



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



## User 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.**

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## 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 insulated, **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



Erythema (sunburn)  
*Skin inflammation*

Skin cancer

Skin ageing

**Burning, inflammation, chronic diseases**

### Effects on eyes along unprotected UV exposure



Conjunctivitis  
*Inflammation of the conjunctiva*

Keratokon  
*Inflammation of the cornea*

Cataracts  
*Eye's clouding*

**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: UMASK-01

- 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.

REF: UGLOVE-01

- 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

REF (jacket): UJACK-01

REF (trouser): UTROUS-01

**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.

REF: USUIT-01

- 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: USHIELD-01

**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

REF: USTICK-01

REF: USTICK-02

REF: USTICK-03



## 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.**



## Technical Overview

The UCUBE™ exists in 2 versions:

- The UCUBE™ 25 LEDs, that can provide an irradiance of 250 mW/cm<sup>2</sup> at 100mm of working distance.
- The UCUBE™ 100 LEDs, that can provide an irradiance of 1000 mW/cm<sup>2</sup> at 100mm of working distance.

		UCUBE™ 25 LEDs	UCUBE™ 100 LEDs
<b>Electronics</b>  	<b>Power supply</b>	48V DC	
	<b>Illumination mode</b>	Continuous with a DIM process [0-10V]	
	<b>Connector</b>	SubD 13W3	
	<b>Power consumption</b>	Max 120W	Max 500W
<b>Optics</b>  	<b>Wavelength</b>	365 or 385 or 395 or 405 nm <i>Contact us for other wavelengths (UVA, UVB &amp; UVC).</i>	
	<b>Max Irradiance at 30mm</b>	600 mW/cm <sup>2</sup>	1500 mW/cm <sup>2</sup>
	<b>Optical option</b>	<i>Can be provided to collimate the light beam. It allows to keep a high irradiance at a higher working distance. For more details, check out the section "optical characteristics".</i>	
<b>Mechanics</b>  	<b>Width and height</b>	100 mm x 100 mm	
	<b>Length</b>	180 mm	
	<b>Material</b>	Device body: Aluminum alloy	
	<b>Weight</b>	2,0 kg	
<b>Thermal</b>  	<b>Cooling system</b>	Active air cooling with fans  <i>Water cooling option available.</i>	
<b>Environment</b>  	<b>Working temperature</b>	+10°C to +35°C	
	<b>Working Humidity</b>	< 80% for temp < 30°C	
	<b>IP Code</b>	IP40	



## Product reference

### Standard version:

Wavelength (nm)	Number of LEDs
<b>UCUBE - XXX - YYY</b>	
365	025
385	100
395	
405	

### Optical option:

Number of LEDs	
<b>UCUBE - COL - YYY</b>	
Option: lenses	

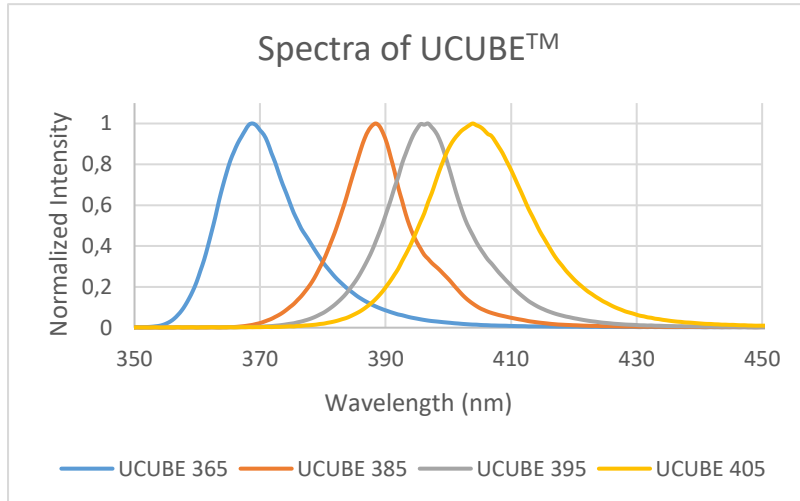
### Water cooling option:

Wavelength (nm)	Number of LEDs
<b>UCUBE - XXX - YYY - WTR</b>	
365	025
385	100
395	
405	



## Optical characteristics

### Spectra



	Pic Wavelength	Full width at half maximum
UCUBE 365	368 nm	14 nm
UCUBE 385	388 nm	10 nm
UCUBE 395	397 nm	14 nm
UCUBE 405	404 nm	18 nm

For other wavelengths (IR / VISIBLE / UVA: 325nm, 340nm / UVB: 310nm / UVC: 255nm, 265nm, 275nm), do not hesitate to contact us.

