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

Security of the user

- 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 0°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.

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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/m²	30 J/m²

Case study with a LED at 365 nm with an Optical Power of 10 mW/cm²:

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

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

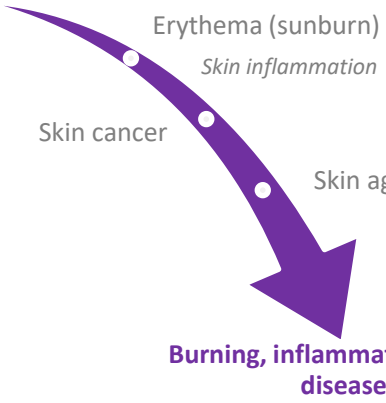
For **skin**, the Optical Power is normalized by skin's sensitivity factors for each wavelength.
The maximal exposure time per day is calculated below:

	Eyes	**Skin**
Optical Power (normalized for skin)	10 mW/cm²	4,7 µW/cm²
Maximal exposure time per day	**1 min 40 s**	**12 min**

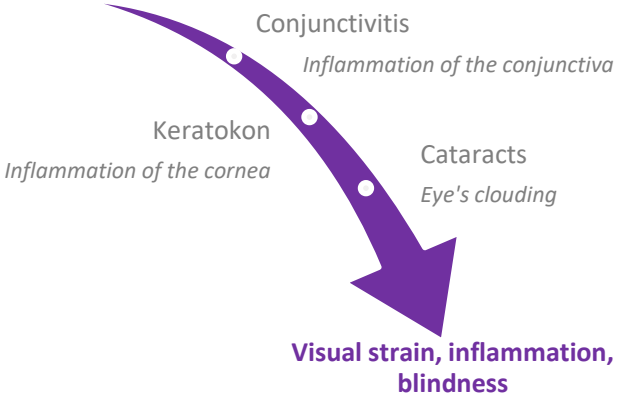
Therefore, with a UV product with an optical power of 10 mW/cm², the Exposure Limit Value per day is **reached in 2 minutes for eyes and 12 minutes for skin** without any safety equipment. Therefore, protective equipment is needed.

Possible damages on health

Effects on skin along unprotected UV exposure



Effects on eyes along unprotected UV exposure



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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/cm², 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/cm², protective mask is necessary according to the European Directive 2006/25/EC.

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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/cm², 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/cm², 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/cm², protective suit is recommended according to the European Directive 2006/25/EC.

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UV source isolation

UV shields are protective windows which isolate the UV insolated 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/cm², 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 — REF: USTICK-01
- 165 mm x 75 mm — REF: USTICK-02
- 290 mm x 130 mm — 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.

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Technical Overview

Electronics	*Power supply*	24V DC
	Illumination mode	Continuous with a DIM process [0-24V]
	Connector	M12 4 pins
	Power consumption	~ 5W
Optics	*Wavelength*	365 or 385 or 395 or 405 nanometers
	Irradiance	Up to 100 mW/cm²
Mechanics	*Diamater*	32 mm
	Length	Up to 200 mm
	Material	Device body: Aluminum alloy
Thermal	*Cooling system*	Passive cooling
Environment	*Working temperature*	10°C to 50°C
	Working humidity	< 80% for temp < 30°C
	IP code	IP40

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Product reference

	Objective	Wavelength (nm)
USHARP -	**WW**	**- XXX**
	NF	365
	MF	385
	FF	395
		405

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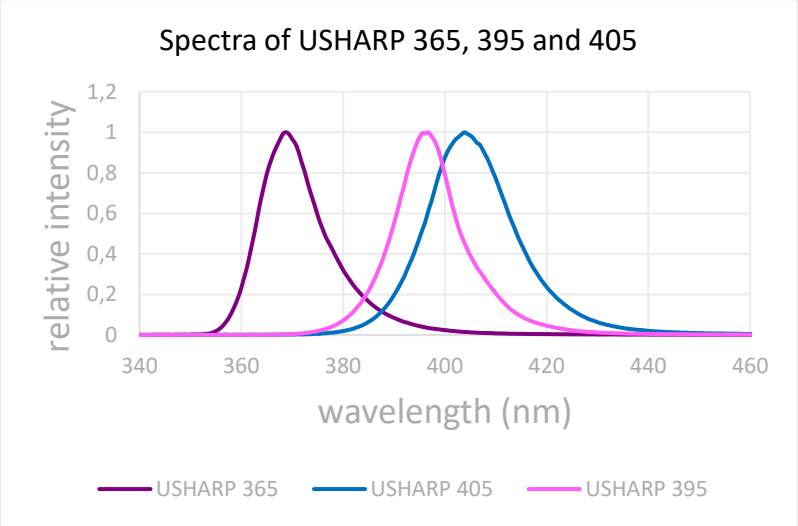
Optical characteristics

