Prizmatix UHP-M
Dual-LED
Microscope Illuminator
User Manual

Ver 3.1

Prizmatix

Contents

Prizmatix

1   Introduction

The UHP-M LED is an Ultra High-Power Dual-LED light engine for fluorescence microscopy at visible and UV spectral bands. It is an effective replacement for spectral light sources such as mercury lamps. The LED driver supports CW operation and TTL triggering.

1.1   Features

- Wideband White LED and 365-370nm UV LED.
- Uniform illumination across field of view from single chip Ultra High Brightness LED
- Optically isolated TTL input for external triggering by Camera output (no shutter needed)
- Fast TTL and Analog input (0-5V) for LED power control by external device
- Computer control via USB and LabView software (optional)
- Excellent for fluorescence excitation
- Stable precisely adjustable power
- Long life (no lamp or laser tube replacement required)
- Instantaneous on/off. No shutter needed
- Passive vibration free cooling. (optional detached fan available when required)
- Compatible with Prizmatix modular products – for creation of multi-wavelength setups, fiber-optic applications and more.

1.2   Intended use

The UHP-M is an Ultra-High-Power LED light source designed as primary light source directly mounted on research grade fluorescence microscope.

2   Safety

2.1   General safety

Please make yourself familiar with the contents of these operating instructions before using the UHP-M illuminator. Use the illuminator only as specified in this manual. Otherwise, the protection provided by the illuminator may be impaired.

The following symbols are used for the warnings:

⚠️ **CAUTION!**   Failure to comply with the safety instructions can be hazardous to the user.

🔲 **CAUTION!**   Failure to comply with the safety instructions can result in damage to the instrument.

Do not use the illuminator if it is damaged. Before you use the illuminator, inspect the case. Look for cracks or missing parts.

Do not use the device around explosive gas.

Prizmatix

Never operate the illuminator with the cover removed or the case open.

Any maintenance should ONLY be performed by a Prizmatix authorized technician.

Prizmatix products are NOT authorized for use as components in life support devices or systems.

2.2 Eye safety

The UHP-M illuminator system designed to be attached to epi-fluorescence port of fluorescence microscope. When used in such configuration the product falls into *Exempt Group*.

3 Setup of the device

Remove the device from the packaging and inspect the device for loose components or any signs of damage. Notify Prizmatix if the device appears damaged in any way: do not install or operate a damaged device.

3.1 Typical package contents list

(1) UHP-M-LED Illuminator	(2) UHP-M-Console (optional item)
(3) Mic-ADPT (one of)	(4) LLG3 (optional items)
(5) UHP-M-USB Interface (optional item)	(6) UHP-M-RS232 Interface (optional item)
(7) Power Adaptor	(8) Mains Power Cord

Prizmatix

| #	Item	Description	QTY
1	UHP-M-LED	UHP-M-LED Illuminator	1
2	UHP-M-Console	Wired control console (optional item)	1
3	Mic-ADPT	Adaptor for Olympus, Nikon, Zeiss or Leica microscope (typically only one adaptor is purchased)	1
4	LLG-3	Liquid light-guide 3 mm core (Optional item)	
5	UHP-M-USB	USB to computer interface (Optional item)	
6	UHP-M-RS232	RS232 to computer interface (Optional item)	
7	Power Adaptor	Universal power adaptor	1
8	Mains Power Cord	Cord to connect the power adaptor to mains voltage	1

3.2 System overview:

Figure 1: UHP-M Illuminator overview: (1) Light output port, (2) Main control and connections panel, (3) Heatsink, (4) Two lens Z-adjustment screws for UV and White (bottom, not seen in this position).

