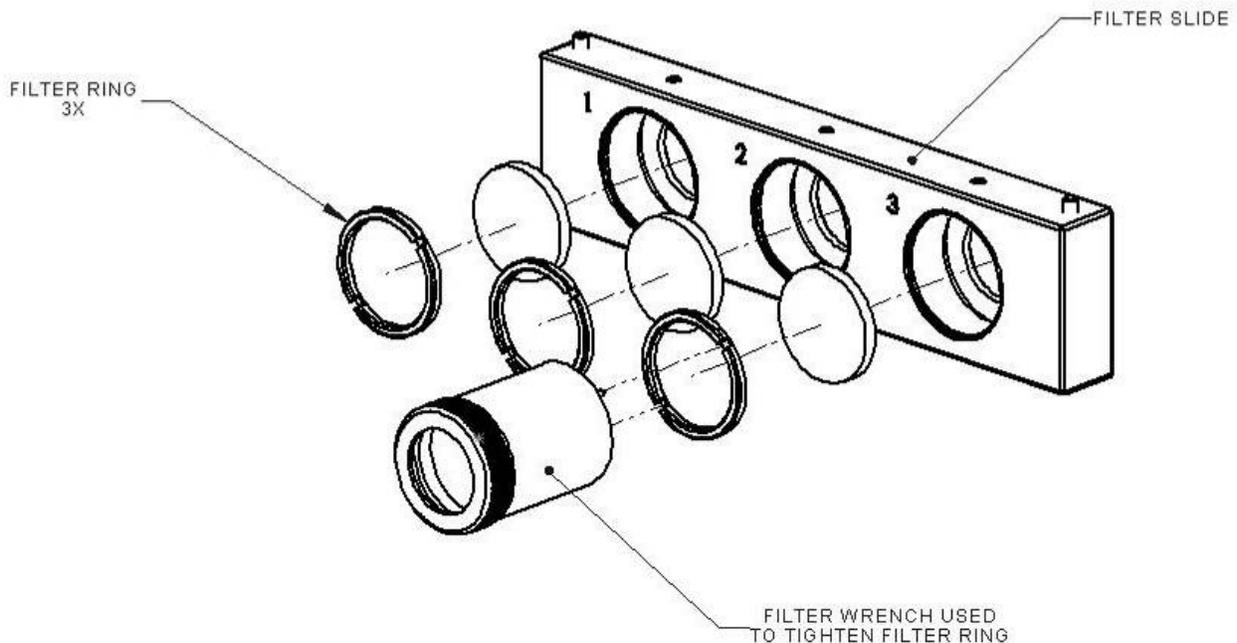


FIGURE 1: MOUNTING ADAPTER INSTALLATION

6. Install the optional colored filters into the filter slide as shown in Figure 2 using the filter wrench provided, or a spanner wrench, to tighten the retaining rings. Do not over tighten, as this will damage the filters.

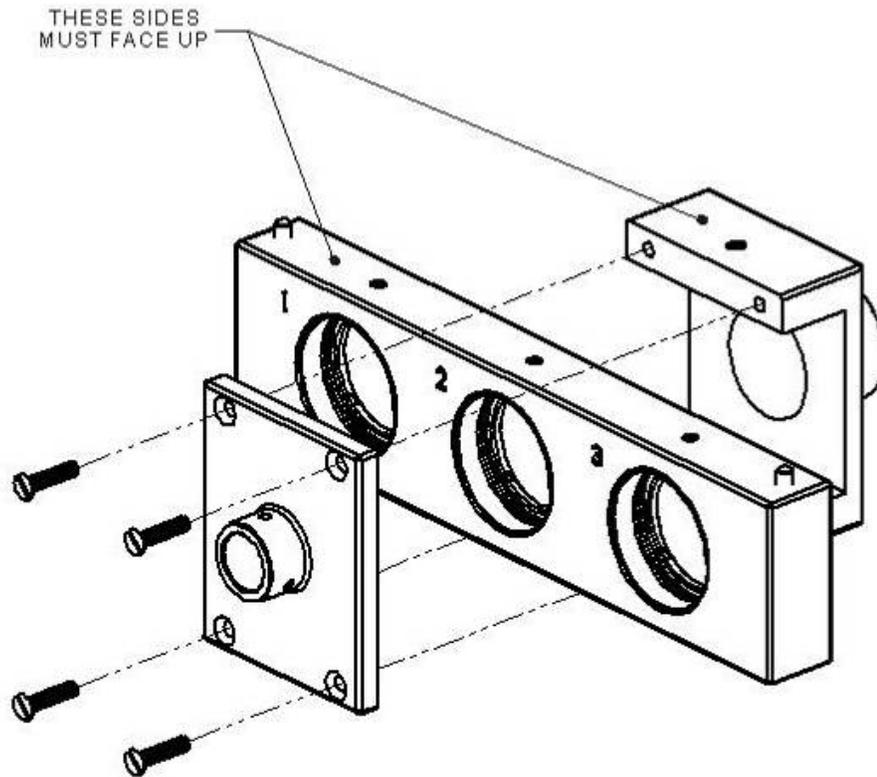
Note that the filter slide must have at least one of the filter locations left open (without a filter) when white light biasing is required. Leave the retaining ring installed so that it does not get misplaced.