Spectra



	Pic Wavelength	Full width at half maximum
USHARP 365	368 nm	14 nm
USHARP 385	397 nm	14 nm
USHARP 405	404 nm	18 nm

Size of the Spot

The USHARP can be used with 3 different optic heads which adjust the size of the spot and the working distance depending on your needs.

For each optics, there is a range of working distance for which the position of the optics can be fixed to see the spot very clear and homogeneous (see below position A). If you want a higher Irradiance, you can reduce the working distance but the spot will be less clear and less homogeneous (see below position B).

Range of Optics 'Near Field' (NF): 135 mm to 280 mm
Range of Optics 'Middle field' (MF): 350 mm to 1050 mm
Range of Optics 'Far Field' (FF): 380 mm to 1500 mm

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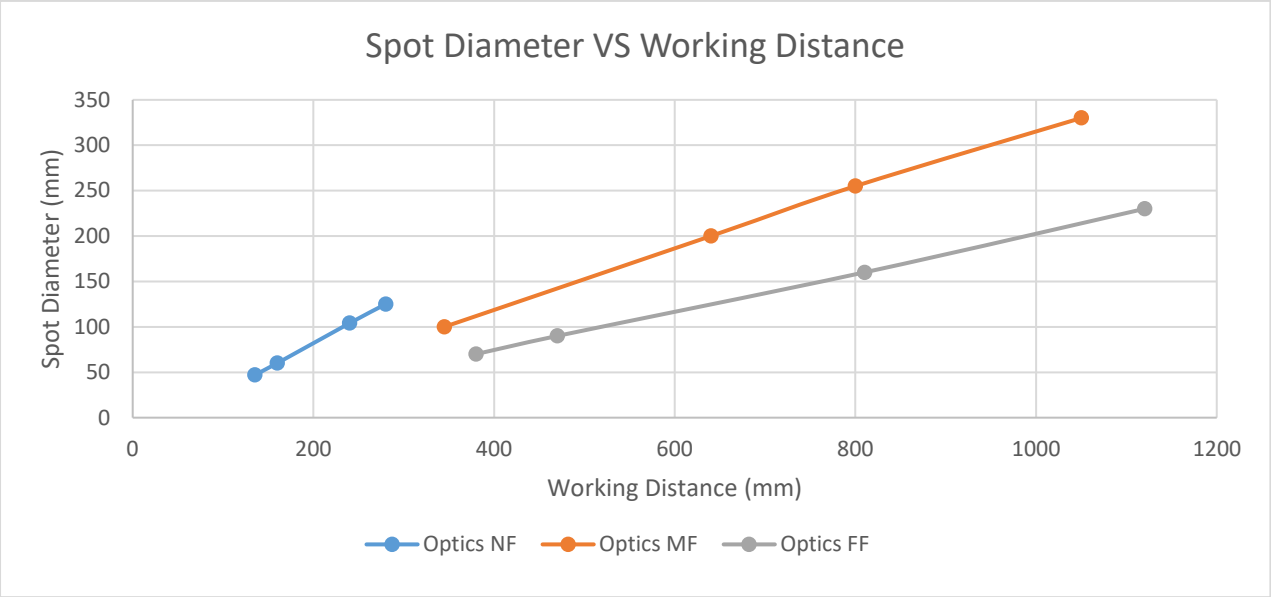
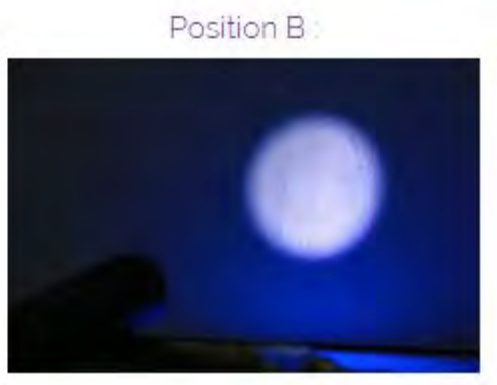
In the following graph, the spot size is the exposed area where the irradiance is higher than 50% of the maximum irradiance. This graph is the same for all wavelength.



