

Lumencor Light Engine Manual

LIDA Light Engine



Regulatory Models

Lumencor utilizes regulatory model names for all certified and CE marked products. The regulatory model names are traceable to all regulatory documentation, third party reports and certifications.

“**Regulatory Model: Lida**” is used as a representative model for all certified and CE marked Lida Products.

Emissions

This equipment has been tested and found to comply with the limits of EMC directive 2014/30/EU and FCC part 15 (CISPR 11:+A1:2016). These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Safety Certifications

TÜV SÜD America, CB Certification (IEC 61010-1:2010)

TÜV SÜD America, NRTLus Certification (UL 61010-1:2012/R:2016-04)

TÜV SÜD America, cNRTL Certification (CAN/CSA-C22.2 No. 61010-1:2012/U2:2016-04)

TÜV SÜD America, EN Certification (EN 61010-1:2010)

CE Marking

Low Voltage Directive (2014/35/EU)

EMC Directive (2014/30/EU)

RoHS Directive (2011/65/EU+2015/863/EU)

REACH Regulation (EC) No. (1907/2006/EC)

EU Declarations of Conformity can be found at <https://lumencor.com/company/compliance>



For EU customers discarding end-of-life Lumencor electrical and electronic equipment: Please submit an RMA request with “Recycle product under WEEE” in the Description of Issues field.

For disposal in countries outside of the European Union: This symbol is only valid in the European Union (EU). If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.

Lumencor Light Engines as supplied, and as represented in this manual, meet safety and regulatory requirements For Research Use Only. If the light engine is incorporated into an instrument or system for a specific end-use application, it is the responsibility of the system integrator to verify that the light engine, and the system into which it is incorporated, meet all safety and regulatory requirements of that end-use application.

Lumencor, Inc. | 14940 NW Greenbrier Parkway | Beaverton, OR 97006 USA | 503.213.4269 | www.lumencor.com

Revision B
011822

Table of Contents

- 1. Introduction**
- 2. Precautions and Warnings**
- 3. Installation and Operating Instructions**
- 4. Spectral Output**
- 5. Specifications**
- 6. Routine Maintenance and Troubleshooting**
- 7. Customer Support**
- 8. Warranty**

1. Introduction

Lumencor's LIDA light engine is a solid state light source for transmitted light microscopy. The light engine produces white light that is a composite of the outputs of individually controllable red, green and blue (RGB) solid state light sources. The LIDA light engine is intended for electronic control and operation via serial and TTL interfaces. Some control functions are also accessible from manual knobs on the light engine side panel. TTL triggering of the LIDA light engine can be done with three signal pulse trains enabling the red, green and blue sources in parallel or with one signal pulse train enabling the red, green and blue sources sequentially. Serial commands allow incremental attenuation of individual source output intensities. Each LIDA light engine incorporates a mounting adapter for direct coupling to the transillumination port of the microscope. Because there is no fan, the compact LIDA light engine is completely quiet and vibration free.

2. Precautions and Warnings {Précautions et mises en garde}

A few simple practices will ensure trouble-free operation for the life of the light engine.

Les quelques règles simples suivantes permettront d'assurer un fonctionnement fiable pendant toute la durée de service de la source lumineuse.

Safety Instructions:

Please read and follow all safety instructions provided **BEFORE** using your new LIDA light engine. Failure to comply with the safety instructions may result in fire, electrical shock, or personal injury and may damage or impair protection provided by equipment. Please save all safety instructions.

Instructions de sécurité:

Veiller à lire et à respecter toutes les instructions de sécurité fournies **AVANT** d'utiliser le nouveau LIDA afin d'écartier les risques d'incendie, de décharge électrique, de blessure corporelle et de possibles dommages ou défaillance de la protection offerte par l'appareil. Conserver toutes les instructions de sécurité.

Safety Definitions {Définitions relatives à la sécurité}:



Warning: Statements identify conditions or practices that could result in personal injury.