**FIGURE 2: GLASS FILTER INSTALLATION**

7. Install the filter slide into the filter assembly, taking care that it is oriented exactly as shown in Figure 3. The filter slide must be installed even if only white light biasing is desired, to prevent light leakage.
8. Affix both 77646 beam probes onto the two legs of the 77533 fiber bundle. Refer to the instructions provided with the beam probes. Ensure that the set screws on the beam probe bodies are backed out far enough so as not to interfere with the fiber insertion and possibly cause damage to the end face.
9. Install the common end of the fiber bundle into the filter slide and tighten the retaining screws, after ensuring that the screws on the filter holder are backed out far enough so as not to interfere with the fiber insertion and possibly cause damage to the end face.
10. Install each leg with its beam probe into the mounting adapter holders. Tighten the set screws [C] as shown in Figure 1 to secure the fiber.

11. Ensure that the beam probes are not aimed at the eyes of any person. Then turn on the fiber light source and move the fiber holders on the mounting adapter until the desired light output onto the sample is achieved. Tighten the set screws to secure the holders in place.



NOTE: QTH LIGHT SOURCE NOT SHOWN FOR CLARITY

**FIGURE 3: FILTER HOLDER ASSEMBLY**

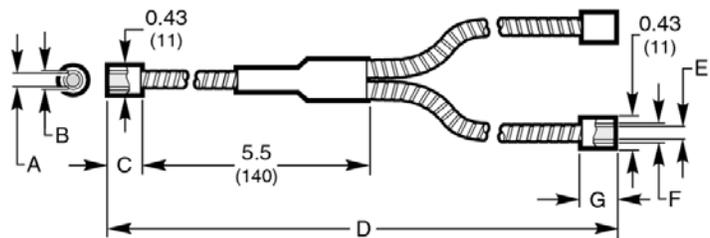
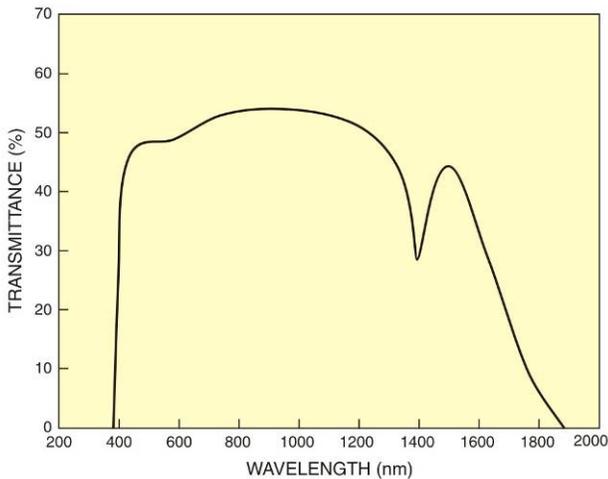
### 3 THE FIBER BUNDLE

The bifurcated glass fiber bundle included with the Light Bias Kit is comb randomized to produce evenly divided outputs. When light is uniformly focused onto the common end, each leg can transmit 43% of the total incident energy. The common end and the two legs are all terminated with standard Oriel 11 mm ferrules.

The fibers in the glass bundle are protected by an interlocking stainless steel sheathing. However, this bundle is sensitive to position changes. Changing the position of the common end or either leg will change the output beam distribution and power. To maintain consistent test conditions, avoid movement of the fiber after the light bias kit has been installed.

Care must be exercised when setting up and storing the glass bundle. Never touch the end faces of the fiber or allow them to be contaminated by dust or solvents. Incorrect handling will result in breakage of the glass fibers within the stainless steel sheathing and decreased light output. It is strongly recommended to save the original packaging for storage.