### Option Collimation Optics

The UCUBE™, whatever the version 25 LEDs or 100 LEDs, can be provided with or without optics to improve the collimation of the light beam, depending on your needs.

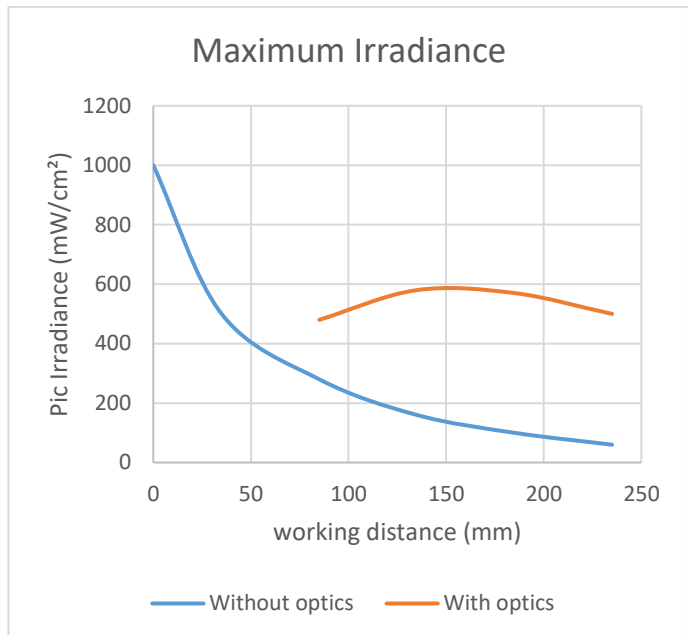
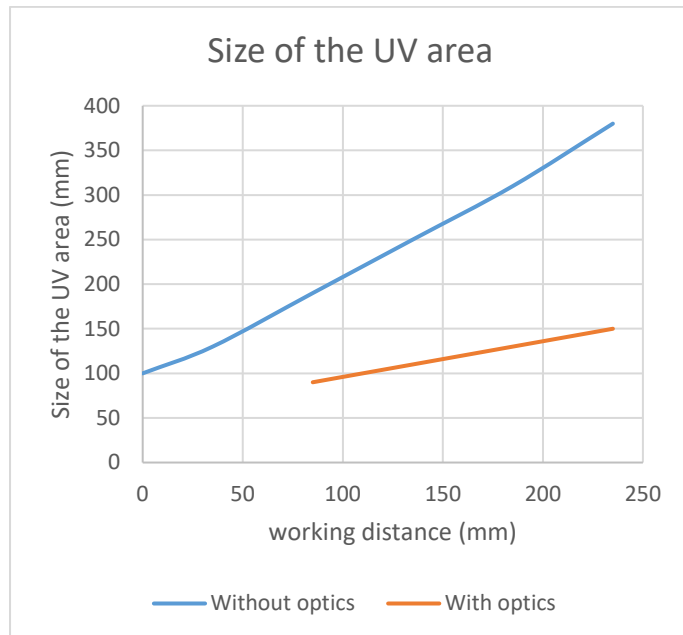
The collimation half-angle of the UCUBE 25 or 100 LEDs with optics has a value of 6°.

This option allows you to increase the irradiance homogeneity.

