AURA Light Engine®

Instruction Manual

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: Aura II**" is used as a representative model for all certified and CE marked Aura II 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 http://lumencor.com/company/regulatory-compliance/

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Document Number 57-10007, Rev. A

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1. Introduction

Lumencor AURA light engines are designed for laboratory use by bioanalytical researchers and/or developers of bio-optical instrumentation. The AURA provides 2, 3, 4, or 5 individually controllable solid state light sources that have been optimized to produce spectrally discrete outputs. This manual covers all AURA II models identified by the designation **Regulatory Model: AURA II** on the identification label affixed to the back panel of the light engine (Figure 1).

The light sources within the AURA are controlled by a serial command interface connecting to the Lumencor light engine control pod accessory (83-10007) or a computer running a Lumencor supplied GUI or a third party microscopy software application. Alternatively, the light sources may be enabled by TTL inputs from a trigger device such as a camera. The user can enable or disable each source independently (serial or TTL) and change the intensity of each source independently (serial only). The only manual control is a power switch on the front panel to turn on/off the electrical power supply to the unit. A green indicator above the power switch is lit when the power supply is connected to the AURA and the power switch is in the on position (see Figure 3, below).

Figure 1. Model and serial number identification label on the AURA light engine rear panel.

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 AURA. 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 AURA 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: ONLY use the power supply provided by Lumencor. The Lumencor-supplied 24 VDC, 9.2 A external power supply is required for use with the AURA light engine. It is imperative that the DC power supply has output over-current protection, as the power input of the AURA 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: utiliser uniquement l'alimentation fournie par Lumencor. Le Lumencor fourni 24 VDC/9.2 A alimentation externe est recommandé pour une utilisation avec le moteur de lumière AURA. Il est impératif que l'alimentation DC a la sortie protection contre les surintensités, que la puissance de l'AURA est pas fusionné. L'alimentation DC doit répondre aux exigences d'un circuit courant limité par la clause 9.4 de la IEC 61010-1 3rd ed. Branchez le cordon d'alimentation à une prise avec une sécurité de protection (terre) borne de terre.

Warning: DO NOT stare into the output of the light engine. The brightness of this light source is higher than most commercial lighting fixtures and is intended to couple directly into a microscope or other bioanalytjcal 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 end of the light guide 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 l'extrémité de sortie du guide de lumière dirigée en toute sécurité dans un chemin optique fermé. NE PAS pointer la sortie de lumière directement sur un matériau susceptible d'être 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

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 unshielded product.

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

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.

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

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 connect a video cable to the TTL input enable port. Although the connector might look compatible, this input is not intended to be driven by a video signal.

Attention: NE PAS raccorder un câble vidéo au port d'activation d'entrée TTL. Bien que le connecteur puisse paraître compatible, cette entrée n'est pas conçue pour être contrôlée par un signal vidéo.

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 AURA 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 AURA autre que celle prévue et du mépris total de toutes les mesures de sécurité et mises en garde affichées.

3. Installation and Operating Instructions

All AURA family light engines ship with the following list of standard components:

1. AURA light engine, configured with three, four or five solid-state light sources (color channels). The output of each source is refined by a bandpass filter. Bandpass filters are installed to order according to customer specifications and are not user-exchangeable. The filter configuration for each AURA light engine is shown on the certificate of conformance issued to the customer when the light engine is shipped by Lumencor (Figure 2).
2. A 24V/9.2A (220 W) DC power supply (Lumencor part no. 27-10019)
3. A 6ft AC power cord for the power supply (for North American customers, Lumencor part no. 29-10002, for UK customers, Lumencor part no. 29-10004 and for European customers, Lumencor part no. 29-10005).
4. A USB A-to-RS232 cable (Lumencor part no. 29-10011) **or** USB B (M) to USB A (M) cable (Lumencor part no. 29-10058)

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Certificate of Conformance

Performance Measurements For Lumencor Light Engine S/N 7101

Color Channel	Bandpass Filter	Power (mW)
Violet	395/25	519
UV	377/54	481
Green	560/32	426
n/a	n/a	n/a
Cyan	485/25	228
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
	Total Power:	1654

SPECIMEN

COC Output Adapter: 3 mm LLG - A

Measurement Method

This product was measured using the custom output adapter installed on the light engine. The output power was directed at a Coherent thermopile sensor head, model number PM10, S/N 4168J13R attached to a Coherent FieldMax®-TO Power Meter, S/N 4183J13R. The measurement system was calibrated on Dec 18, 2014. The meter scale was set to average mode and the meter zeroed for each measurement. Measurements were taken at room temperature and at initial turn-on (t=0).