The minimum bend radius for this fiber bundle is two (2) inches. This bend radius should never be attempted for the first 3/4" after the termination. Minimum bend radius is defined as the smallest radius a fiber cable can bend before increased attenuation or breakage occurs, as measured from the inside curvature.



#### FIBER BUNDLE SPECIFICATIONS

Numerical Aperture	Acceptance Cone	Common Bundle Diameter Inch (mm) [A]	Common End Tip Diameter Inch (mm) [B]	Common End Tip Length Inch (mm) [C]	Total Length Inch (mm) [D]	Leg Bundle Diameter Inch (mm) [E]	Leg End Tip Diameter Inch (mm) [F]	Leg End Tip Length Inch (mm) [G]
0.56	68°	4.5 (114)	6.4 (163)	0.50 (12.7)	36 (914)	3.2 (82)	4.75 (121)	12.7 (323)

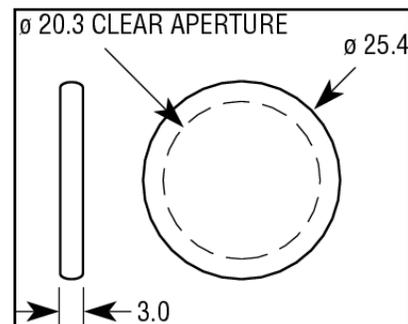
## 4 COLORED GLASS FILTERS

Oriel colored glass filters serve as broadband, band pass, or long-wave pass filters. A variety of Schott color glasses covering the visible and near-infrared wavelength regions are offered. These filters are precision polished for demanding research or OEM applications.

The light bias kit accepts 25.4 mm (1 inch) diameter filters. For easy identification, the filters are permanently labeled with the glass type. Transmission curves for each filter type listed, as well as additional filters, may be viewed at [www.newport.com/oriel](http://www.newport.com/oriel).

To prevent breakage, the glass filters must always be removed from the filter holder prior to transporting or shipping the light bias kit.

SPECIFICATIONS	
Material	Schott colored glass or equivalent
Clear Aperture	≥central 80% of dimensions
Surface Quality	60-40 scratch-dig
Dimensions	±0.3 mm
Thickness	3.0 ±0.1 mm
Wedge	≤3 arc min
Chamfers	0.25–0.76 mm face width x 45° ±15°
Angle of Incidence	0°
Damage Threshold	30 W/cm <sup>2</sup> CW, typical



SCHOTT GLASS DESIGNATIONS	
BG	Blue, blue-green, and multi-band glasses
GG	Nearly colorless to yellow glasses, IR transmitting
OG	Orange glasses, IR transmitting
RG	Red and black glasses, IR transmitting

COLORED GLASS FILTERS (25.4MM DIAMETER)					
Model	Glass	Description	Model	Glass	Description
FSR-BG18	BG.18	Blue Band pass	FSR-OG590	OG.590	Cut-on 590 nm
FSR-BG38	BG.38	Blue Band pass	FSR-RG610	RG.610	Cut-on 610 nm
FSR-BG39	BG.39	Blue Band pass	FSR-RG630	RG.630	Cut-on 630 nm
FSR-BG40	BG.40	Blue Band pass	FSR-RG645	RG.645	Cut-on 645 nm
FSR-GG420	GG.420	Cut-on 420 nm	FSR-RG665	RG.655	Cut-on 655 nm
FSR-GG435	GG.435	Cut-on 435 nm	FSR-RG695	RG.695	Cut-on 695 nm
FSR-GG455	GG.455	Cut-on 455 nm	FSR-RG715	RG.715	Cut-on 715 nm
FSR-GG475	GG.475	Cut-on 475 nm	FSR-RG9	RG.725	Cut-on 725 nm
FSR-GG495	GG.495	Cut-on 495 nm	FSR-RG780	RG.780	Cut-on 780 nm
FSR-OG515	OG.515	Cut-on 515 nm	FSR-RG830	RG.830	Cut-on 830 nm
FSR-OG530	OG.530	Cut-on 530 nm	FSR-RG850	RG.850	Cut-on 850 nm
FSR-OG550	OG.550	Cut-on 550 nm	FSR-RG1000	RG.1000	Cut-on 1000 nm
FSR-OG570	OG.570	Cut-on 570 nm			

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## 5 PRODUCTS FOR CARE AND MAINTENANCE

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As part of the Newport family of brands, Oriel Instruments is able to offer a variety of items needed for the care and maintenance of optics. The appropriate cleaning method varies according to the material and application for which it is being used. Some of the products available are listed below. For more products and information, please visit the Oriel Instruments website at [www.newport.com/oriel](http://www.newport.com/oriel).