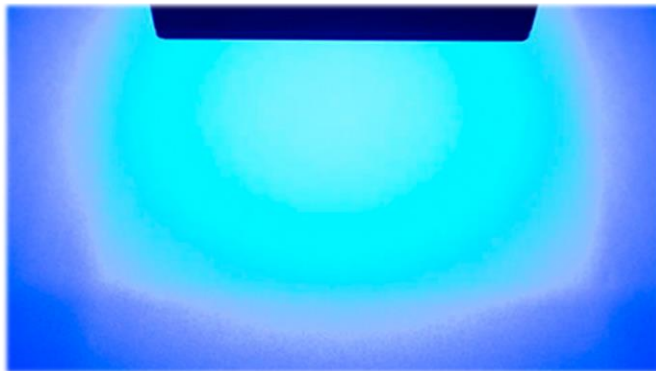


## Photometry: UCUBE 25 LEDs

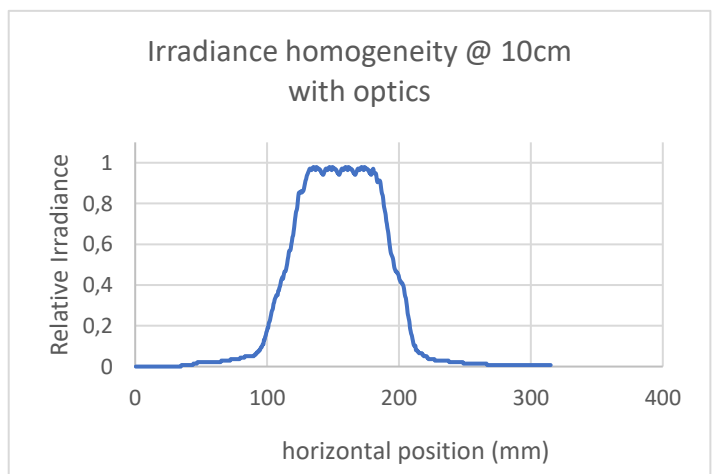
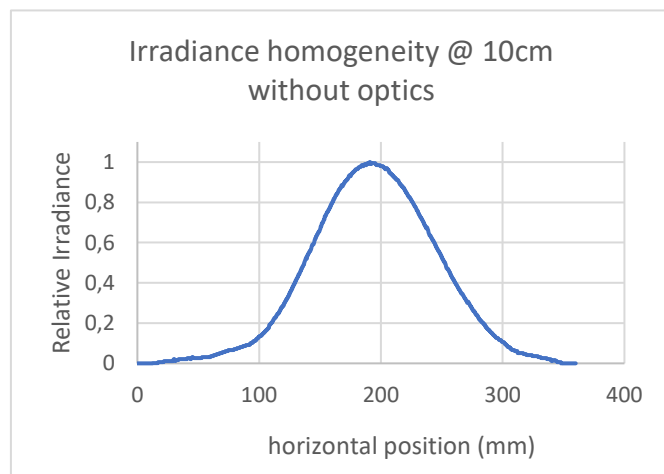
In the following graph, the area exposed is the area where the irradiance is higher than 50% of the maximum irradiance. The UCUBE™ 25 LEDs with optics is not usable for a working distance smaller than 80mm.



