



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 +45°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

| | |
|----------------------------------------|----|
| User security | 1 |
| Eyes & Skin Safety | 3 |
| Legal obligations | 4 |
| Possible damages on health | 4 |
| Protective equipment | 5 |
| Technical Overview | 8 |
| Product reference | 9 |
| Mechanical dimensions | 10 |
| How to use: with a power supply | 15 |
| How to use: with a PLC | 16 |
| Signals | 18 |
| Accessories | 19 |



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 ² | 30 J/m ² |

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:

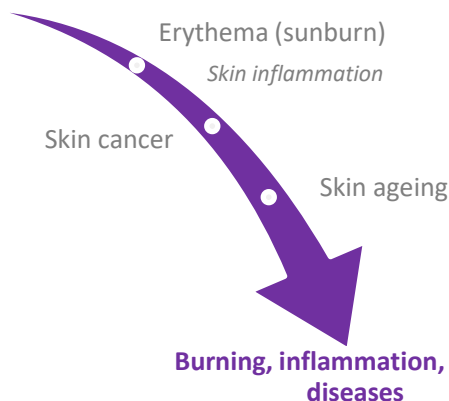
| | Eyes | Skin |
|--------------------------------------|-----------------------|------------------------|
| Optical Power (normalized for skin) | 10 mW/cm ² | 4,7 μW/cm ² |
| Maximal exposure time per day | 1 min 40 s | 12 min |

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.

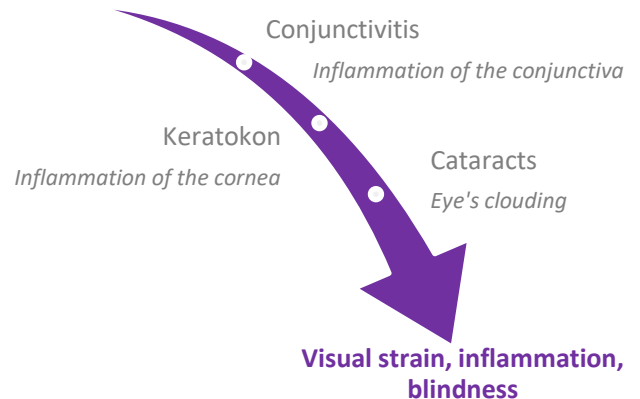


Possible damages on health

Effects on skin along unprotected UV exposure



Effects on eyes along unprotected UV exposure





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.



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.



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/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
- 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 ULINE™ exists in 5 standard versions corresponding to 4 different length: 75mm, 150mm, 225mm, 300mm and 375mm. However, we can provide you custom products up to 900mm long depending on your needs.

| | | ULINE™ 75 | ULINE™ 150 | ULINE™ 225 | ULINE™ 300 | ULINE™ 375 |
|---------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------|------------|-------------------|------------|----------------|
| Electronics  | Power supply | 48V DC | | | | |
| | Illumination mode | Continuous with a DIM process [0-10V] | | | | |
| | Connector | SubD 13W3 | | EPIC + M12 8 pins | | |
| | Power consumption | 500 W | 1000 W | 1500 W | 2000 W | 2500 W |
| Optics  | Wavelength | 365 or 385 or 395 or 405 nanometers | | | | |
| | Irradiance at the window | Up to 16 W/cm ² for 385, 395 and 405 nm Up to 12 W/cm ² for 365 nm | | | | |
| Mechanics  | Width and height | 65 mm x 166 mm | | | | 65 mm x 186 mm |
| | Length | 100 mm | 175 mm | 250 mm | 325 mm | 400 mm |
| | Material | Device body: Aluminum alloy Window glass type: Quartz | | | | |
| | Weight | 1.1 kg | 2.0 kg | 2.9 kg | 3.8 kg | 5.0 kg |
| Thermal  | Cooling system | Water Cooling | | | | |
| | Recommended Chiller | 1200 W | 1200 W | 1800 W | 2400 W | 3000 W |
| | | <i>UWAVE can support you through the CHILLER & accessories choice.</i> | | | | |
| Environment  | Working temperature | +15°C to +45°C | | | | |
| | Working Humidity | < 80% for temp < 30°C | | | | |
| | IP Code | IP40 | | | | |