Avertissement: déclarations qui identifient des situations ou des pratiques susceptibles d'entraîner des blessures corporelles.

Caution: Statements identify conditions or practices that could result in damage to your equipment.

Attention: déclarations qui identifient des situations ou des pratiques susceptibles d'endommager le matériel.

Safety Items {Mesures de sécurité}:

Warning: DO NOT use an unapproved power supply. The Lumencor supplied 9V, 4.45A external power supply is required for use with the Lida light engine. It is imperative that the alternative power supply has output over-current protection, as the power input of the Lida is not fused. The DC power supply must have the AC power cord connected to a receptacle with a protective safety (earth) ground terminal.

Avertissement : NE PAS utiliser une alimentation électrique non homologuée. Le Lumencor fourni 9V, 4.45a alimentation externe est nécessaire pour une utilisation avec le moteur de lumière Lida. Il est impératif que le bloc d'alimentation de remplacement a une sortie protection contre les surintensités, comme l'entrée de puissance du Lida est pas fusionné. L'alimentation en courant continu doit avoir le cordon d'alimentation relié à une prise avec une sécurité de protection (terre) du sol.


Warning: DO NOT look into the output of the light engine. The brightness of this light source is higher than most commercial lighting fixtures and is required to couple directly into a microscope or other bioanalytical instrument.

Avertissement: NE PAS regarder directement la sortie de la source lumineuse. L'intensité lumineuse de cette source est supérieure à celle de la majorité des appareils d'éclairage disponibles dans le commerce et est conçue pour un raccordement direct à un microscope ou autre appareil de bioanalyse.

Warning: DO NOT turn on the light without the output safely directed into an enclosed optical path. DO NOT point the light output directly onto any flammable or burn-susceptible material. This includes all animal or vegetable tissues, plastics, fabrics, paper and liquids.

Avertissement: NE PAS allumer la lumière sans que la sortie ne soit dirigée de manière sûre dans un chemin optique inclus. NE PAS pointer la sortie de lumière directement sur tout matériau inflammable ou susceptible de brûler. Cela comprend tous les tissus, les plastiques, les tissus, le papier et les liquides animaux ou végétaux

RISK GROUP 3

	<p>RISK GROUP 3</p> <p>WARNING Possibly hazardous optical radiation emitted from this product. Do not look at operating lamp. Eye injury may result.</p> <p>Groupe de risque 3</p> <p>AVERTISSEMENT Ce produit émet un rayonnement optique potentiellement dangereux. Ne regardez pas la lampe lorsqu'elle est allumée. Des lésions oculaires peuvent en résulter.</p>
	<p>RISK GROUP 3</p> <p>WARNING IR emitted from this product. Do not look at operating lamp. Avoid eye exposure. Use appropriate shielding or eye protection.</p> <p>Groupe de risque 3</p> <p>AVERTISSEMENT Ce produit émet un rayonnement infrarouge. Ne regardez pas la lampe lorsqu'elle est allumée. Évitez toute exposition aux yeux. Utilisez un écran ou dispositif de protection oculaire approprié.</p>
	<p>RISK GROUP 3</p> <p>WARNING UV emitted from this product. Avoid eye and skin exposure to unshielded product.</p> <p>Groupe de risque 3</p> <p>AVERTISSEMENT Ce produit émet un rayonnement ultraviolet. Évitez d'exposer les yeux et la peau à un produit sans protection.</p>

Warning: Possibly hazardous optical radiation emitted from this product. Do not look at operating lamp. Eye injury may result.

Warning: Infrared (IR) emitted from this product. Do not look at operating lamp.

Warning: UV emitted from this product. Avoid eye and skin exposure to unshielded product.

GROUPE DE RISQUE 3

Avertissement: Infrarouge (IR) émise par ce produit. Ne regardez pas la lampe d'exploitation.

Avertissement: Rayonnement optique Peut-être dangereux émis par ce produit . Ne regardez pas la lampe d'exploitation. Une blessure oculaire peut entraîner.