### Homogeneity without optics @ 10cm – UCUBE 25 LEDs

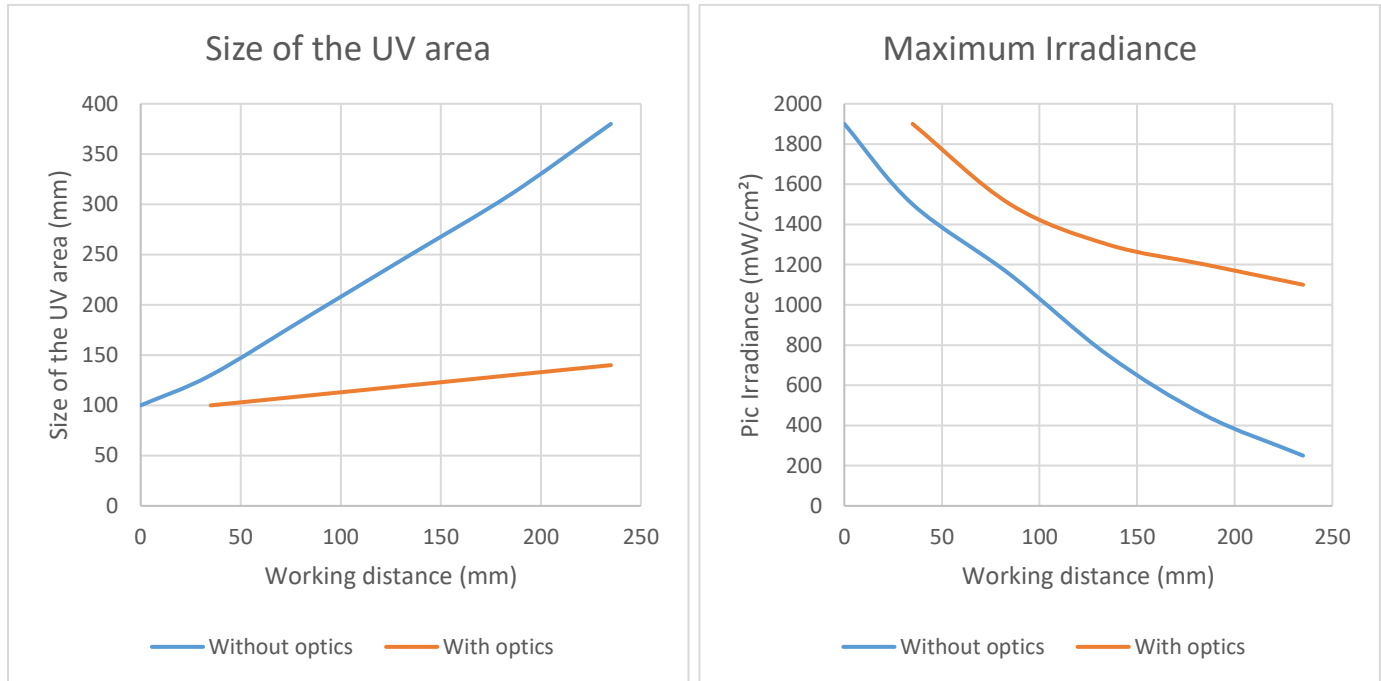


### Homogeneity with optics @ 10cm – UCUBE 25 LEDs



## Photometry: UCUBE 100 LEDs

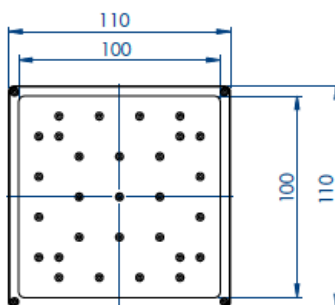
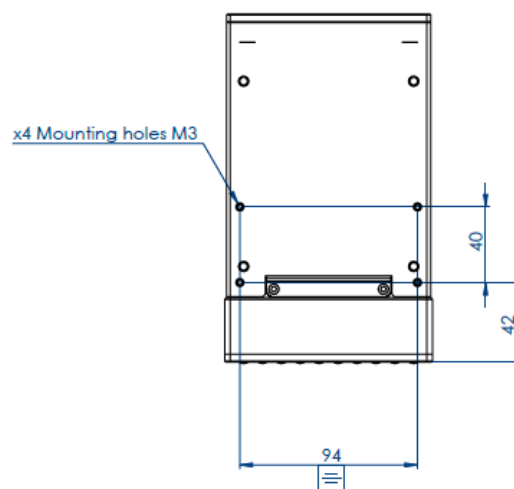
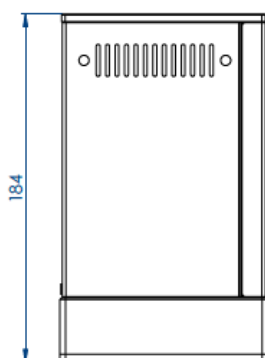
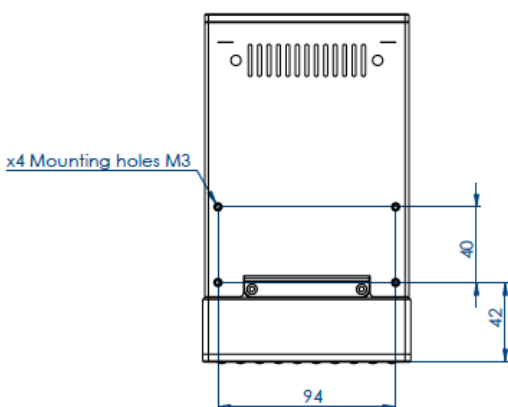
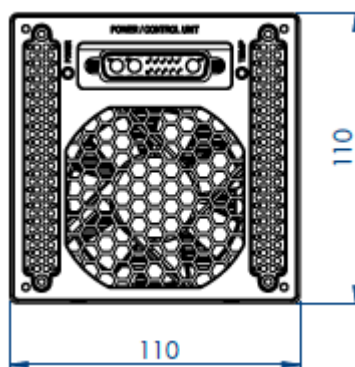
In the following graph, the area exposed is the area where the irradiance is higher than 50% of the maximum irradiance.



