

### Lumencor Light Engine Manual

# MIRA 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: Mira" is used as a representative model for all certified and CE marked Mira 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 enduse 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 011822





## **Table of Contents**

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



#### 1. Introduction

The Lumencor MIRA light engine is a compact solid-state light source for fluorescence microscopy and other bioanalytical applications. The MIRA light engine incorporates efficient thermal management, requiring no fan and providing quiet and vibration-free operation. This enables direct coupling to the fluorescence epi-illumination port of a microscope.

The light engine provides four distinct color bands of light output that are controlled using either manual control knobs on the side panel or the light engine control pod accessory (part number 83-10007). The COLOR knob located on the side panel is used for on/off control, selection of color channels and for enabling external tablet control. The INTENSITY knob provides four different levels of output attenuation between 100% and 10% of maximum.

#### 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 MIRA 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 MIRA 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 Mira light engine. It is imperative that the alternative power supply has output over-current protection, as the power input of the Mira 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 Mira. Il est impératif que le bloc d'alimentation de remplacement a une sortie protection contre les surintensités, comme l'entrée de puissance du Mira 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 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**



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





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

AC Power Cords

**Figure 1.** MIRA light engine rear panel showing identification label, input receptacles for DC power supply, USB connection to light engine Control POD ("external") and electronic shutter ("gate")

#### 3. Installation and Operating Instructions

#### 3.1 Contents

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

- 1. MIRA light engine configured with an output adapter for coupling to a specific microscope.
- 2. A 9 V, 4.45 A power supply (Lumencor p/n. 27-10017).
- 3. A USB A (M) to USB A (M) cable (p/n 29-10057) for connection to the optional light engine control pod accessory.
- 4. A region-specific 6 ft AC power cord for the power supply (see above table).

The model name and unique 4- or 5- digit serial number of the light engine are marked on an identification label affixed to the back panel (Figure 1). 👪 Lumencor

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 or transferred, the certificate of conformance should be conveyed to the new owner

#### 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.

Take necessary precautions to protect yourself and others from the high intensity light when turning on the unit. The MIRA light engine should be coupled to a microscope before it is turned on. **BE AWARE** that although the human visual system does not register the wavelengths of light from the violet color channel, exposure can guickly produce eye damage. When setting up the MIRA light engine, be sure that the output adapter is securely attached to the appropriate illumination port of the microscope. Usually this will be the fluorescence epi-illumination port. Be careful to properly support the MIRA light engine until it is securely attached to the instrument.

The MIRA light engine must be operated in a non-condensing environment (dew point <10°C with controlled ambient temperature <30° C). Restricting the airflow will cause the unit to operate at elevated temperatures and could result in decreased product life and/or premature failure. The power supply should be plugged into the DC power connector at the back of the light engine. The green "power" indicator light on the rear panel (Figure 1) illuminates when electrical power is being drawn by the light engine.

#### 3.3 Manual Operation

Two control knobs are located on the side panel (Figure 2). The "COLOR" knob allows the user to select light output from

any or all of the four color channels. The selections are "V" for violet, "C" for cyan, "G" for green and "R" for the red color channel. The "W" setting is for white light, when all four color bands are simultaneously illuminated. The "ext" setting allows the MIRA light engine to be controlled using the Light Engine Control Pod (see below). There are two "off" settings at opposite ends of the knob range. Both of these "off" settings turn the electrical power to the light engine off. The "INTENSITY" control

Figure 3. USB connectors on the rear of the light engine control pod.







knob sets four different levels of output attenuation between 100% and 10% of maximum. This setting is applied to the current source selection according to the position of the "COLOR" knob. It is recommended that the intensity be set to the "10%" position when a source is first turned on, and then increased as necessary. A yellow indicator light below the INTENSITY control knob on the side panel (Figure 2) alerts the user that light output is active.

#### 3.4 Operation Using the Light Engine Control Pod

- 1. Connect the USB A port of the light engine control pod accessory (83-10007) to the USB A ("external") port on the MIRA using the USB-A to-USB A cable (29-10057) [1].
- 2. Move the COLOR control knob on the side panel of the MIRA) to the "ext" position [2].
- 3. Press and hold the right button on the pod until a menu of light engines appears. Turn the rotary dial to select "MIRA" from the menu. Press the right button again to return to the main (0–100 analog intensity) display screen.
- 4. **WARNING:** Before turning the light output on, be sure the output port of the MIRA is safely directed into an enclosed optical path (e.g. microscope epi-illuminator input port).

