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. 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
TUV SUD America, CB Certification (IEC 61010-1:2010)
TUV SUD America, NRTLus Certification (UL 61010-1:2012-05)
TUV SUD America, cNRTL Certification (CAN/CSA-C22.2 No. 61010-1:2012)
TUV SUD 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)
REACH Regulation (EC) No. (1907/2006/EC)

EU Declarations of Conformity can be found at www.lumencor.com/company/regulatory-compliance

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Document Number 57-10005, Rev. A
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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 trains enabling the red, green and blue sources in parallel or with one signal 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’écarter 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 regarde 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 end of the light guide safely directed into an enclosed optical path.

**Avertissement** : NE PAS allumer la lumière sans l’extrémité de sortie du guide de lumière dirigée en toute sécurité dans un chemin optique fermé.

**RISK GROUP 3**

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

**Warning**: UV emitted from this product. Avoid eye and skin exposure to light output.

**GROUPE DE RISQUE 3**

**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 chassis and opening the light engine enclosure will void the manufacturer’s warranty. Changes or modifications not expressly approved by Lumencor void the user’s authority to operate the equipment.
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. Les changements ou modifications non approuvés expressément par Lumencor annuler l'autorité de l'utilisateur à faire fonctionner l'équipement.

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 all 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 toutes les mesures de sécurité et mises en garde affichées.

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 6 ft AC power cord for the power supply (for North American customers, Lumencor part number 29-10002, for UK customers, Lumencor part number 29-10004 and for European customers, Lumencor part number 29-10005).
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

<table>
<thead>
<tr>
<th>AC Power Cords</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Region</strong></td>
</tr>
<tr>
<td>North America</td>
</tr>
<tr>
<td>Europe</td>
</tr>
<tr>
<td>United Kingdom</td>
</tr>
<tr>
<td>Israel</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
</tr>
</tbody>
</table>
3.2 Installation

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 should be operated in an open area where airflow facilitates proper cooling. 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. 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

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 4) 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 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.
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 4) using the USB A (M) to USB A (M) cable. If required, connect the USB B port of the control pod (Figure 5) 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 the 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 the 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 to the 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 Serial Control from Computer Workstation

1. 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
- Nikon Elements 4.5.1 and above

2. Connect the USB A (M)-to-USB A (M) cable between the computer and the USB A (“external”) port on the LIDA (Figure 4).

3. Connect the DC power supply to the LIDA.

4. Turn the control knob on the LIDA to the “ext” position.

5. Successful connection is indicated by the appearance of “USB Serial Port (COM #)” under the “Ports (COM &LPT)” tab in the Windows Device Manager. If the virtual COM port (VCP) is not registered by the operating system, download and install the VCP driver from http://lumencor.com/resources/documentation-software/?section=S1.

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 4). 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 6). >+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 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

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Figure 6. 4-Channel BNC Breakout Cable (29-10081)
(shutter = open). In SEQ mode, >+3.3 V “high” DC levels trigger the red, green and blue sources (in that order; Figure 7). <+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.

4. Spectral Output

The typical spectral output distribution of a LIDA light engine is shown below (Figure 8)

Figure 7. 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.

Figure 8. LIDA Light Engine spectral output distribution.
5. Specifications

LIDA light engines must be operated and stored within the environmental conditions specified.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>32 to 95°F (0 to 35°C)</td>
</tr>
<tr>
<td>Non-operating</td>
<td>-4 to 158°F (-20 to 70°C)</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td></td>
</tr>
<tr>
<td>Operating and non-operating</td>
<td>0 to 80% relative humidity, non-condensing</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>0 to 10,000 feet (3,048 meters)</td>
</tr>
<tr>
<td>Non-operating</td>
<td>0 to 45,000 feet (13,176 meters)</td>
</tr>
<tr>
<td><strong>Dimensions (WxLxH)</strong></td>
<td>4.25 in x 6.0 in x 4.25 in / 10.5 cm x 15 cm x 10.5 cm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>3.3 lb / 1.5 kg</td>
</tr>
<tr>
<td><strong>Input Power Requirements</strong></td>
<td>9 VDC / 4.45 A, 40 W maximum, power supply included</td>
</tr>
<tr>
<td>Power consumption</td>
<td>16 W (R, G and B sources at 100% intensity)</td>
</tr>
<tr>
<td><strong>Switching Speed</strong></td>
<td>On/Off rate up to 100 Hz</td>
</tr>
<tr>
<td>Warm-up Period</td>
<td>1 s</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td>IP Rating of X0</td>
</tr>
<tr>
<td><strong>Sound Level</strong></td>
<td>Sound Level at 1 m = 0 db(A)</td>
</tr>
<tr>
<td><strong>Connections</strong></td>
<td>one USB A for serial control from remote r console, one DB15HD connector for TTL control</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>36 months parts and labor for end users</td>
</tr>
</tbody>
</table>

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 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.
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 obtain a RMA number, submit the online request form at http://lumencor.com/support/lumencor-rma-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

The LIDA light engine comes with a 36-month warranty, starting on the original date of shipment from Lumencor. Please fill out and submit the online warranty registration form. This will facilitate provision of warranty service should it be required. 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.