Avertissement: UV émis par ce produit . Évitez les yeux et la peau exposition au produit non blindé.

Caution: DO NOT open the unit. There are no serviceable parts inside and opening the light engine enclosure will void the manufacturer's warranty.

Attention: NE PAS ouvrir l'appareil. Il ne contient aucune pièce réparable et l'ouverture de son boîtier a pour effet d'annuler la garantie.

Caution: DO NOT set liquids on the light engine. Spilled liquids may damage your light engine.

Attention: NE PAS placer de liquide sur la source lumineuse. Les liquides renversés peuvent endommager la source lumineuse.

Caution: DO NOT drop the light engine. It contains glass optical components that could be damaged or misaligned by the shock produced by a drop onto a hard surface.

Attention: NE PAS laisser tomber la source lumineuse. Elle contient des composants optiques en verre susceptibles d’être endommagés ou désalignés par le choc résultant d’une chute sur une surface dure.

DISCLAIMER: Lumencor shall not be liable for injury to the user or damage to the product resulting from the LIDA light engine being used in a way for which it was not intended and in complete disregard for any posted safety precautions and warnings.

AVIS DE NON-RESPONSABILITÉ: Lumencor décline toute responsabilité pour les blessures corporelles ou les dommages au produit résultant d’une utilisation du LIDA autre que celle prévue et du mépris total de les mesures de sécurité et mises en garde affichées.



Figure 1. LIDA light engine rear panel showing identification label, input receptacle for DC power supply, power indicator, USB connection to light engine Control POD (“external”) and TTL interface.

3. Operating Instructions

3.1 Contents

The LIDA light engine ships with the following list of standard components.

1. LIDA light engine configured with an output adapter for coupling to a specific microscope transillumination port.
2. A 9 V / 4.45 A DC power supply (Lumencor part no. 27-10017).
3. A region-specific AC power cord for the power supply (see AC Power Cords table).
4. A 6 ft USB A (M) to USB (A) M cable (29-10057) for serial connection to a light engine control pod or host computer. The model name and unique 4- or 5- digit serial number of the light engine are marked on a label affixed to the back panel (Figure 1).

Performance specifications for individual light engines are listed on the certificate of conformance included with the shipping documents e-mailed to the customer. It is important to retain the certificate of conformance for reference. In the event that the light engine is sold, the certificate of conformance should be transferred to the new owner.

AC Power Cords

Region	Part Number
North America	29-10002
Europe	29-10005
United Kingdom	29-10004
Israel	29-10008
Australia/New Zealand	29-10024

3.2 Installation

NOTE: Any end-product/system incorporating or coupled to a Lumencor Light Engine shall be fully evaluated to verify all applicable safety and regulatory compliance requirements prior to use.

When setting up the LIDA light engine, be sure that the adapter is securely attached to the appropriate illumination port of the microscope. Usually this will be the transmitted light port (Figure 2). Be careful to properly support the LIDA light engine until it is mechanically coupled to the instrument.

The LIDA light engine must be operated in a non-condensing environment (dew point <10°C with controlled ambient temperature <30° C). Restricting airflow around the unit will result in elevated operating temperatures and could result in decreased service life and/or premature failure.

With the manual control knob (Figure 3) in the OFF position, plug the DC power supply into the power connector at the back of the light engine (Figure 1). A green indicator light on the rear panel above the DC power input connector indicates that electrical power is being supplied to the light engine.

3.3 Operation: Manual Control

Warning: DO NOT turn on the light without the output safely directed into an enclosed optical path.

Avertissement: NE PAS allumer la lumière sans que la sortie ne soit dirigée de manière sûre dans un chemin optique inclus.