Prizmatix
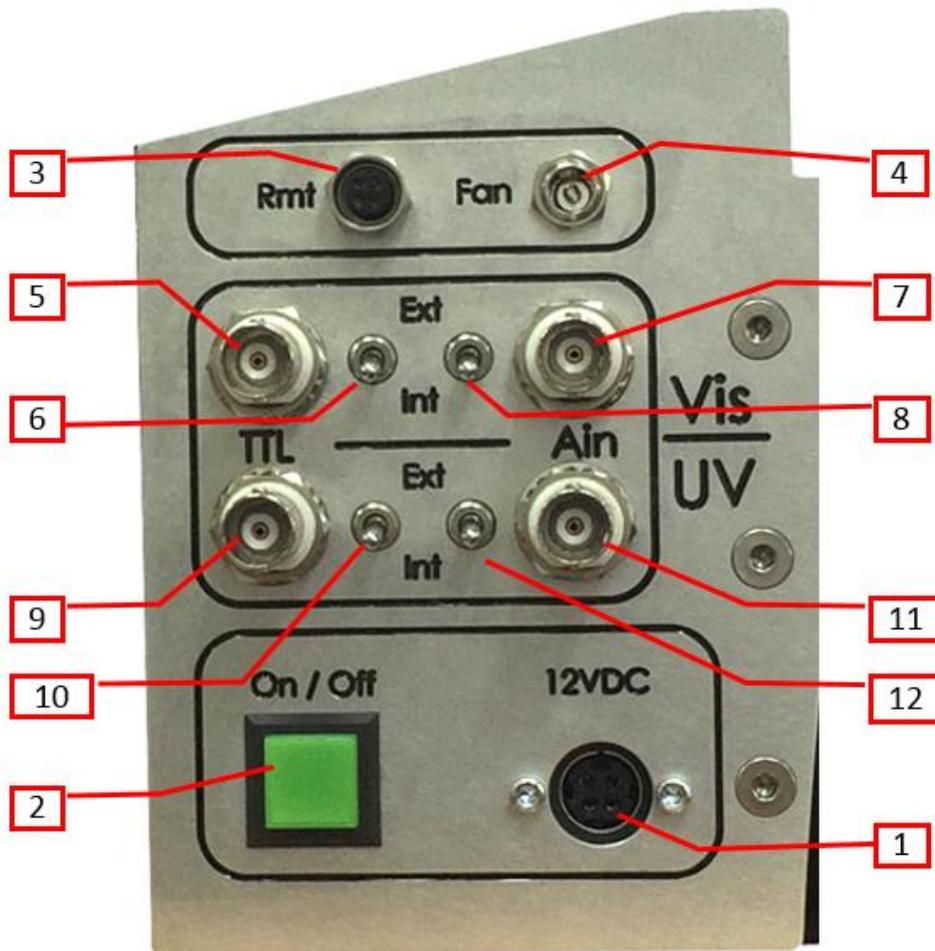
Figure 2: UHP-M Main control and connections panel: (1) DC power jack, (2) On/Off illuminated pushbutton, (3) Remote controller connector port, (4) Optional external fan connector jack, (5) Visible light – TTL input, (6) Visible light – TTL enable toggle switch, (7) Visible light - Analog input (Ain) , (8) Visible light - Analog input (Ain) enable toggle switch, (9) UV light – TTL input, (10) UV light – TTL enable toggle switch, (11) UV light - Analog input (Ain) connector, (12) UV light - Analog input (Ain) enable toggle switch.

Prizmatix
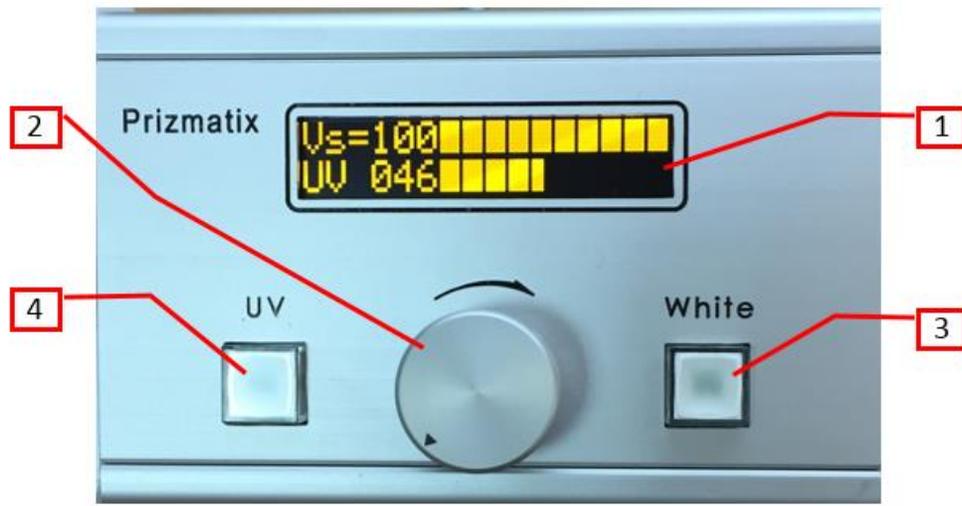
Figure 3: UHP-M-Console: (1) 2-lines display, (2) adjustment (by rotation) and selection (by clicking) dial, (3) White (visible) light On/Off illuminated pushbutton, (4) light On/Off illuminated pushbutton.