Measures taken with a USHARP 405 equipped with a 15mm diameter mask.

Custom mask can be made in order to achieve your specifications.

Clear UV spot



Blurred UV spot

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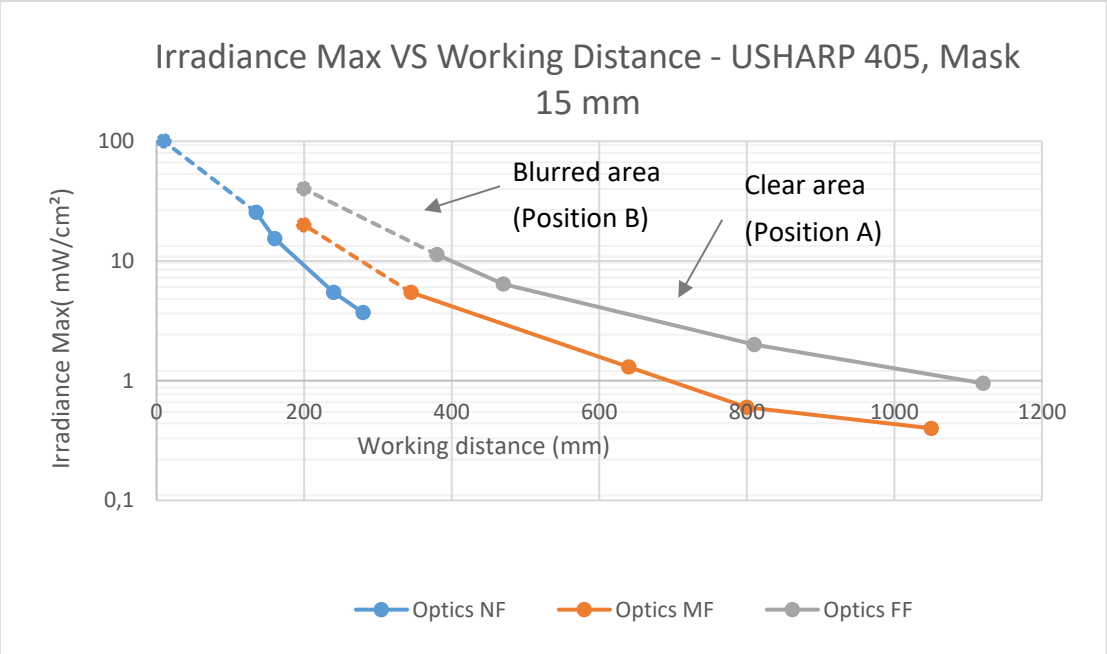
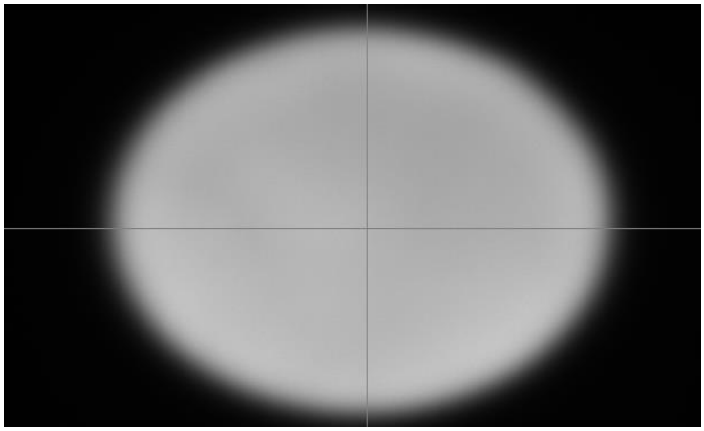
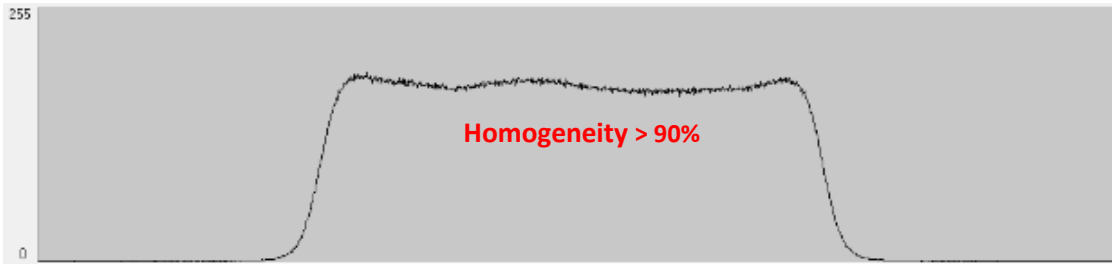
Photometry



Measures taken with a USHARP 405 equipped with a 15mm diameter mask.