Take necessary precautions to protect yourself and others from the high intensity light when turning on the unit. The LIDA light engine should be coupled to a microscope before it is turned on. Two control knobs are located on the side panel (Figure 3). The CONTROL knob turns white light output on or off [1]. The yellow “light” indicator on the side panel alerts the user when the light output is on. In the “ext” position, control is transferred to the USB (“external”) port on the rear panel (Figure 1) for control pod (Section 3.4) or computer workstation (Section 3.5) operation. The INTENSITY control knob has four positions that set the light engine

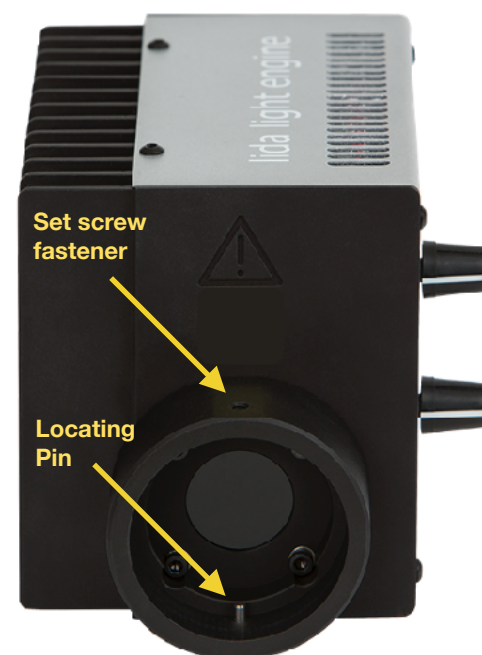


Figure 2. LIDA light engine with output adapter for coupling to Nikon Ti/Ni/Ci microscope transmitted light port.

to deliver approximately 10%, 25%, 50% and 100% of maximum output. There is no warm-up time; the light engine output stabilizes less than 1 second after the CONTROL knob is turned to the “on” position. Light output can be switched off during intervals when it is not required for active viewing or data collection.

Notes

[1] Manual controls do not allow selection of the individual red, green and blue component light sources. This functionality is accessed through the serial (Sections 3.4 and 3.5) or TTL (Section 3.6) interfaces.

3.4 Operation with Light Engine Control

Pod

1. Connect the USB A port of the light engine control pod accessory (83-10007) to the USB A port on the LIDA (Figure 1) using the USB A (M) to USB A (M) cable. If required, connect the USB B port of the control pod (Figure 4) to a USB A port on a host computer. Turn the control knob on the LIDA to the “ext” position. The main (0–100 analog intensity) display on the pod will illuminate, indicating that control line to the LIDA is active [1].
2. Press and hold the right button on the pod until a menu of light engines appears. Turn the rotary dial to select “LIDA” from the menu. Press the right button again to return to the main (0–100 analog intensity) display screen.
3. Press the left button to select the desired color channel. Successive presses will cycle through the available color channels.
4. Press the right button to turn the selected light source on. Adjust output intensity using the rotary dial. Press the right button again to turn the selected light source off.
5. Press and hold the left button to obtain digital output intensity settings for each color channel [2]. Press the right button to return main display screen.

Notes

[1] Electrical power to the pod is supplied from the LIDA via the USB connection.

[2] The current intensity settings are internally stored. When the pod is powered down, the settings are retained and will be restored at the next restart.

3.5 Color Imaging with Monochrome Cameras

The LIDA light engine can be integrated through Nikon NIS-Elements v4.51 and above to enable color imaging using monochrome cameras. Camera support for this application is limited to pco.edge, Nikon Qi2, Andor Neo/Zyla, and Hamamatsu ORCA Flash 4.0 models.