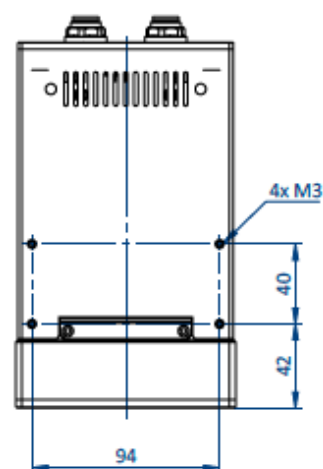
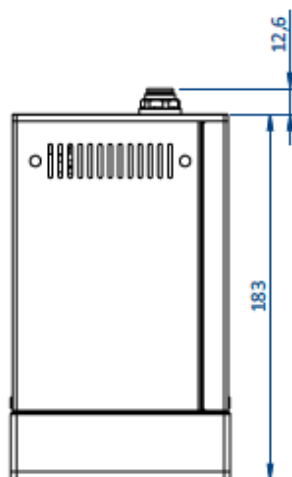
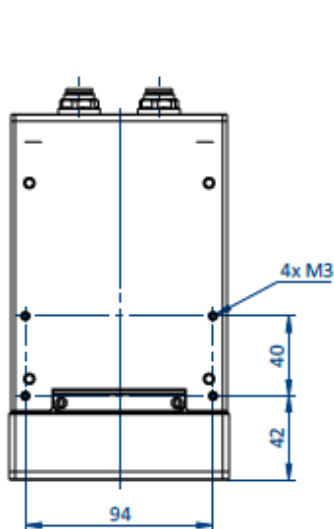
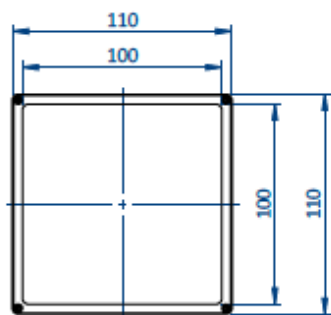
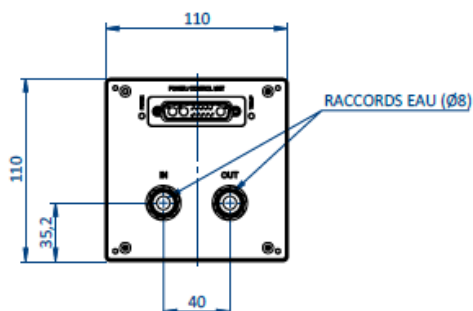


## Mechanical dimensions

Standard version:



## Water cooling version:





## How to use: with the power supply

The UCUBE™ can be provided with its power supply UPOWER™

Steps	Illustrations
Fix the product using the dimensions given in the “mechanical considerations” part (pay attention to leave a 10 cm space next to mechanicals holes for ventilation).	
Connect the cable SubD13W3 between the UCUBE™ and the UPOWER™	
Plug the UPOWER to a 230V outlet	
<p><b>The UCUBE™ is ready to be used.</b></p> <p>To turn the UCUBE™ ON, you can either use the buttons ON on the UPOWER, or connect the UPOWER to your PLC</p>	
<p><b>How to choose the light intensity</b></p> <p>Use the light intensity controller buttons on the UPOWER to control the light intensity from 20% to 99%</p>	

### How to choose the exposure time

Use the TIMER interface on the UPOWER to choose the exposure time. The red timer is fixed, and the orange timer is the one that you can change. To validate the time, push the reset button on the timer.

### How to lock the UPOWER

Turn the lock key in order to lock the timer configuration. The word "LOCK" appears on the timer screen.