- **DUST REMOVAL**

- LAB-16 Canned Duster, 10 oz. (300 ml)
  - LAB-15 Bulb Blower

- **PROTECTIVE BAGS**

- LAB-26 white polyester, 50.8 mm square, quantity 10, holds 25.4 mm to 38.1 mm diameter optics

- **OPTICS CLEANING TISSUE**

- LAB-28 Optics Cleaning Tissue, 4" x 6" (10.2 mm 15.2 mm), quantity 1000
  - LAB-10 Cotton Swabs, quantity 1000
  - LAB-11 Micro Absorbond™ Swabs by Texwipe, quantity 500

- **MATERIAL HANDLING**

- LAB-17 Hemostats
  - LAB-18 Precision Stainless Steel Tweezers
  - LAB-19 Soft-tip Precision Stainless Steel Tweezers
  - LAB-20 Teflon® Tweezers
  - LAB-01 Finger Cots, Small quantity 720
  - LAB-02 Finger Cots, Medium quantity 720
  - LAB-03 Finger Cots, Large quantity 720
  - LAB-04 Gloves, Small quantity 100
  - LAB-05 Gloves, Medium quantity 100
  - LAB-06 Gloves, Large quantity 100

## 6 REPLACEMENT PARTS

All items listed that come with the light bias kit may be purchased separately. Copies of all instructions can be provided. Additionally, the following replacement parts may also be purchased at any time from Oriel Instruments. For pricing and lead times, United States and Canadian customers should contact the Oriel Service Department. All other customer must contact their regional sales representative.

<u>ITEM</u>	<u>PART NUMBER</u>
Filter Holder Ring	244-6040-501
Filter Wrench*	77371-2-2900
Allen Hex Wrench, #1/16	90-11-042
Power Cord, U.S. plug to IEC320	70010
Power Cord, Europe plug to IEC320	70012NS
Other power cords	<i>Contact Oriel Instruments</i>
Quick Disconnect Lamp Socket	<i>Contact Oriel Instruments</i>
Nosepiece adapter for .43 OD fibers	77817
Lamp, QTH ZIV, 150W	6346

\*As an alternative to using the filter wrench, spanner wrench part number SW-OM may be ordered instead. The spanner wrench is adjustable so that it can be used for 6.35 mm to 50.8 mm diameter optics.

*NOTICE: if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.*

## 7 FIBER ILLUMINATOR SETUP

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### 7.1 VOLTAGE SELECTION

The 66088 illuminator has universal AC voltage input. Connect the appropriate AC line cord to the DC950 and connect to an AC power receptacle. The 66088 can operate with line voltages from 100 to 250 VAC and at 50 Hz. or 60 Hz..

### 7.2 FIBER OPTIC CONNECTION

**Notice:**

- Do not operate the illuminator without the fiber optic connected to the illuminator.
- Loosen the fiber optic nosepiece thumbscrew.
- Insert the fiber optic into the illuminator nosepiece.
- Tighten the thumbscrew by hand to make a secure connection to the fiber optic. ***Use of pliers or other tools is not recommended.***

## 8 FIBER ILLUMINATOR OPERATION

Insert the power cord into the power entry module at the rear of the illuminator. Next, insert the power cord into a 3 wire grounded AC power receptacle. **Use only approved power cord supplied with the illuminator.**