1. Connect the LIDA to the computer using a USB A to USB A cable.
2. Connect the GATE/SEQ lead of the LIDA breakout cable (Lumencor p/n 29-10081) to the synchronization TTL signal output by the camera via a



Figure 3. LIDA light engine manual controls

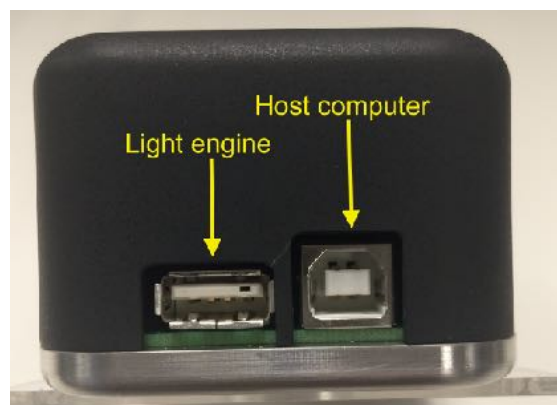


Figure 4. USB connectors on the rear of the light engine control pod.

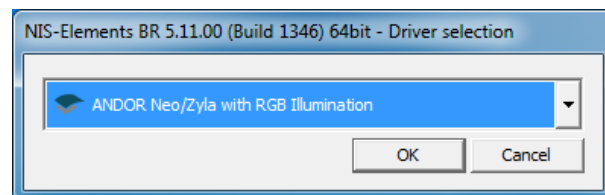


Figure 5. NIS Elements driver selection dialog.

BNC junction connector [1].

3. Turn the control knob on the LIDA light engine to the “EXT” position.
4. Open NIS-Elements and select the camera model with RGB illumination in the driver selection dialog box (Figure 5).
5. ”Go to Devices > Manage Devices > Add and select “Lumencor LIDA.” The serial port connection dialog box will appear. Select the COM port connected to the LIDA light engine [2].
6. Click “Configure Device” to open the Lida Configuration dialog. Select connection type USB + GATE/SEQ BNC (Figure 6) [3].
7. Go to View> Acquisition Controls > Lida Pad to display the light engine control settings (Figure 7).
8. Go to View > Acquisition Controls > Zyla Settings [4] to display the camera control settings (Figure 8).
9. Prior to beginning an acquisition, select “Color” in the camera settings and position the field of view over a blank portion of the slide. Click “Auto White” to automatically adjust the LIDA red, green and blue source intensities to render the background white.

In addition to Nikon NIS-Elements, several software packages provide serial control interfaces for the LIDA light engine:

- Hamamatsu HCI Image 4.3.1. and above
- MetaMorph 7.7.12 and above
- Micro-Manager 1.4.22. Instructions and driver download at <http://lumencor.go2scope.com/lida-virtual-rgb>.
- Lumencor GUI (Windows). Download from Lumencor’s [Control Software](#) page . This GUI provides light engine control only. It provides an alternative control interface for testing and troubleshooting the performance of other software packages.

Notes

[1] For Andor Neo/Zyla cameras, the synchronization TTL signal lead is labeled “FIRE”.

[2] If no connection is obtained, check that the control knob on the LIDA is in the “EXT” position and that the required virtual COM port (VCP) driver is installed on the computer. If the driver is not installed, it may be downloaded from the [Control Software](#) page

[3] Checking “Show temperature” will display the internal operating temperature of the LIDA on the LIDA Control Pad (Figure 7).

[4] Camera model according to selection made in step 4.

3.6 TTL Control

TTL provides light output on/off switching but not intensity control. However TTL signals elicit much faster responses than serial commands. To implement TTL control, turn the manual control knob to the “ext” position and apply control signals to the TTL input port on the rear panel (Figure 1). Individual TTL lines are provided for each color channel. These can be conveniently addressed using an accessory BNC breakout cable (Lumencor part no.29-10081; Figure 9). >+3.3 V “high” DC levels applied to the R, G or B BNCs trigger red, green or blue light source output. <+1.5 V “low” DC levels turn light sources off [1]. The default level is low (source = off). The fourth BNC (labeled “GATE/SEQ”) controls either a global electronic shutter function (“GATE”) or sequential triggering (“SEQ”) of the red, green and blue sources. GATE or SEQ mode selection is made by serial command from the GUI or other control software. The