Lumencor Build Recipe: Aura II-NII-4X-A1

Lumencor Part Number: 90-10144 Rev. A

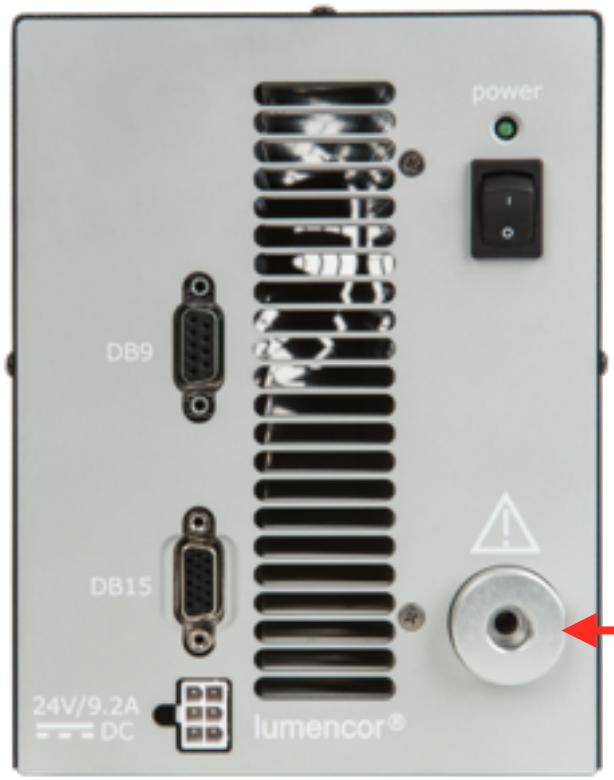

Figure 3. Aura Light Engine front panel.
DB9 = Serial communication receptacle for RS-232-to-USB cable (replaced by USB B on some models). DB15 = Receptacle for TTL breakout cable. Lower left (24V/9.2A DC) = Input from DC power supply. Top right: Electrical power on/off switch with green indicator LED above. Lower right: Light output port with receptacle for 3 mm diameter liquid light guide.

AURA light engines incorporate fan-assisted air cooling. When positioning the AURA for use, place the unit on a hard surface and avoid blocking or restricting airflow at the air intake (front panel) and exhaust (rear panel) ports. Restricting the airflow will cause the unit to operate at elevated temperatures and will result in decreased operating lifespan and/or premature failure.

AURA light engines may be configured for light delivery via a 3 mm liquid light guide or an SMA-terminated optical fiber. The output couplers are built into the light engine front panel and are not field-exchangeable (Figure 3). The 3 mm liquid light guide output coupler incorporates an electrical power interlock switch in the back of the receptacle. The liquid light guide must be fully inserted in the receptacle to activate the interlock. Electrical power supply to the light engine cannot be turned on via front panel power switch until the interlock is activated. After fully inserting the liquid light guide, lock it in position using the set screw on the side of the receptacle to prevent inadvertent disconnection of the light guide during use.

The AURA can be controlled via serial commands delivered through the RS-232 port from the Lumencor light engine control pod accessory (83-10007), a Windows GUI (free download from www.lumencor.com) or via customer-supplied instrumentation control software. Serial commands provide controls for on/off switching and intensity adjustment (0 to 100% in 1% increments) of individual color channels. Refer to Figure 3 for the location of the various connectors. TTL signals delivered to the DB15 connector (Figure 3) provide high speed (10 µs) on/off switching of individual color channels.

3.1 GUI Installation and Operation

1. Operation and installation of the AURA GUI requires a computer running the Windows operating system with a free USB port.
2. Download the zip file for the AURA GUI from http://lumencor.com/resources/documentation-software/.
3. Unzip the file and run setup.exe to install the AURA GUI.
4. Connect the USB-to-RS-232 cable between the computer and the DB9 RS-232 port on the AURA (Figure 3) [1].
5. Successful installation 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/.
6. Connect the DC power supply to the AURA.
7. Check that the liquid light guide is fully inserted and locked in the front panel receptacle (Figure 3).
8. Toggle the power switch on the front panel to the ON position. The green LED above the switch (Figure 3) should light.
9. Run the GUI by going to the Program Menu and selecting LLE Controller.
10. In the COM pulldown menu (GUI window, upper left), select COM # assigned to USB-Serial port.
11. Press the “INIT” button in the GUI
12. The computer should now have control of the AURA. Graduated sliders control the source output intensity for each color channel. ON/OFF buttons for each color channel are located below the respective slider controls [2, 3].