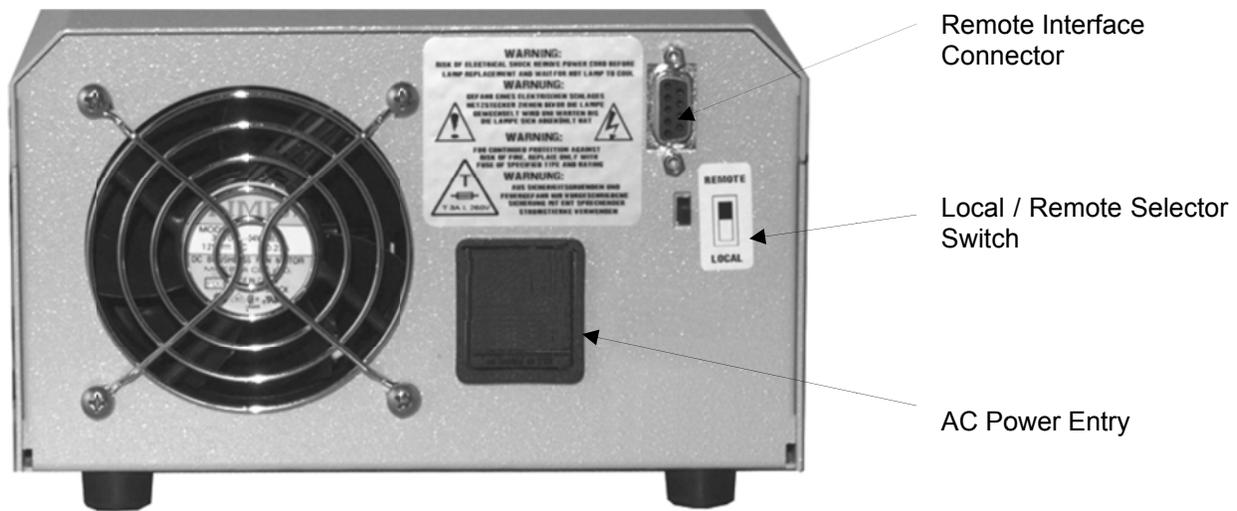
### 8.1 LAMP INTENSITY CONTROL

All the 66088 series illuminators are equipped with a front panel manual solid state intensity control and an external interface (9-pin, D style connector) for remote intensity control via a 0-5 VDC signal on the back panel.

### 8.2 MANUAL

The illuminator intensity is controlled by the rotary control located on the front panel of the illuminator. The 0 position (when control is turned fully counter-clockwise) corresponds to the lowest illuminator intensity. The 100 position (when control is turned fully clockwise) corresponds to the highest illuminator intensity.

*NOTE: Continuous operation of the illuminator at the highest intensity level may yield shortened lamp life. Operating the illuminator at reduced intensity can result in significantly extended lamp life.*



### 8.3 REMOTE INTERFACE

To enable the remote interface, move the LOCAL/REMOTE, located on the rear panel of unit, to the REMOTE position. When the switch is in the REMOTE position the front panel intensity control is not active. See Fig. B for the Pin Functions on the 9 Pin D-Sub connector. If the Remote Intensity Control Pin is not connected, the illuminator will run at the maximum intensity setting until the Remote Intensity Control Pin is connected.

## 8.4 REMOTE INTENSITY CONTROL

The Remote Intensity Control is located on Pin 3 of the Remote Interface. When the LOCAL/REMOTE switch is in the REMOTE position the intensity is controlled by the signal applied to Pin 3. NOTE: The front panel intensity control is deactivated in remote mode.

The input signal must be limited to a 0 to +5 volt DC signal. A negative voltage or a voltage in excess of 5 volts will cause the lamp to run at maximum intensity potentially shortening lamp life. The DC950 Remote Intensity control is highly linear. At 0 volts the lamp voltage is 0 volts. At +5 volts the lamp voltage is the maximum voltage for the lamp specified at the time the order was placed. A 2.5 volt input signal will cause the lamp to run at 50% of lamp voltage. Refer to Table A for intermediate values.

Pin 1 can be used to supply power to a remote potentiometer. Connect the potentiometer as shown in Figure C. The 500 ohm series resistor prevents shorting the power supply on Pin 1 if the potentiometer should fail as a short circuit. In all cases the minimum resistance between Pin 1 and common ground (Pins 2 and 7) must be at least 500 ohms to prevent damage to the Pin 1 power supply.

The user may also use a fixed voltage divider to control the illuminator at a non-varying intensity level. Refer to Figure E and the resistance values in Table A for sample resistor values and the corresponding lamp intensity levels. In all cases, the minimum total resistance value connected between Pin 1 and common ground (Pins 2 and 7) must be 500 ohms ( $R_A + R_B > 500$  ohms.)

The lamp power can be controlled via Pin 6, see Fig A. By connecting Pin 6 to a logic high (+5v) signal (Pin 1) the lamp power will be interrupted for as long as Pin 6 is connected to logic high. When the contacts connecting Pin 6 are opened, removing the +5v from Pin 6, the illuminator will return to the intensity level set by the signal connected to Pin 3 or to the intensity level set by the front panel control. The response time of the illuminator going from On to Off and Off to On is dependent on the thermal response of the lamp. The lag time of the lamp may be several hundred milliseconds from the time the Remote On-Off signal is applied to the time the lamp attains either the full On or full Off state. The response time of the power supply is less than 100 milliseconds.