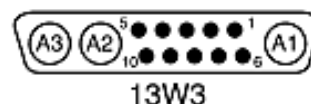
\*The version of the UPOWER™ is not furnished with the product. The UCUBE on the picture is a UCUBE-365-025 with UCUBE-COL-025 optical option.



## How to use: without the power supply UPOWER™

To connect the product into an automate, use the cable by following the board below.

SubD13W3  
Connector



### Female SubD 13w3 Connector

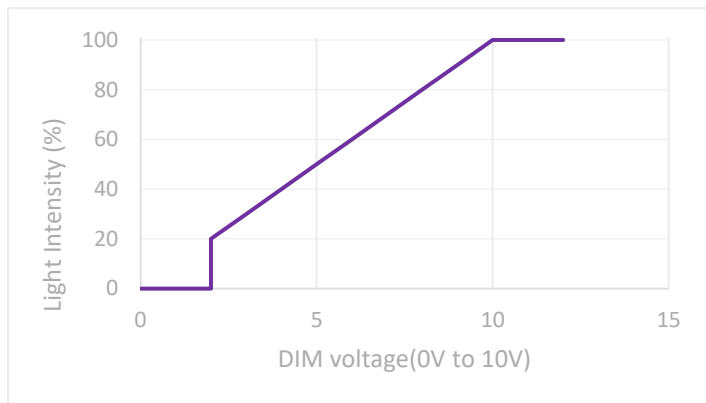
Cable number/Color	Pin number	In / Out signal	Designation	Signal
<b>1</b>	A1	In	Power supply +	48V
<b>2</b>	A3	In	Common Ground	0V
<b>3</b>	Pin 1	In	Intensity Control - DIM	0-10V or look at the graph in section "signals"
<b>5</b>	Pin 6	Out	Temperature Default	<b>0V to 6V: Fault / 16V to 24V: No Fault</b>
<b>6</b>	A3	In	Common ground	0V
<b>7</b>	Pin 4	In	Enable +	Dry contact CLOSED: UV emission allowed; OPEN: UV emission stopped
<b>8</b>	Pin 5	In	Enable -	
<b>Yellow and Green</b>			Protective Ground	

For more details about the several signals emitted, check out the section "signals"



## Signals

### Intensity Control



The UCUBE™ is supplied with a 48V constant voltage source.

Using the DIM pin, the light intensity can be controlled:

- 0V – OFF (0%)
- 2V to 10V – ON 20% to 100%
- 10V to 24V – ON (100%)

Max DIM power consumption: 5 mW

### Temperature Default

If the temperature of the LED is too high, probably because the cooling system has a problem, the product puts itself in temperature safety in order to prevent any damage on the LEDs.

- The LED of temperature state turn red
- A signal is sent to the automate

### Status LEDs

Two status LEDs 'Power' and 'Temp' can be found on both sides of the SubD connector. This LEDs give information about the proper functioning of the product.



STATUS	MEANING
POWER <b>off</b>	The product is not under voltage
POWER <b>red</b>	The product is under voltage but do not emit UV light
POWER <b>green</b>	The product is emitting UV light
TEMP <b>green</b>	The temperature inside the product is OK: the product can be turned on
TEMP <b>red</b>	The temperature of the LED is too high for the product to be turned on



## Accessories

Description and Photo	Description
<p><b>Cable for the UCUBE™</b></p> 	<p>Both sides connectors (UPOWER™ link):</p> <p>Reference: <b>UCAB-SUBD-FD-5-D-L5</b> }   2 } Depending on  10 } the length you  want (in meters)</p> <p>One side with bare wire (towards automate):</p> <p>Reference: <b>UCAB-SUBD-FM-5-DD-L5</b> }   2 } Depending on  10 } the length you  want (in meters)</p>
<p><b>UPOWER™</b></p> 	<p>We are able to provide you with any kind of power supply you need, different IHM, power, control and connectors.</p> <p>To build the one adapted to your needs please contact us.</p>
<p><b>UVCHAMBER™</b></p> 	<p>The UCUBE can be integrated into a protected chamber in order to protect operators and to work in hidden time. A tray inside can be placed at different working distance from the UV light.</p>