3.3 UHP-M illuminator system configurations

The UHP-M illuminator and its control units (Console and USB Interface) can be assembled on microscope in several various configurations as described in following figures.
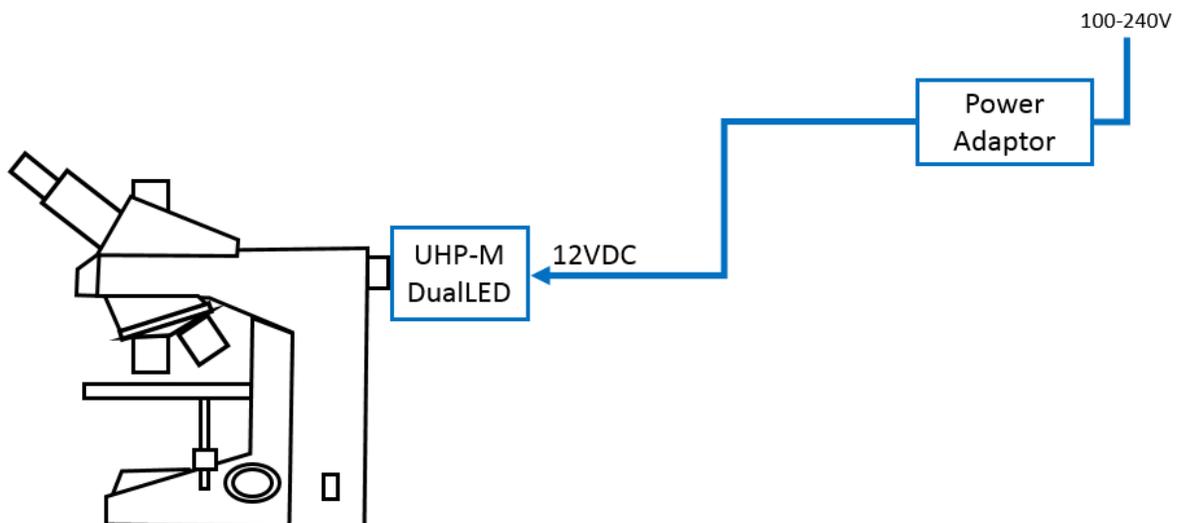

Figure 4: Basic On/Off - The most basic system comprising UHP-M head assembled on the epi-fluorescence port of microscope and connected to the power adaptor. In this configuration, the UHP-M mimics the standard Mercury lamp. Console control unit is not used.

Prizmatix
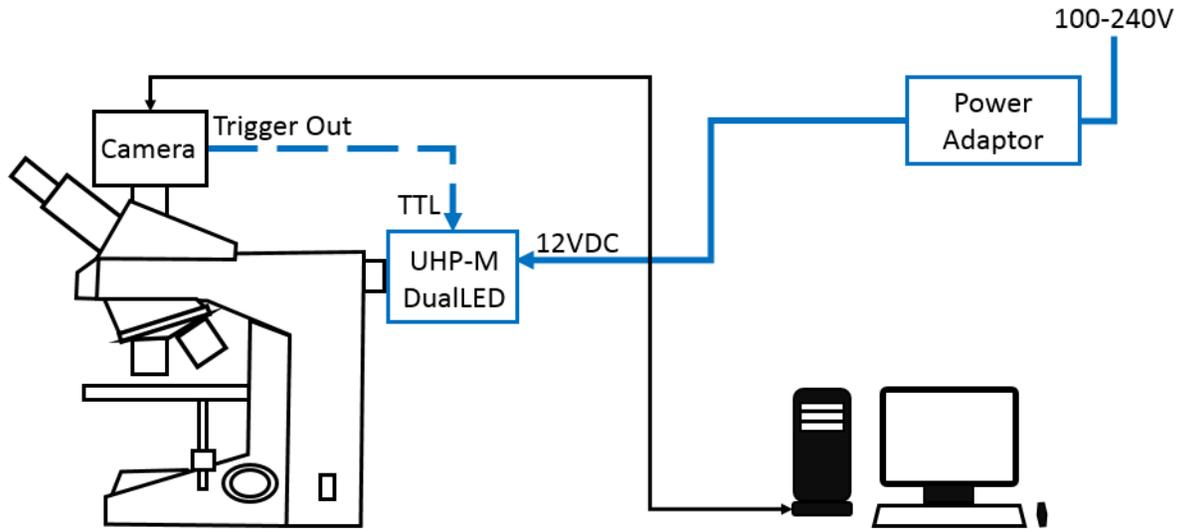
Figure 5: Simplest configuration: On/Off with optional camera sync. system comprising a camera connected to computer. The UHP-M head assembled on the epi-fluorescence port of microscope and connected to the power adaptor. In this configuration the UHP-M can be used as standard Mercury lamp without synchronization with the camera, but it can be easily synchronized with camera by connecting the camera's Trigger Out signal t to UHP-M TTL input. UHP-M-Console unit is not used.
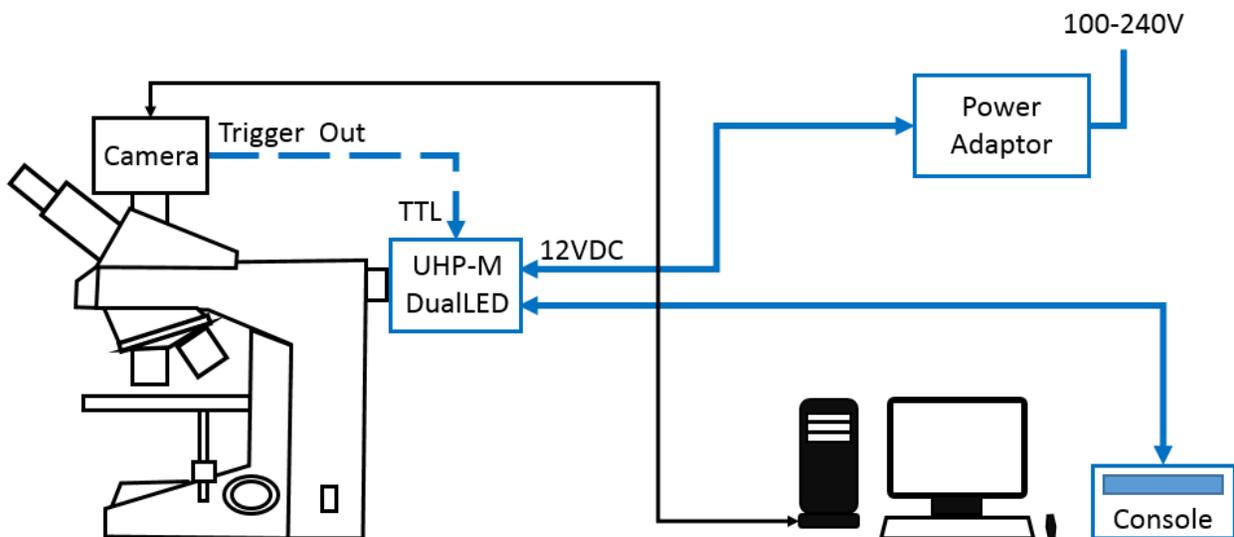