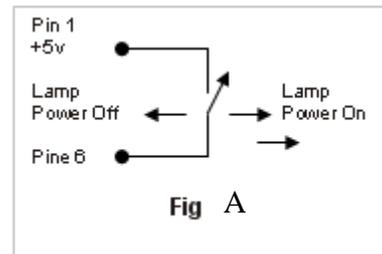


Fig A

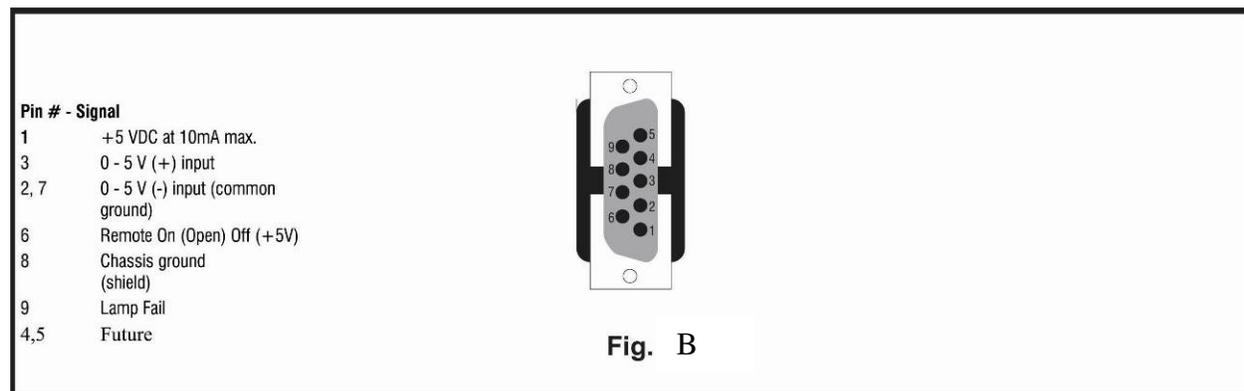
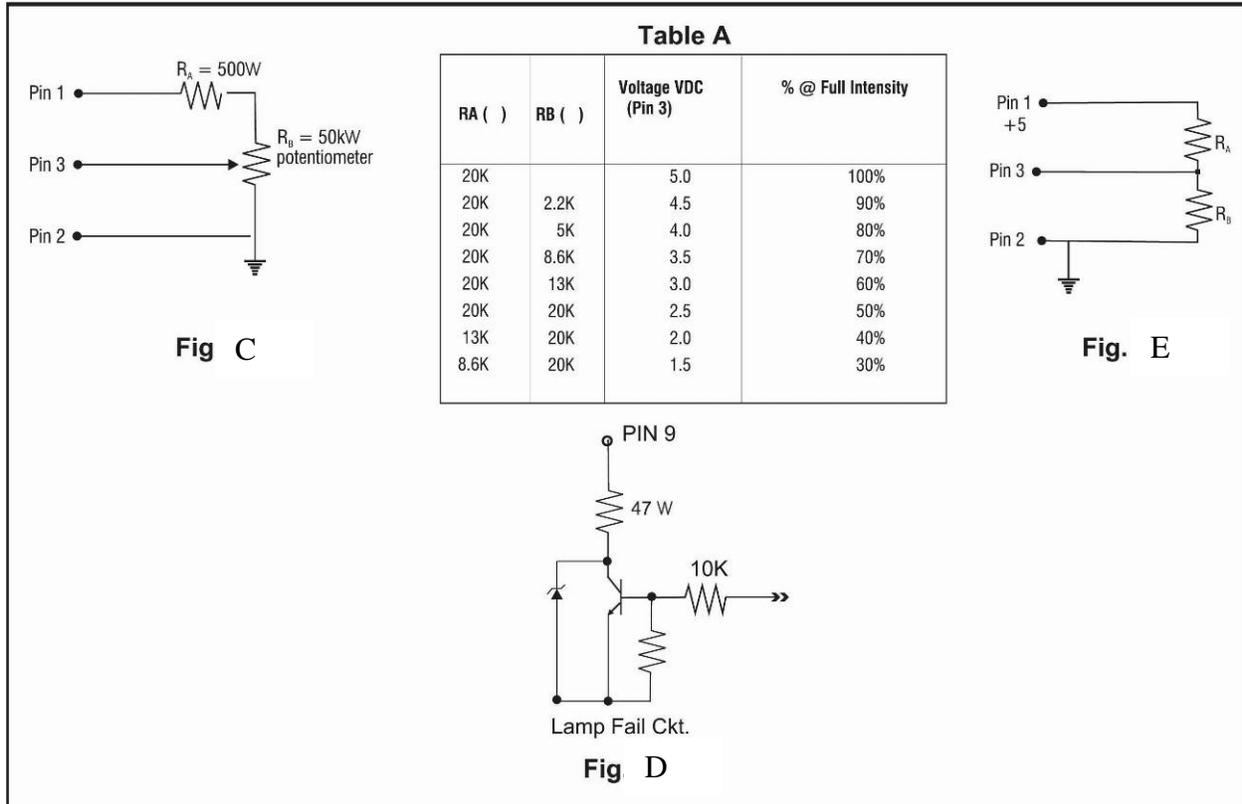