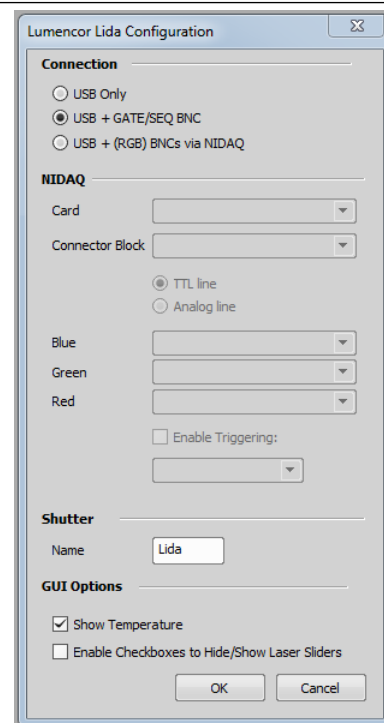


Figure 6. Lida Configuration dialog

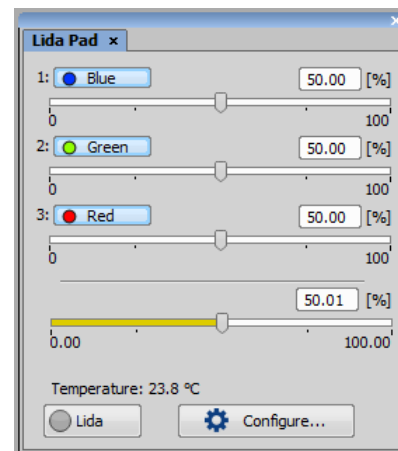


Figure 7. NIS Elements Lida control pad

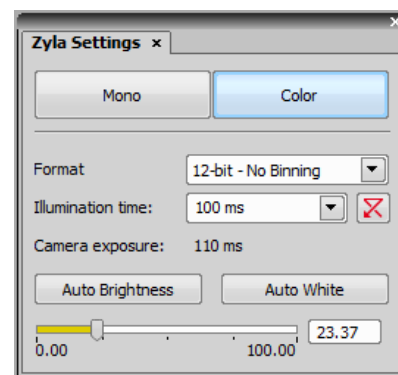


Figure 8. NIS Elements camera settings.

default mode is GATE. In gate mode, $>+3.3$ V “high” DC levels applied to the BNC initiates light output (shutter = open) from all active light sources. Light sources must first be activated by serial command or manual control. $<+1.5$ V “low” DC levels terminate light output (shutter = closed). The default level is high (shutter = open). In SEQ mode, $>+3.3$ V “high” DC levels trigger the red, green and blue sources (in that order; Figure 10). $<+1.5$ V “low” DC levels turn light sources off. The default level is low.

Notes

[1] TTL enables/disables and serial on/off commands have a logical OR relationship. Therefore on/off controls in the GUI or other serial control software must be set in the “OFF” state when using TTL triggering.

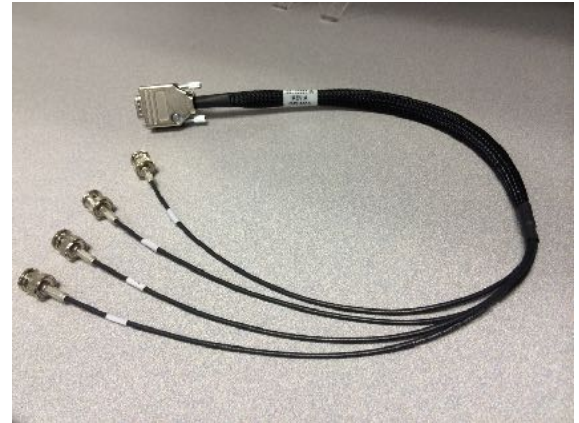


Figure 9. 4-Channel BNC Breakout Cable (29-10081)