Figure 6: Basic System: User controllable with optional camera sync: System comprising a camera connected to computer. The UHP-M-Console control unit is connected to the UHP-M head. In this configuration the UHP-M power can be manually controlled by the user. The LED can be optionally synchronized with the camera by Trigger Out signal connected to TTL input on UHP-M head.

Prizmatix
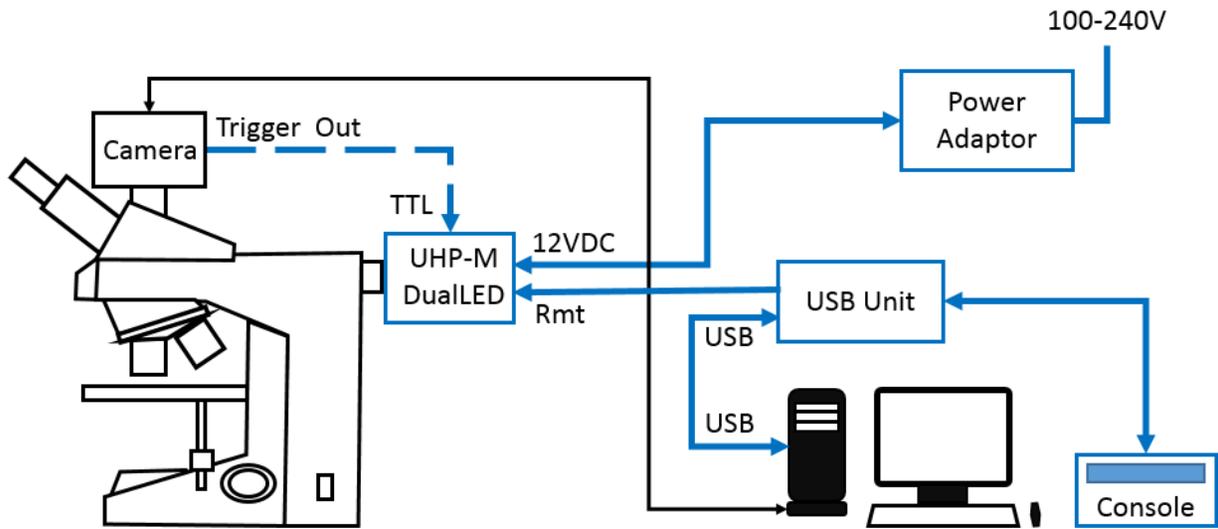
Figure 7: Software and user controllable: Most advanced configuration comprising a camera connected to computer, UHP-M-Console and UHP-M-USB (or UHP-M-RS232) control units connected to the UHP-M head. In this configuration the UHP-M power can be controlled either by software or manually. The LED can be optionally synchronized with the camera by Trigger Out signal connected to TTL input on UHP-M head.
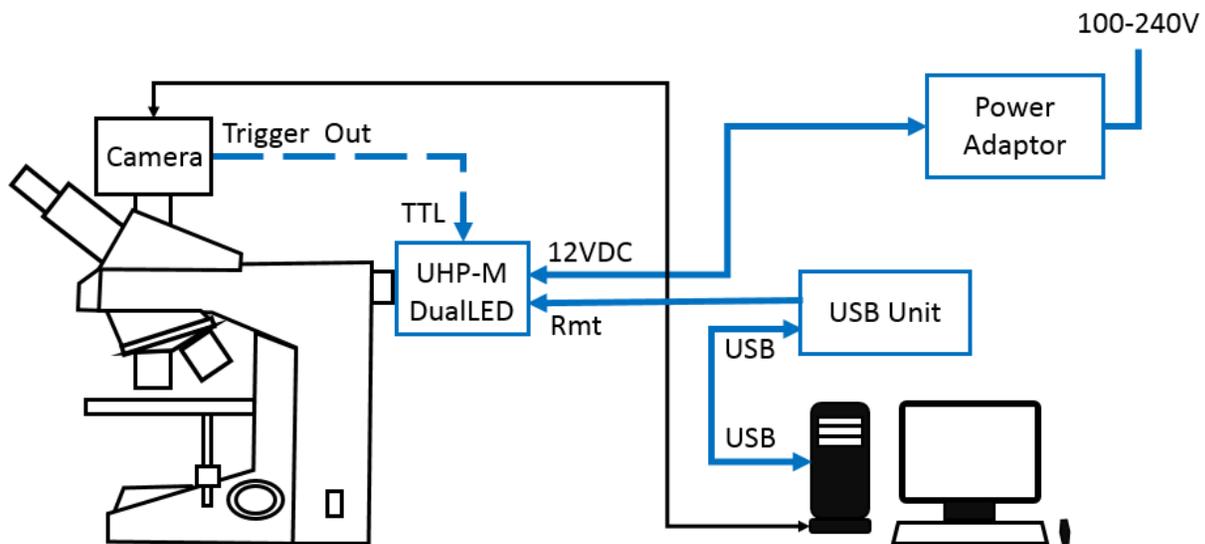
Figure 8: Software controllable: Similar to Figure 6 but the LED power can be controlled only by software through USB and UHP-M-USB interface unit. Same configuration is possible with UHP-M-RS232 interface unit.
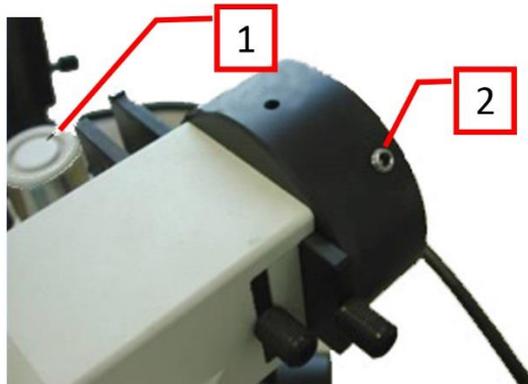
Prizmatix

