



UPEN™

**Before use, please take the time to read this datasheet and make sure you understood the advices and cautions of use.**



## Security

- Do not watch directly the beam of light or through any optical instrument.
- Avoid any contact with the LEDs or its lens.
- Code IP40: protected against solid corpses larger than 1 mm and non-protected against water intrusion.
- Use the product in an environment where the working temperature is between +15°C and +35°C and there is little humid air (<80%): if those conditions are not respected the product can be damaged.
- Do not use the product in an environment where smokes and oil vapors are present.
- Never try to repair by yourself any potential damages on the product.
- Make sure to use the right power supply before connecting the product.
- Do not reverse the electrical polarity – check your connections and the conventions before turning on the product.
- Make sure you have the correct connector to link the product to the power supply.

**Any incorrect use cancels the warranty.**

## Table of contents

<b>Security</b>	1
<b>Technical overview</b>	3
<b>Product reference</b>	4
<b>General information</b>	5
<b>Accessories included in the kit</b>	6
<b>Eyes &amp; Skin Safety</b>	7
<b>Legal obligations</b>	8
<b>Possible health damages</b>	8
<b>Protective equipment</b>	9



## Technical overview

The UPEN™ is held like a pen and controlled manually. It is powered with a rechargeable battery which can be running continuously up to 2 hours.

		UPEN™
<b>Electronics</b>  	<b>Power supply</b>	1x rechargeable Li-ion battery
	<b>Illumination mode</b>	Continuous with an ON/OFF button
	<b>Running time</b>	Up to 2 hours per battery
	<b>Battery recharging</b>	Battery charger is delivered
<b>Optics</b>  	<b>Wavelength</b>	365/385/395 or 405nm
	<b>Irradiance</b>	Up to 2 000 mW/cm <sup>2</sup>
<b>Mechanics</b>  	<b>Diameter</b>	12mm (head) & 25mm (handle)
	<b>Length</b>	146 mm
	<b>Material</b>	Device body: Aluminum alloy
	<b>Weight</b>	130 g (with battery)
<b>Thermal</b>  	<b>Cooling system</b>	Passive
<b>Environment</b>  	<b>Working temperature</b>	+15°C to +35°C
	<b>Working Humidity</b>	< 80% for temp < 35°C
	<b>IP Code</b>	IP40



Product reference

**UPEN™:**

**UPEN - XXX\***

365

385

395

405

\*XXX corresponds to the wavelength of the product.

## KIT-UPEN-XXX

**Presentation & content:**





## General information

ON/OFF SWITCH

OPTICAL SYSTEM

BATTERY LOCATION  
(SCREW/UNSCREW)

BODY OF THE PEN



When the UV light starts blinking:  
battery is low and must be replaced or charged.



Standard optical system CL10: at 5mm it produces a 10mm diameter UV spot  
Other lenses are available on request. Contact us!



Accessories included in the kit

**UV Protective Glasses (REF: UGLASS-02)**



The kit contains a pair of UV protective glasses to protect the operator during the use of the UV LED spotlight.

- UV protective glasses prevent from UV damages to eyes by absorbing 99,9% of UV radiation and visible light up to 525nm.
- Protect against side irradiation.
- Resist to chemical products and scratches.
- Compliant to standards:



**Li-ion Rechargeable Batteries**



The kit contains two rechargeable batteries to power the UV LED spotlight

- Each battery offers a 2-hour running time.
- Full charge of these batteries may take up to 8 hours with the charger.
- Compliant to standards:



Please fully charge the batteries before first use.

**Batteries Charger + USB Cable**



The kit contains a charger to charge the two batteries.

- The charger is powered with an USB cable provided in the kit.
- Full charge of these batteries may take up to 8 hours with the charger.
- LED indicator to see the level of charge.
- User's manual included.
- Compliant to standards:





## Eyes & Skin Safety



UWAVE products come under the standard DIN EN 62471:2008 which classified sources of optical radiation into risk groups subject to their potential photo biological hazard. Due to the emission of high UV irradiation, our products belong to Risk Group 3 (hazardous even for momentary exposure) therefore special safety measures, detailed in the following, must be observed.



To protect the eyes and skin staff everyone in the area must wear **protective equipment**. Protective **goggles** should comply with the standard EN 170 (Personal eye-protection - Ultraviolet filters - Transmittance requirements and recommended use). The goggles must protect eyes against direct and side irradiation.



Don't look directly at the product's output window because of a risk of becoming blind.  
Don't expose skin too long without protection to avoid skin burning or cancer.



Due to the high emission power, the area near the LEDs can reach high temperature during operation.  
Avoid touching directly the product and especially the output window.