Fig. B



## 8.5 LAMP FAIL SIGNAL:

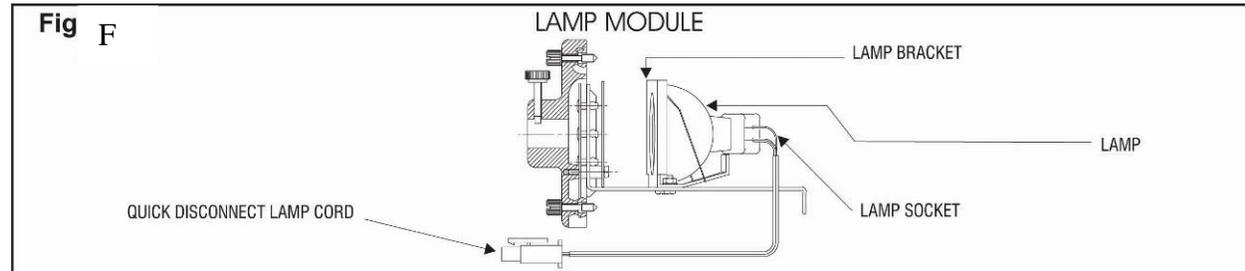
A signal indicating that the lamp has failed is available on Pin 9. This signal is open collector (see Fig D). The user must supply the necessary circuitry to connect the lamp out signal to a signaling device. The maximum current through the circuit is 10 mA. When the signal at Pin 9 is logic High(5v) the lamp has failed.

The Lamp Fail signal will detect if current has stopped flowing to the lamp while the intensity control signal is not at 0 volts, the illuminator On-Off switch is in the On position, and the Remote On-Off signal is in the On condition. The Lamp Fail signal will also indicate if the lamp is not properly seated after a lamp change, if the lamp power connector is not properly connected after a lamp change, or if the lamp socket was replaced.

## 9 FIBER ILLUMINATOR LAMP MODULE REPLACEMENT

**⚠ WARNING ⚠**  
**Risk of electrical shock.**  
**Remove power plug before lamp**  
**replacement and wait for**  
**hot lamp to cool.**

1. Turn the illuminator intensity control fully counterclockwise (the 0 position) and run the illuminator with the fan for several minutes. Wait until the nosepiece is cool to the touch. Press the ON(1)/OFF(0) rocker switch to the OFF(0) position.
2. Remove the AC line cord from the AC power receptacle.
3. Release lamp module from the power supply by turning both retaining screws counterclockwise using a straight blade screwdriver. *NOTE: Both retaining screws will be disengaged from the power supply, but will remain in place in the lamp module.*
4. Remove the lamp module from the front panel of the light source by slowly pulling outward.
5. Release the lamp module by unlatching the quick disconnect lamp cord. See Fig F.
6. Attach new lamp module by connecting the quick disconnect lamp cord.
7. Insert lamp module into power supply. Make sure lamp cord does not interfere.
8. Secure lamp module by tightening the (2) retaining screws
9. Reattach AC line cord and the illuminator is ready for service.



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## 10 FIBER ILLUMINATOR LAMP REPLACEMENT

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 **WARNING**   
*Risk of electrical shock.  
Remove power plug before lamp  
replacement and wait for  
hot lamp to cool.*

1. Follow steps 1-4 of Lamp Module Replacement.
2. Check the lamp assembly to verify that the lamp and socket are cool before proceeding.
3. Lift and remove the lamp from the lamp holder by grasping the rear of the lamp adjacent to the lamp socket.
4. Remove the lamp from the socket by holding the lamp socket and gently pulling the lamp reflector.
5. Discard the lamp.
6. Insert the replacement lamp into the lamp socket. *CAUTION: Do not touch the interior of the lamp reflector, the lamp envelope, or the lamp pins with your fingers. Touching the interior of the lamp reflector, the lamp envelope, or the lamp pins will result in significant shortening of the lamp life. Handle the lamp only by the exterior of the reflector or the area adjacent to the pins.*
7. Insert the replacement lamp and socket into the lamp holder.
8. Follow steps 7-9 of Lamp Module Replacement.