Notes

[1] On some AURA models, the port is USB B and the connecting cable is USB B (M) to USB A (M).
[2] The identity of the source outputs corresponding to control channels 1–5 differs among AURA light engine models. If you are unsure of the correspondence, please contact our Technical Support Group (see Section 7). Please provide notification of the serial number of your AURA light engine with your inquiry.
[3] Two luminescent light pipe sources (e.g. Green and Yellow, Figure 5A) cannot be ON simultaneously.

3.2 Light Engine Control Pod Interface

1. Connect the USB A port of the light engine control pod accessory (83-10007) to the DB9 port on the AURA (Figure 3) using the USB-to-RS-232 cable (29-10011) [1]. Connect the USB B port of the control pod to a USB A port on a host computer. For applications not requiring a host computer, connect a DC power supply (5V/ 500mA) to the USB B port. Press and hold the **right** button on the pod until a menu of light engines appears.

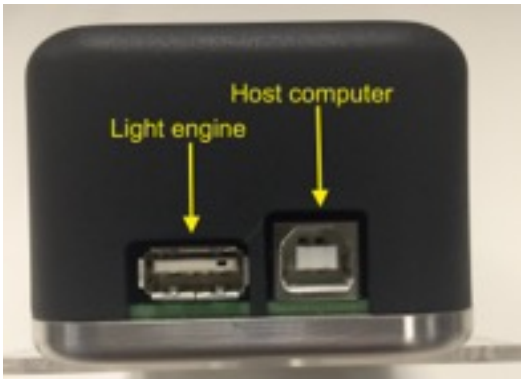

Figure 4. USB connectors on rear of the light engine controller pod

Turn the rotary dial to select "AURA" from the menu. Press the right button again to return to the main (0–100 analog intensity) display screen.

2. Press the **left** button to select the desired color channel. Successive presses will cycle through the available color channels.
3. Press the **right** button to turn the selected light source on. Press the **right** button again to turn the selected light source off. Adjust the output intensity using the rotary dial [2,3].
4. Press and hold the **left** button to obtain digital output intensity settings for each color channel [4]. Press the **right** button to return to the main display screen.

Notes

[1] On some AURA models, the port is USB B and the connecting cable is USB B (M) to USB A (M).

[2] Output intensity can be set from 0–100% in 1% increments; however operation in the 0–5% range is not recommended.

[3] Dialing intensity to zero automatically issues an OFF command to the light engine. Press the **right** button to turn the light output on again.

[4] 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.

3.3 TTL Interface

The TTL Interface provides users with a faster method of switching color channel outputs on and off. Individual TTL lines are provided for each color channel. These can be conveniently addressed using an accessory BNC breakout cable (Lumencor part no. 29-10015 or 29-10080) connected to the front panel DB15 port (Figure 3). As a safeguard against unintended light output when the inputs are initially connected, the TTL port is disabled and must be enabled by a serial command. To enable the TTL port, establish a serial connection as described in Section 3.1 and click the TTL ON (SFT) button in the GUI. A description of the serial command string for this operation is available on request from Lumencor Technical Support (Section 7). Note that TTL 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 control. TTL polarity (ACTIVE = HIGH or ACTIVE = LOW) is factory set according to order specifications. TTL polarity can be reversed using controls provided in the GUI.