**AVERTISSEMENT :** avant d'allumer la sortie de lumière, assurez-vous que le port de sortie du MIRA est dirigé en toute sécurité dans un chemin optique fermé (par exemple, le port d'entrée de l'épi-il-luminateur du microscope).

- 5. Press the left button on the pod to select the desired color channel. Successive presses will cycle through the available color channels.
- 6. Press the right button to turn the selected light source on [3]. The yellow "light" indicator on the MIRA side panel (Figure 2) alerts the user that light output is active. Adjust the output intensity using the rotary dial on the pod [4]. Press the right button again to turn the selected light source off.
- 7. Press and hold the left button to view a digital rendition of the intensity setting [5]. Press the right button to return to the main display screen.
- 8. Further details of control pod operation are available at Lumencor's Operating Instructions site.

#### Notes

[1] The MIRA does not currently support pass-through control from a host computer.

[2] This will activate electrical power supply from the MIRA to the pod.

[3] There is no warm-up time; the light engine output stabilizes less than 1 second after the light output is switched on. Light output can be switched off during intervals when it is not required for active viewing or data collection.

[4] Output intensity can be set from 0–100% in 1% increments; however operation in the 0–5% range is not recommended. Turning the rotary dial to zero intensity automatically turns the selected light source off. Press the right button to turn the source back on again.

[5] 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 Using the Gate Connector

The MIRA light engine output can be turned on/off electronically using the electronic shutter function accessed through the BNC "gate" connector located on the rear panel. A > 3.3 V "high" signal applied to the BNC connector will turn the source on while a <1.5 V signal turns the source off. The



MIRA light engine can support an on/off switching rate up to approximately 1 kHz. Note that DC control levels applied to the gate connector DO NOT trigger selected color channels. Light sources must first be enabled using the side panel COLOR control knob or the touchscreen control tablet. Switching the gate connector to ground will then shut off light output. Restoring the input level to >3.3 V will restart light output.

#### 4. Spectral Output

The normalized spectrum shown below is representative of the MIRA light engine output. External bandpass filters can be used to restrict the wavelength range of each color channel.

#### 5. Product Specifications

The MIRA light engine 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 or transferred, the certificate of conformance should be conveyed 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 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 in MIRA light engines. Opening the light engine enclosure will void the manufacturer's warranty.

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 (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
Input Power Requirements	9 VDC / 4.45 A, 40 W maximum, power supply included
Gating Speed	On/Off rate up to 1 kHz
Warm-up Period	1 s
Protection	IP Rating of X0
Sound Level	Sound Level at 1 m = 0 db(A)
Connections	USB A for Light Engine Control Pod and one BNC connection for TTL gating
Warranty	24 months parts and labor for end users

#### 7. Customer Support

For technical support of the MIRA light engine, please contact Lumencor by phone at 503.213.4269 or through e-mail at <u>techsupport@lumencor.com</u>. Any light engine return to Lumencor for repair or refurbishment requires a return material authorization (RMA) number. To request an RMA number, fill out and submit the <u>online request form</u>. Units that are returned to Lumencor without an RMA number will not be accepted. Notification of RMA issuance, together with shipping instructions will be sent to the customer e-mail address provided on the request form. It is the customer's responsibility to properly package and safely ship products to Lumencor. The customer is responsible for selecting the method of shipment to Lumencor and paying for the shipment. If it is determined that necessary repairs or refurbishment are covered by warranty, then Lumencor will pay for return shipment to the customer. For out-of-warranty service work, Lumencor will evaluate the light engine upon re-



ceipt and then provide a quotation for the cost of necessary repairs or refurbishment. Work will not begin until a purchase order for the quoted services has been received.

#### 8. Warranty

The MIRA light engine comes with an 18 month warranty starting from the date of shipment from Lumencor's factory in Beaverton, OR. Please fill out and submit the <u>online warranty registration form</u> This will facilitate provision of warranty service should it be required.