Homogeneity of the Irradiance along the spot





Pixel intensity along the UV spot

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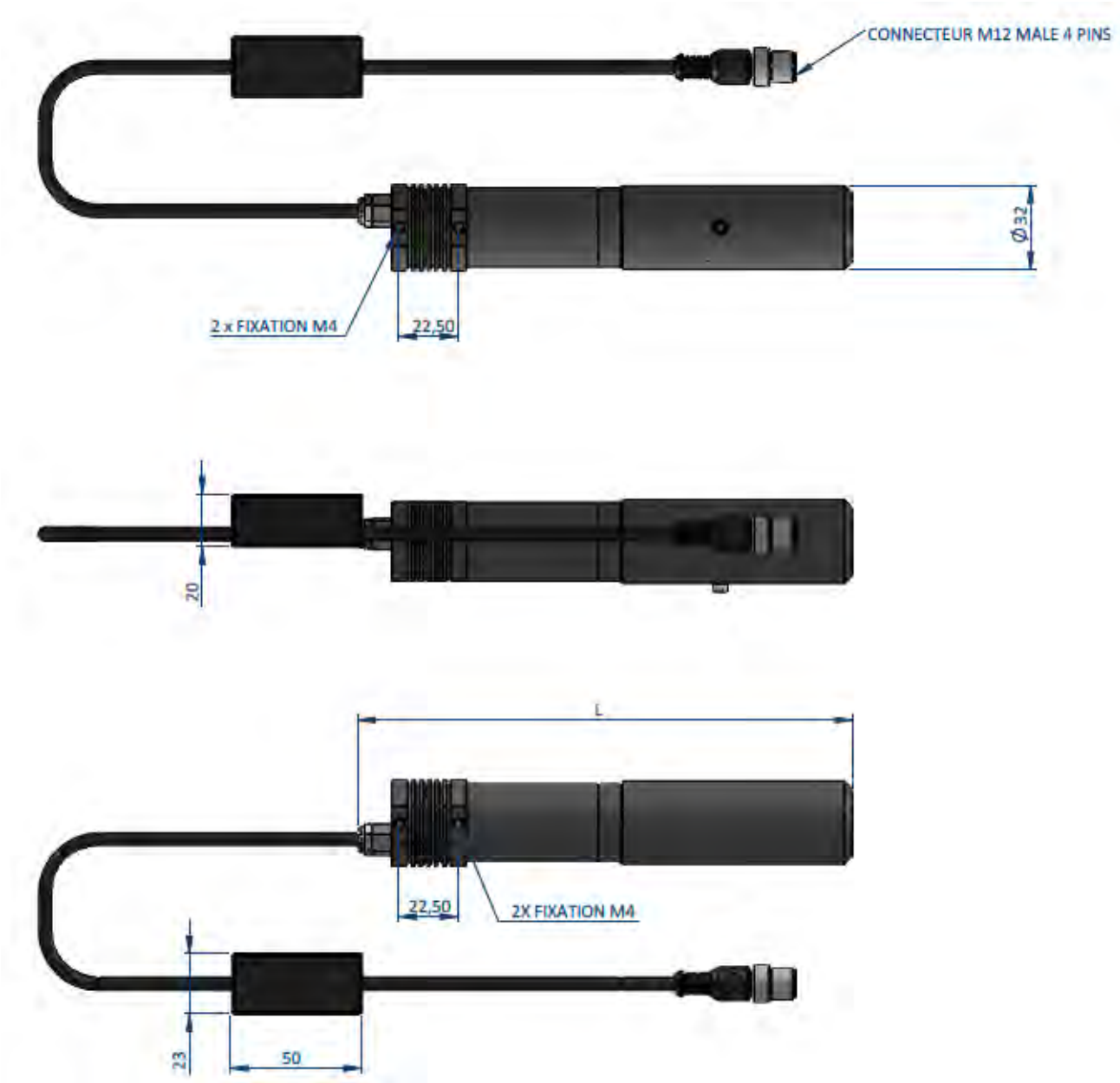
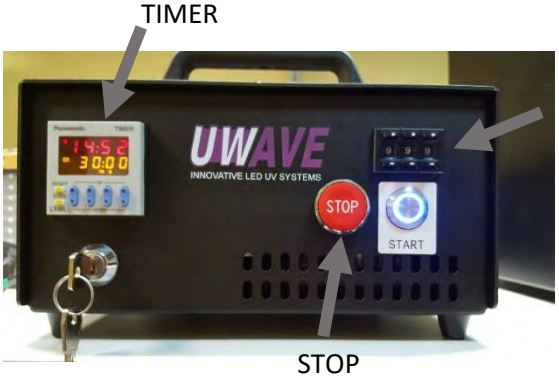
Mechanical dimensions