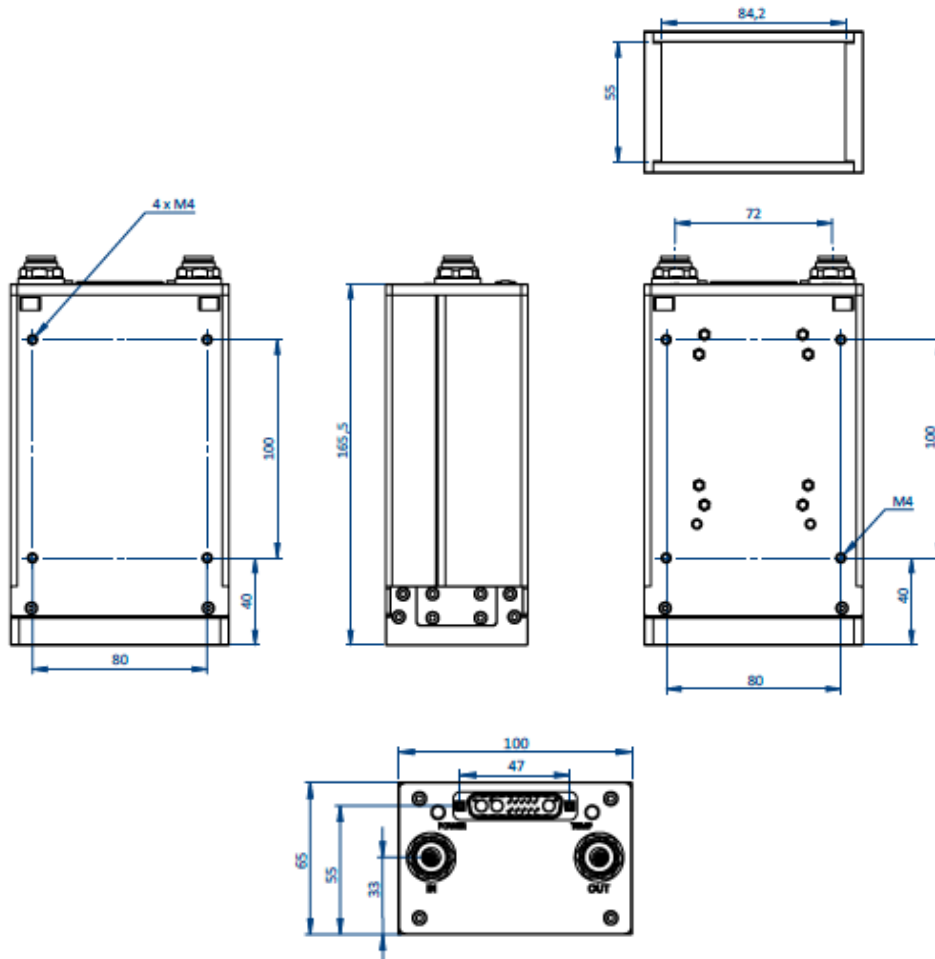
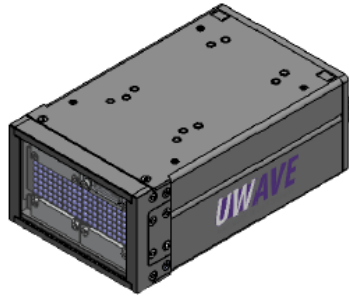
Product reference

| Wavelength (nm) | Irradiance (W/cm ²) | Length (mm) |
|--------------------|------------------------------------|----------------|
| XXX | YY | ZZZZ |
| 365 | 12 | 75 |
| 385 | 16 | 150 |
| 395 | | 225 |
| 405 | | 300 |
| | | 375 |