3.4 Use of UHP-M LED illuminator on a microscope

3.4.1 Setting of the illuminator LED head on the microscope

1. The UHP-M LED is designed to mount on the fluorescence lamp port (epi-fluorescence port) of a microscope using the appropriate microscope adaptor.
2. Dismantle any existing fluorescence lamp (Hg, Xenon, etc.) from the microscope: most microscope manufacturers (Zeiss, Olympus, Leica) use set screws to tighten the lamp onto the port. Release the screws and carefully pull out the lamp. In the case of Nikon microscopes with an F-mount, turn the grooved collar counterclockwise and release the lamp.
3. Carefully insert the UHP-M-LED into the lamp port and tighten the set screws (or collar in Nikon microscopes).
4. Observe the illumination. If needed adjust the UHP-M-LED axial focus by a Hex Key (2mm or 5/64").

Figure 9: Olympus microscope epi-fluorescence lamp port: (1) Olympus hex screw driver, (2) Light source fixation set screws.

Prizmatix

3.4.2 UHP-M illuminator basic system connection

1. Check that ON/OFF green button on front panel of UHPLCC current controller is in OFF position (Out position)

2. Ensure proper orientation and connect the UHP-M-Console cable to the **Rmt** port on the UHP-M Main control and connections panel.

3. Connect the Power Adaptor cable to the **12VDC** jack on the UHP-M Main control and connections panel. Set to correct orientation and press until it clicks into place.