## Legal obligations

Under the law at present, workers' exposure must be lower than the Exposure Limit Value (Directive 2006/25/EC of the European Parliament). Depending on the wavelength of the product and the body part insolated, **Limit Values are summarized in the tables below:**

	Eye	Skin
Wavelength	315 – 400 nm (UVA)	180 – 400 nm (UVA, UVB, UVC)
Exposure Limit Value	10 000 J/m <sup>2</sup>	30 J/m <sup>2</sup>

### Case study with a LED at 365 nm with an Optical Power of 10 mW/cm<sup>2</sup>:

For the **eyes**, the maximal exposure time ( $\Delta t$ ), the Exposure Limit Value (*ELV*), and the Optical Power (*P*) of a UV product are linked by the formula:

$$\Delta t = \frac{ELV}{P}$$

For **skin**, the Optical Power is normalized by skin's sensitivity factors for each wavelength.

The maximal exposure time per day is calculated below:

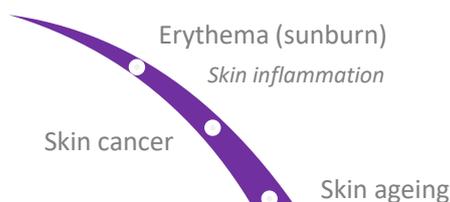
	Eyes	Skin
Optical Power (normalized for skin)	10 mW/cm <sup>2</sup>	4,7 μW/cm <sup>2</sup>
<b>Maximal exposure time per day</b>	<b>1 min 40 s</b>	<b>12 min</b>

With a UV product with an optical power of 10 mW/cm<sup>2</sup>, the Exposure Limit Value per day is **reached in 2 minutes for eyes and 12 minutes for skin** without any safety equipment. Therefore, protective equipment is needed when a UWAVE UV LED equipment is used.



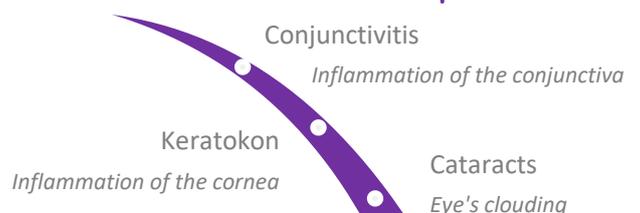
## Possible health damages

### Effects on skin along unprotected UV exposure



**Burning, inflammation, chronic diseases**

### Effects on eyes along unprotected UV exposure



**Visual strain, inflammation, blindness**



## Protective equipment



### Eyes protection



**Safety goggles** prevent UV damages to eyes.

REF: UGLASS-02

- Certified NF EN 170 absorbing 99,9% of UV radiation and visible light up to 532nm
- Protect against side irradiation
- Resist to chemical products and scratches

**Beyond 2 minutes per day of eye UV LED exposure at 10 mW/cm<sup>2</sup>, protective goggles are necessary according to the European Directive 2006/25/EC.**



**Safety face shield** prevents UV damages to eyes and skin's face.

REF: UGLASS-03

- Certified NF EN 170 absorbing 99,9% of UV radiation and visible light up to 400nm
- Protect against side irradiation
- Resist to scratches

**Beyond 12 minutes per day of face UV LED exposure at 10 mW/cm<sup>2</sup>, protective mask is necessary according to the European Directive 2006/25/EC.**



## Body protection



**Safety gloves** prevent UV damages to exposed skin.

- High protection against UV radiation
- Resist to chemical products and scratches

**Beyond 12 minutes per day of hands UV LED exposure at 10 mW/cm<sup>2</sup>, protective gloves are necessary according to the European Directive 2006/25/EC.**



**Safety jacket and trousers** prevent UV damages to exposed skin, especially arms & legs.

- Certified UPF 50+ absorbing more than 90% of UV radiation
- Durable and resistant

**Beyond 12 minutes per day of arms & legs UV LED exposure at 10 mW/cm<sup>2</sup>, protective clothes are recommended according to the European Directive 2006/25/EC.**



**Protection suit** prevents UV damages to entire body, especially neck.

- Certified UPF 50+ absorbing more than 90% of UV radiation
- Resist to chemical products

**Beyond 12 minutes per day of neck UV LED exposure at 10 mW/cm<sup>2</sup>, protective suit is recommended according to the European Directive 2006/25/EC.**



## UV source isolation



**UV shields** are protective windows which isolate the UV insulated zone to protect all workers around.

They are made to measure to fit with your constraints.

REF: UVSHIELD

**Beyond 2 minutes per day of eye UV LED exposure and 12 minutes of skin UV exposure at 10 mW/cm<sup>2</sup>**, protective shields are necessary to protect staff without safety equipment according to the European Directive 2006/25/EC.



## Warning stickers



**Warning stickers** inform workers of radiation danger and invite them of wearing protection equipment. They are available in 3 sizes:

- 55 mm x 25 mm
- 165 mm x 75 mm
- 290 mm x 130 mm



## Expertise

Our UV LED experts from UWAVE can come and check your production lines to:



Measure UV irradiance to **determine the maximum UV personal exposure time** compared with limits (European Directive 2006/25/EC).



Determine the most **adapted solution** to protect workers' eyes and skin.



**Contact us to get our expertise. We will find together the equipment which fits with your application.**