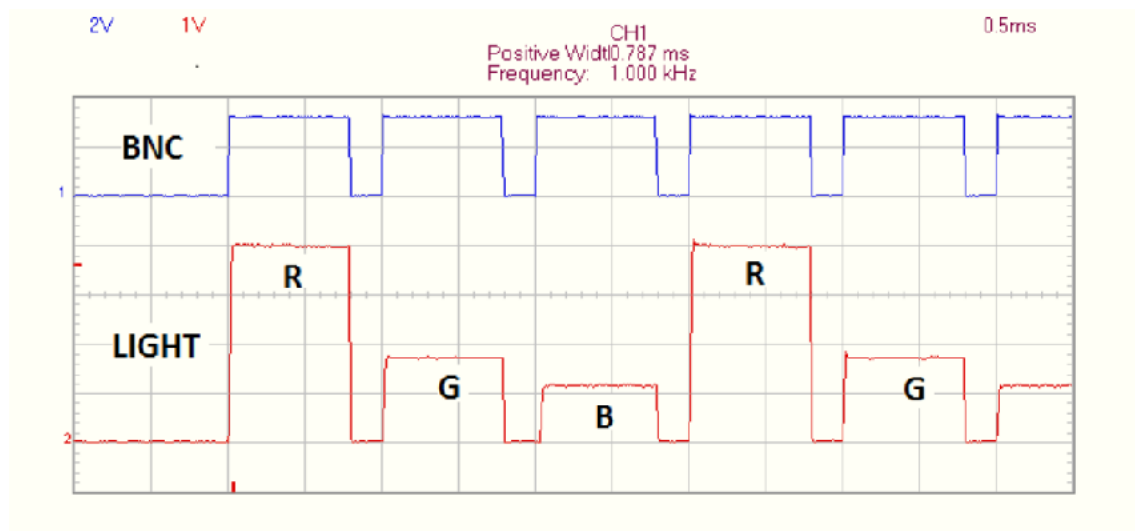


Figure 10. Sequential triggering of LIDA red (R), green (G) and blue (B) sources. The blue trace represents an input pulse train (1 kHz, 80% duty cycle) applied to the gate/seq lead of the 4-channel BNC breakout cable (29-10081) connected to the LIDA TTL port. The red trace represents the light output from the LIDA detected by an analog photodiode.

4. Spectral Output

The typical spectral output distribution of a LIDA light engine is shown below (Figure 11).

5. Specifications

LIDA light engines must be operated and stored within the environmental conditions specified. Performance specifications for individual light engines are listed on the certificate of conformance included with the shipping documents e-mailed to the customer. It is important to retain the certificate of conformance for reference. In the event that the light engine is sold, the certificate of conformance should be transferred to the new owner. Certificates of conformance are also recorded in Lumencor’s database and

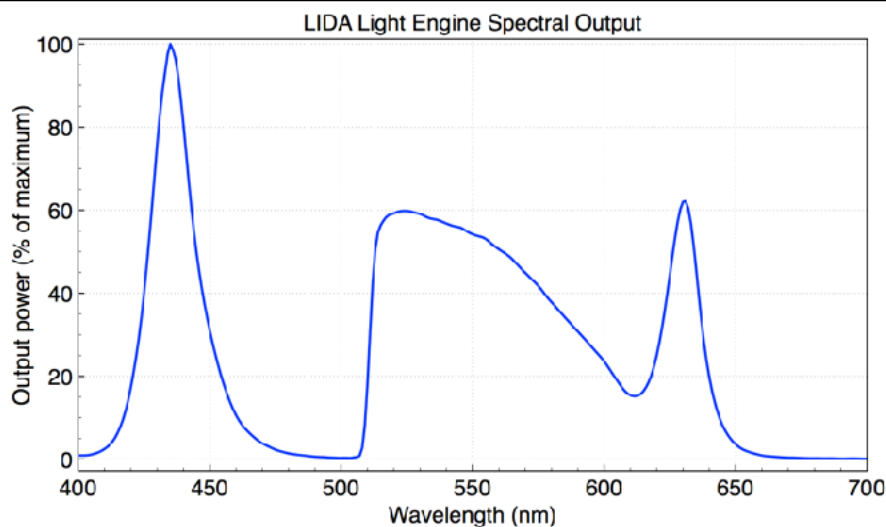


Figure 11. LIDA Light Engine spectral output distribution.

copies can be requested by e-mail to techsupport@lumencor.com. The request message must include the 4- or 5-digit serial number of the light engine.