4. Connect the Power Cord to the Power Adaptor.
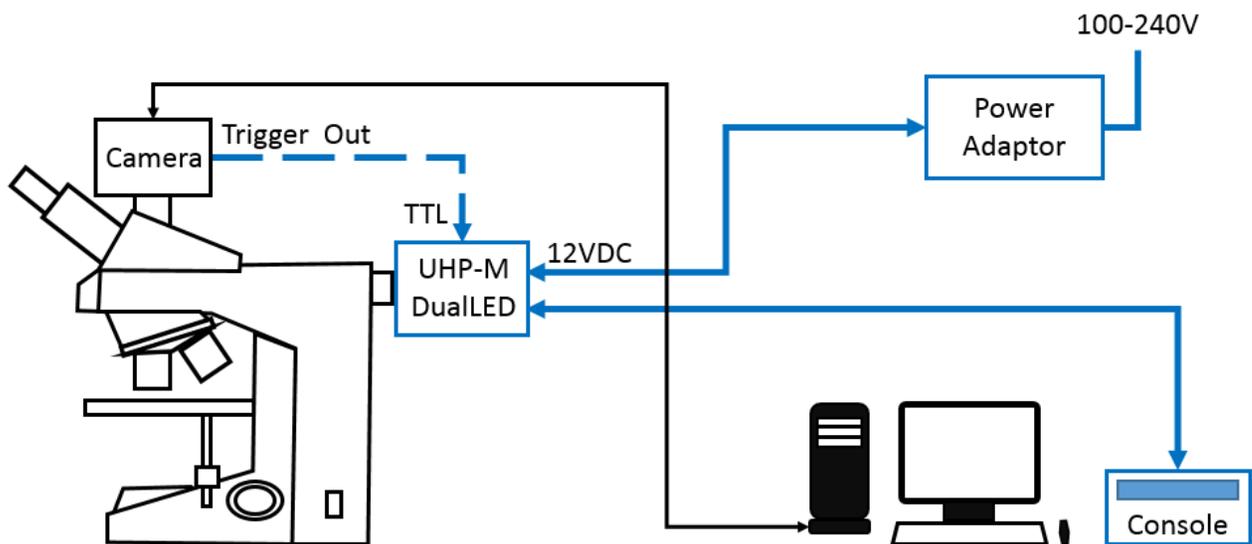
Figure 10: UHP-M LED Illuminator cable connection

5. Plug the Power cord to electrical socket (100-240V).

6. Switch the Int / Ext toggle switches at the side panel to **Int** position.

7. Push the green ON button. The button will light up.

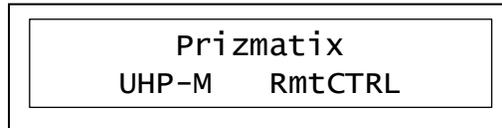8. Refer to the data displayed on the remote controller display.

> ⚠️ **CAUTION!** Never disconnect the power cord form the product before switching the ON/OFF switch button on front panel to OFF position
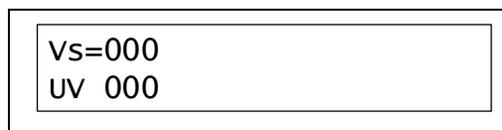
Prizmatix

3.4.3 Operation of the Remote Controller

1. When the system starts up, a welcome notice is displayed for few seconds:

```
           Prizmatix
     UHP-M    RmtCTRL
```

2. The following screen appears, indicating the illumination level of the Visible (white) LED and the UV LED:

```
    Vs=000
    UV  000
```

3. Turn the dial clockwise: the white illumination level will increase, up to 100. The numeric display is accompanied by a graphic display - each block indicates 10% of power. The LED will not output light yet and the pushbuttons will be off.

```
    Vs=020 ■■
    UV  000
```
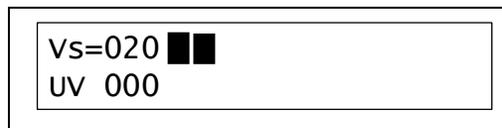
4. Click the **WHITE** pushbutton (#3 in Figure 3) to toggle the white LED On. When the LED is On, the pushbutton itself become illuminated. The LED intensity will be as displayed on the screen. You can adjust intensity by turning the dial clockwise or counter-clockwise. Clicking the **WHITE** pushbutton again, will toggle the white LED off.

5. Clicking the dial toggles between setting the power of the White LED and the UV LED. Click the dial – the **=** sign will move to the **UV** line. Turning the dial clockwise will now change the UV LED power:

```
    Vs  020 ■■
    UV=060 ■■■■■■
```
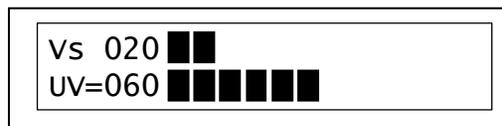
6. Click the **UV** pushbutton (#4 in Figure 3) to toggle the UV LED On. When the LED is On, the pushbutton itself become illuminated. The LED intensity will be as displayed on the screen. You can adjust intensity by turning the dial clockwise or counter-clockwise. Clicking the **UV** pushbutton again, will toggle the UV LED off.

7. Each of these steps can be performed during the operation.

Prizmatix

3.4.4 Remote Controller Setup Mode

1. You can access the remote controller setup mode by pressing the dial continuously for about 6 seconds. The following message will appear:

```
UHP-M RmtCTRL
  Setup Mode
```

2. Currently, the setup mode enables adjustment of the display brightness. The following message will appear automatically:

```
Brightness Setup
 Exit press Dial
```
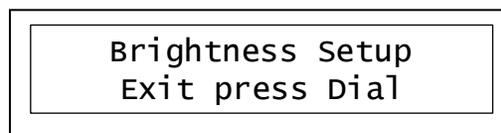
3. Turn the dial clockwise to increase the display brightness, and counter-clockwise to decrease the display brightness.