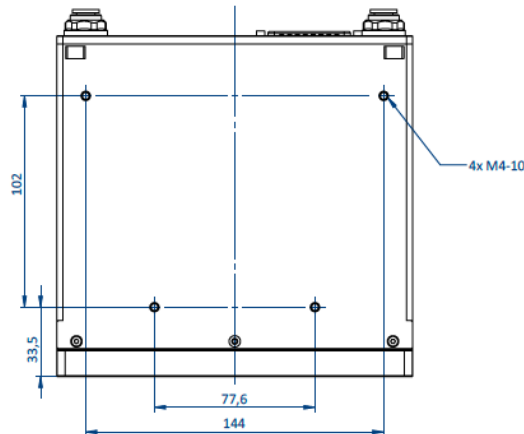
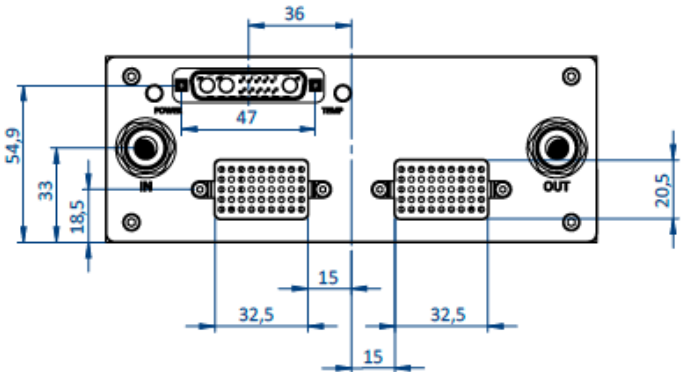
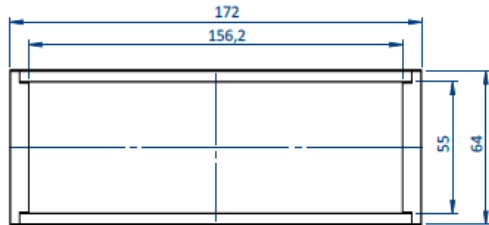
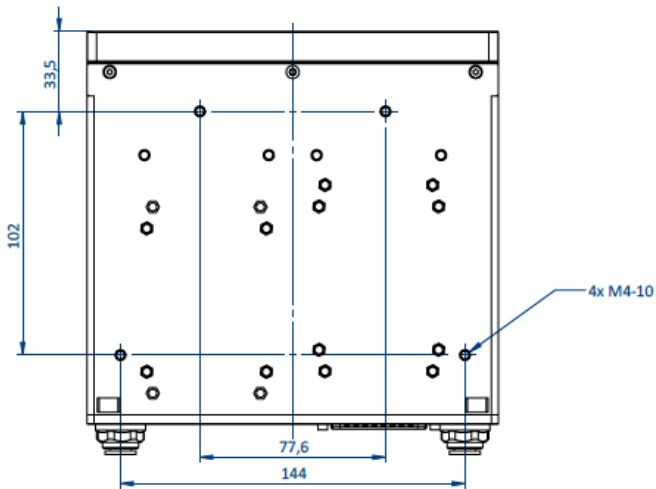
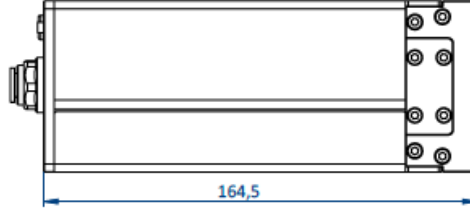
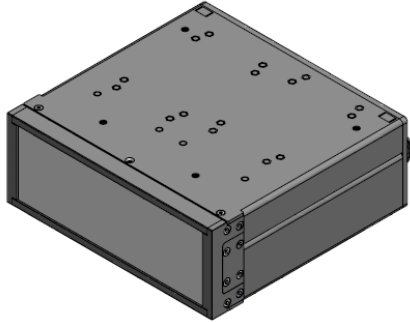