How to use: with the power supply UPOWER™

In order to correctly use the product, please read the following steps:

Steps	Photo description
Fix the product using the dimensions given in the mechanical dimensions part.	
Put the UPOWER™ in place. Pay attention to leave a 10cm space next to the ventilation.	
Link the product to the UPOWER™ with the cable.	 
Make sure every security connector is plugged on the back of the UPOWER™ (dry contact, door security…)	 *
Plug the UPOWER™ into your power supply. The plug is located on the back side of the UPOWER™	
Press the red button behind the UPOWER™ to power it up. (State LEDs on the product must turn on)	
Set up the power and the insolation time on the UPOWER™. For more details refer to the UPOWER™ datasheet if needed	
In case of emergency, press the STOP button.	

*The version of the UPOWER™ is not furnished with the product

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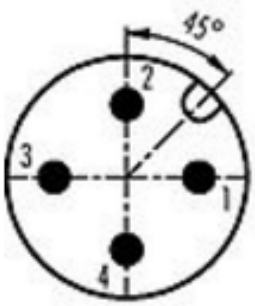
How to use: without the power supply UPOWER™

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

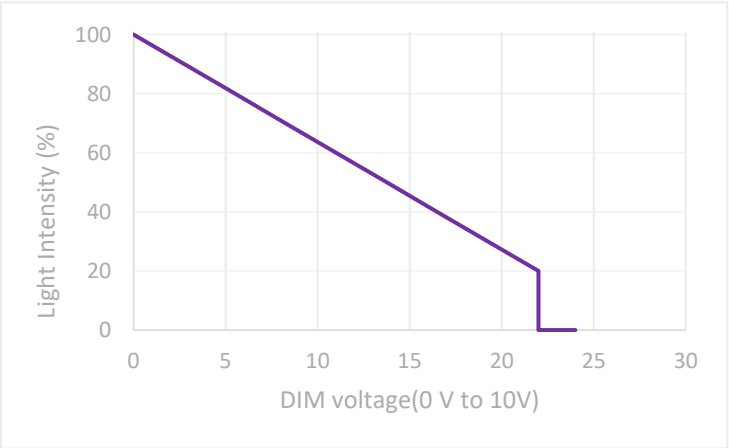
M12 4 pins Connector



M12 4 pins

Pin number	*Cable color*	*In / Out signal*	*Designation*	*Signal*
1	Brown	In	Power supply DC	+24V
2	White	-	Not used	-
3	Blue	In	Common ground	0V
4	Black	In	Intensity Control - DIM	0 – 24V or look at the graph below

Intensity control - DIM



The USHARP™ is supplied with a 24V constant voltage source.
Using the DIM pin, the light intensity can be controlled:

- 0V – ON (100%)
- 0V to 22V – 100% to 20%
- 22V to 24V – OFF (0%)

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Accessories

Here are some accessories for your USHARP:

Safety glasses, prevent UV damages to your eyes.

Reference: **UGLASS-02**

Cables for the USHARP™:

Both sides connectors (UPOWER™ link):

Reference: **UCAB-M12-FM-4-DD-L5** **2** / **10** — Depending on the length you want (in meters)

One side with bare wire (towards automate):

Reference: **UCAB-M12-FD-4-D-L5** **2** / **10** — Depending on the length you want (in meters)

UPOWER™:

We are able to provide you with any kind of power supply you need, different IHM, power, control and connectors.

To build the one adapted to your needs please contact us at sales@uwave.fr