4. Click the dial to set the brightness level and leave the setup mode.

3.4.5 Illuminator alignment on the microscope

Z -alignment of the collimator lenses is required to optimize the illumination provided by the UHP-M LED illuminator.

1. Adjustment of the Z placement of the collimating lens relative to the LED chip is done by slightly turning the Z-Adjust screws on the bottom of the UHP-M LED head using a 2mm or 5/64" Hex Key (see Figure 6 below). Note that the span of the screw motion is less than one full turn – this covers the full Z adjustment move.
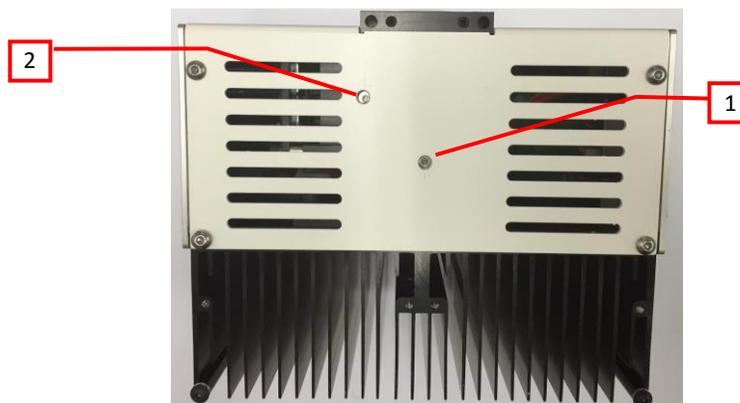
Figure 11: Z-Axis Focus Adjust (Bottom view of the UHP-M): (1) White LED focus adjust screw, (2) UV LED focus adjust screw.

Prizmatix

3.4.6 Disconnection of illuminator LED head from a microscope

1. Turn the power OFF and disconnect the cables from the LED head.
2. Loosen the fixing set screws (or the F-mount collar on Nikon).
3. Pull out the UHP-M-LED head to disengage it from the microscope.

3.4.7 LED Control by TTL and / or Analog Input

The TTL input (TTL) and Analog Input (Ain) BNC connectors are located on the side panel of the UHP-M, featuring the TTL and Ain connector and toggle switches as shown in figure 2.

To control the LED by TTL input:
- Connect the BNC cable to the TTL input and to TTL trigger source.
- Switch the "TTL Enable" toggle switch to **Ext** position to enable the triggering
- When TTL Enable switch is set to Ext the UHP-M-Console and / or UHP-M-USB or UHP-M-RS232 controllers are overridden. The controllers still enable power control and LED OFF functionality, but LED ON state will be executed ONLY when both controller and TTL are at HIGH state – enabling fast triggering from TTL input. In case none of controllers is connected and the "TTL Enable" toggle switch is in Ext position, TTL input state will responsible for the LED state ON or OFF.
- While TTL input triggering, the Analog input BNC can be used for control pulse height by 0-5 Volt, see below.

To control the LED power via Analog Input voltage:
- Connect the BNC cable to the Ain input and to 0-5 Volt voltage source.
- Switch the "Ain Enable" toggle to **Ext** position to enable power control by analog voltage
- When "Ain Enable" switch is set to Ext the UHP-M-Console and / or UHP-M-USB or UHP-M-RS232 controllers are overridden. The controllers will not enable power control and LED ON / OFF functionality.
- While Ain control, the TTL input can be used for fast pulsin.

⚠️ **CAUTION!:**
- The absolute maximum voltage to be applied to Ain is +5V.
- The internal pin of BNC connector is Positive (+).
- The external part of the connector is Negative (-).
- The Ain input is not opto-isolated.
- The Ain is intended for LED power control via Digital to Analog (D/A) modules. It is not suited for analog modulation of LED power at rates higher than few 10Hz

---

Prizmatix

> ⚠️ **CAUTION!:**
> Using more than the maximum voltage or inverse polarity may cause permanent damage to LED and Current Controller!

4   Cleaning

Keep the UHP-M LED illuminator head clear from dirt and do not leave it open. Make sure to close the output aperture of the illuminator with a cap when it is not in use.

The UHP-M remote controller box can be wiped with mild wet-wipes.

> ⚠️ **CAUTION!:**
> Do not attempt to use chemicals, e.g. Alcohol or Acetone – you may damage plastic components!