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## 11 FIBER ILLUMINATOR FUSE REPLACEMENT

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 **WARNING**   
*Replace the fuse with the correctly  
rated fuse as listed on the label  
on the back of the illuminator. Use of  
an improper fuse can create  
a hazardous situation.*

1. Press the ON(1)/OFF(0) switch to the OFF(0) position.
2. Remove the AC line cord from the AC power receptacle.
3. Remove the AC line cord from the power entry module at the rear of the illuminator. The fuse drawer is part of the power entry module. The drawer is located directly beneath where the AC line cord plugs in.
4. Pull out the fuse drawer. Remove the blown fuse that is positioned closest to the illuminator and discard. The second fuse is the spare.
5. Place the replacement fuse into the fuse drawer. The fuse should work in either orientation. The recommended fuse should be rated at 3.15 A, 250V, time delay, 5 x 20 mm.
6. Push the fuse drawer until it "clicks" into position.
7. Attach the AC line cord to power entry module at the rear of the illuminator. The illuminator is now ready for service.

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## 12 FIBER ILLUMINATOR SPECIFICATIONS

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F/#	F/1.1
Lamp Voltage	21 VAC, nominal; adjustable from 0 - 21 VAC
Lamp Input Power	150 W, nominal
Lamp Life	200 – 10,000 hours depending on intensity level
Color Temperature	3200° Kelvin at max. intensity
Light Output Regulation	±0.5% or better
Light Ripple	±6% pk. to pk.
Intensity Control	solid state 0-100%
AC Line Input	100/240 VAC, 50/60 Hz
Remote Intensity Control	0-5 VDC analog, optional 8-bit digital or RS232
Dimensions	7.25" x 9.50" x 4.6"
Weight	<15.0 lbs.
Approvals	UL/c-UL, CE

*NOTICE: if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.*

## 13 DECLARATION OF CONFORMITY

### EC DECLARATION OF CONFORMITY

Manufacturer's name: Newport Corporation

Manufacturer's address: 150 Long Beach Boulevard  
Stratford, CT 06615 USA

Declares that the product:

Product Name: IQE Light Biasing System

Model Number: IQE-LIGHT-BIAS

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

conforms to the following Product Specifications:

Safety: EN 61010-1:2010  
EMC: EN 61326-1:2006 +cor:2008 +cor:2010

complies with the following Directives:

2004/108/EC EMC Directive  
2006/95/EC Low Voltage Directive

and accordingly, carries the **CE** mark

**CE** mark affixed:

Beaune; 12/01/2010



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Stratford, CT 06615 USA



Bruno Rety Authorized to compile technical documentation  
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Zone Industrielle  
45340 Beaune la Rolande, France

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## 14 WARRANTY AND SERVICE

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### CONTACTING ORIEL INSTRUMENTS

Oriel Instruments belongs to Newport Corporation's family of brands. 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 Corp - 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: [Orielpv.sales@newport.com](mailto:Orielpv.sales@newport.com)

Repair Service & Technical Assistance: [Orielpv.service@newport.com](mailto:Orielpv.service@newport.com)

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: <http://www.newport.com/oriel>.

### 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? If 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?

## **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 Instruments.

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

Return the product to Oriel Instruments, freight prepaid, clearly marked with the RMA number and it will either be repaired or replaced it 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.

## **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 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 Corporation may use a purchase order.

When the evaluation had 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.

## **WARRANTY REPAIR**

If there are any defects in material or workmanship or a failure to meet specifications, notify Oriel Instruments 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 conform to the applicable specifications, 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 Buyer's expense to Oriel facility, provided, that Buyer notifies Oriel in writing promptly after discovery of the defect or nonconformity and within the Warranty Period. Products may only be returned by Buyer when accompanied by a return material authorization number ("RMA number") issued by Oriel, with freight prepaid by 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 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 or 3000 hours of operation, whichever comes first.

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 REMEDY, FOR BREACH OF THE FOREGOING WARRANTY. Representations and warranties made by any person including distributors, dealers and representatives of Oriel / Newport Corporation which are inconsistent or in conflict with the

terms of this warranty shall not be binding on Oriel unless reduced to writing and approved by an expressly an authorized officer of Newport.

**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.

First printing 2009

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Part No. IQE-LIGHT-BIAS