Connector Pin Definitions

DB15HD connector (TTL)		
Pins	**Definition**	**DC Characteristics**
1, 2, 3, 12, 15	Channel 5, 3, 2, 1, 4 enables respectively.	VCC = 5.0V V_{ilow} (max) = 1.5V, V_{ihigh} (min) = 3.3V, I_{ilow} = 0.5mA, I_{ihigh} = 1.0µA
6, 7, 8, 10	Gnd	
5	Dosimeter	
4, 9, 11,13,14	N/C	

DB9 connector (RS-232)		
Pins	**Definition**	**DC Characteristics**
1, 2, 3, 4, 6, 7, 8	DCD, RXD, TXD, DTR, D3R, RTS, CTS	VCC = 5.0V V_{ilow} (max) = 0.8V, V_{ihigh} (min) = 2.4V, I_{ilow} = 0.5mA, I_{ihigh} = 1.0µA
5	Gnd	
9	N/C	

4. Spectral Output

The spectral output of AURA light engines depends on the configuration of solid-state light sources installed and the bandpass filters associated with each source. Two typical examples are shown in Figure 5. The light sources installed and the bandpass filters associated with each are shown on the Certificate of Conformance included with the shipping documents e-mailed by Lumencor to the customer. The certificate of conformance also shows full (100%) power outputs for each source measured at the terminus of the liquid light guide (LLG) or optical fiber (Figure 2).

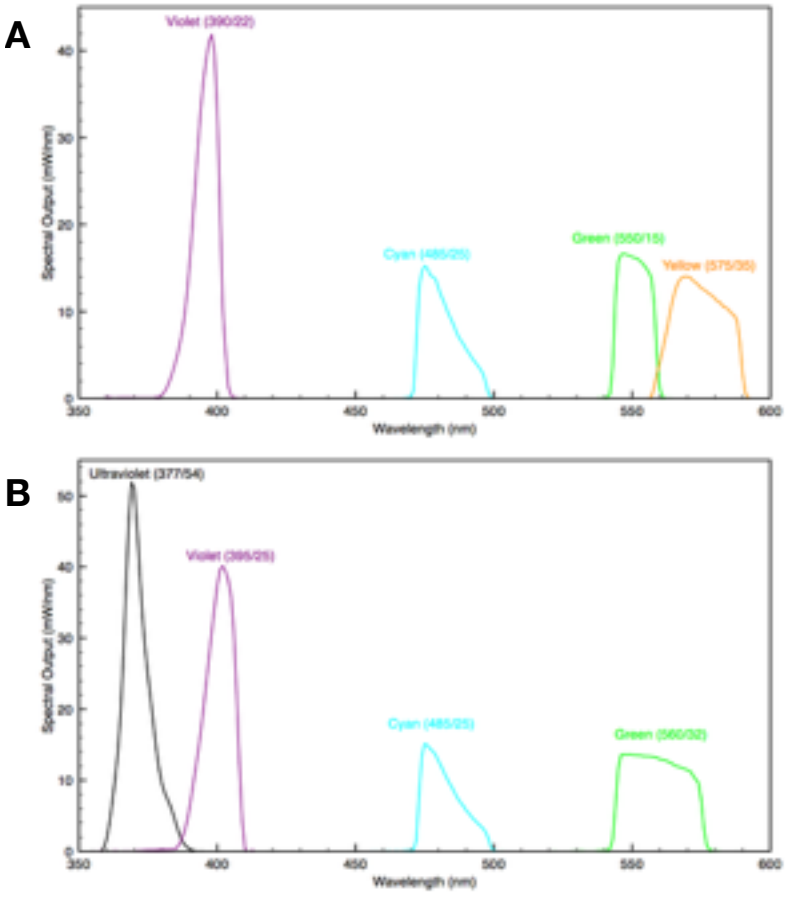

Figure 5. Output spectra for 4-channel AURA light engines

5. Product Specifications

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

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 (W x L x H)	12.5 cm x 26.3 cm x 16.3 cm (4.9 in x 10.4 in x 6.4 in)
Weight	3.6 kg (8 lb)
Input Power Requirements	24V DC / 9.2A
Warm-up Period	1 s
Ingress Protection	IP Rating of X0
Sound Level	Sound level at 1 meter < 65db(A)
Control Interfaces	Serial (USB to RS-232), TTL
Warranty	36 months parts and labor

Performance specifications for individual light engines are listed on the certificate of conformance included with the shipping documents e-mailed to the customer (see example shown in Figure 2). 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 Trouble Shooting

No routine maintenance is required. There are no user-replaceable components or sub-assemblies in the AURA light engine. 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 AURA 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 AURA family of light engines is backed by a 36 month warranty. An extended warranty option is available; extended warranties must be purchased in advance of receipt of goods or within 90 days of the date of original shipment from Lumencor. 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.