Specification	Detail
Temperature	
Operating	32 to 95° F (0 to 35° C)
Non-operating	-4 to 158° F (-20 to 70° C)
Humidity	
Operating and non-operating	0 to 80% relative humidity, non-condensing
Altitude	
Operating	0 to 10,000 feet (3,048 meters)
Non-operating	0 to 45,000 feet (13,176 meters)
Dimensions	
Size (WxLxH)	4.25 in x 6.0 in x 4.25 in / 10.5 cm x 15 cm x 10.5 cm
Weight	3.3 lb / 1.5 kg
Operation	
Lifetime	Time for the light engine output to decrease to 70% of the values recorded on the original certificate of conformance [#]
Optional Accessories	4-Channel BNC Breakout Cable (29-10081); Light Engine Control Pod (83-10007)
Input Power Requirements	9 VDC / 4.45 A, 40 W maximum, power supply included
Power consumption	16 W (R, G and B sources at 100% intensity)
Switching Speed	On/Off rate up to 100 Hz

Specification	Detail
Warm-up Period	1 s
Protection	IP Rating of X0
Sound Level	Sound Level at 1 m = 0 db(A)
Connections	one USB A for serial control from light engine control pod or computer workstation, one DB15HD connector for TTL control
Warranty	36 months parts and labor for end users
# the corresponding number of days/months/years may vary considerably depending on the duty cycle implemented by the user and the prevailing environmental conditions during operation.	

6. Routine Maintenance and Troubleshooting

Remove any built-up dust or accumulation on the case vent holes. A vacuum may be used to remove debris so that a steady supply of air is available for cooling. It is recommended that the vent holes be cleaned by a gentle suction device at least every 6 months and more often in dusty or smoke-filled environments.

There are no user-replaceable components or sub-assemblies inside LIDA light engines. Opening the light engine enclosure will void the manufacturer's warranty. In the event that the light engine fails to perform in accordance with the specifications listed on the certificate of conformance, please contact Lumencor Technical Support for assistance, as directed in Section 7.

7. Customer Support

For technical support of the LIDA light engine, please contact Lumencor by phone at 503.213.4269 or via e-mail at techsupport@lumencor.com. Please be prepared to provide the 4- or 5-digit serial number of the light engine (see Figure 1), a description of the problems encountered and information on the usage context (e.g. what microscope and what control software is being used). This information will help to determine whether the problems can be resolved in situ by adjustments to the system configuration, or whether a fault has developed in the light engine that requires its return to Lumencor's facility in Beaverton, Oregon for evaluation and, if necessary, repair. Any light engine return to Lumencor for service or repair requires a material authorization (RMA) number. To request an RMA number, fill out and submit the [online request form](#). It is the customer's responsibility to properly package and safely ship products to Lumencor. Instructions for shipping will be provided in the e-mail giving notification of the RMA number.

8. Warranty

LIDA light engines come with a 36 month warranty, starting on the original date of shipment from Lumencor. Light Engines qualifying for warranty service must be verifiably delivering performance that is substantially at variance with the levels documented on the certificate of conformance. The light engine must also have been used and maintained under operating conditions consistent with the specifications given in Section 5, and observing all the Precautions and Warnings notified in Section 2 of this manual. This warranty does not extend to light engines that have been subject to misuse, accident, tampering or improper installation. Accessories including (but not limited to) liquid light guides, optical fibers, collimators, cables and control consoles are not covered by the warranties attached to light engines. Please fill out and submit the [online warranty registration form](#). This will facilitate provision of warranty service should it be required.