5   Specifications

5.1   Electrical specifications

| TTL Input		Optically isolated BNC connectors
Analog power control	%	0-100
ON/OFF		Power switch or by TTL signal
Current controller input supply voltage	V	12
Power Adaptor Input		85-264 VAC, 47-63 Hz, 1.5 A

5.2   General specifications

Operation temperature range	°C	10 - 35
Storage temperature range	°C	-10 - 55
Operating relative humidity (Non condensing)	%	<90
Head dimensions		See drawing below
Head weight	g	2600
Controller dimensions (L x W x H)	mm	185 x 124 x 153
Controller weight	g	280
Power adaptor dimensions (L x W x H)	mm	175 x 72 x 35
Power adaptor weight	g	650
Power Adaptor Safety		℗ c(UL)us △GS ⊖ CCC CB FC CE

Prizmatix
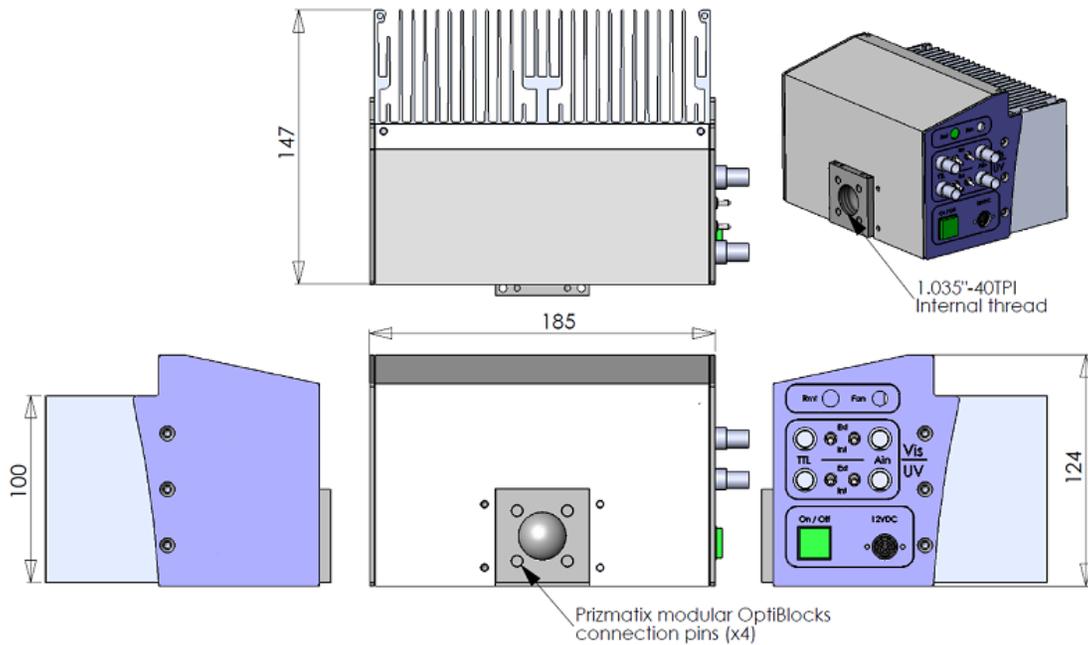
UHP-M main body
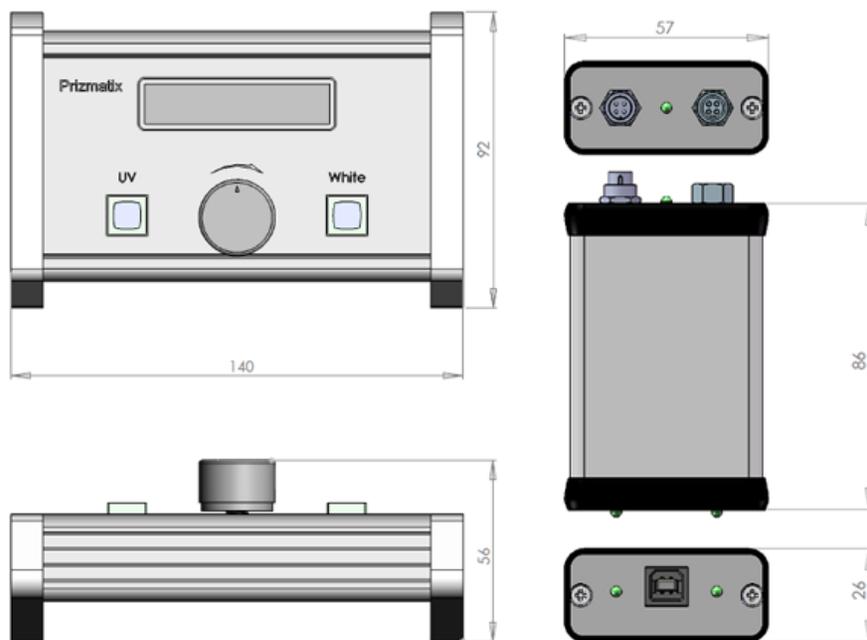
UHP-M-Console (left) and UHP-M-USB (right) control units (UHP-M-RS232 has same dimensions)