Mechanical dimensions

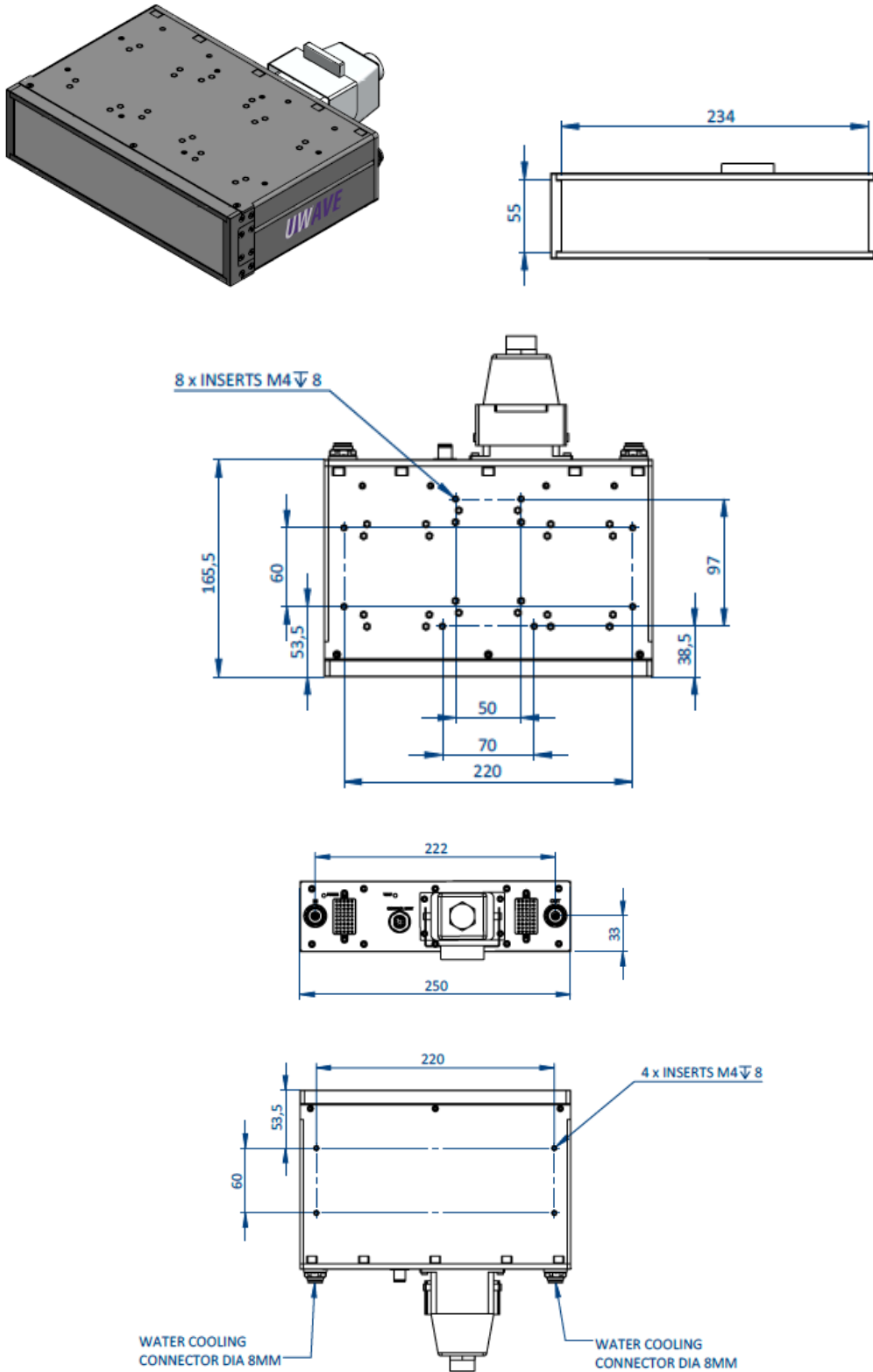
ULINE 75 mm



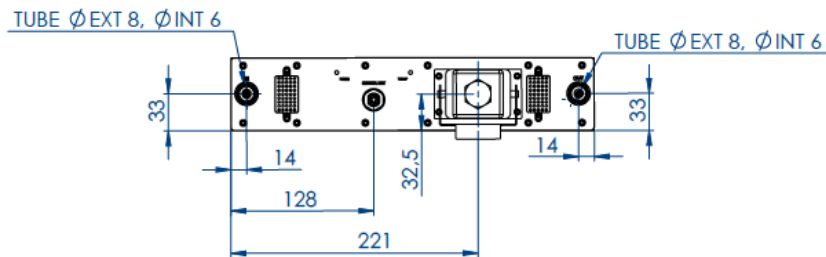
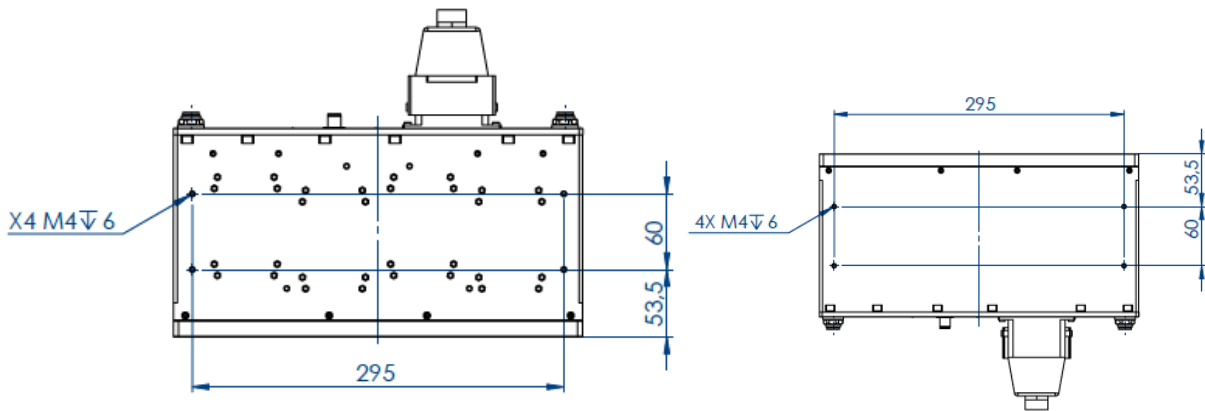
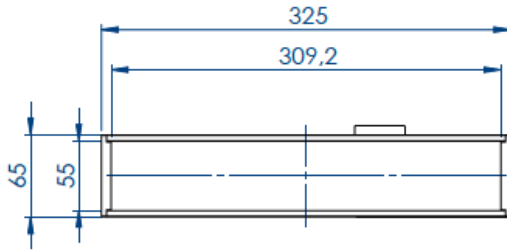
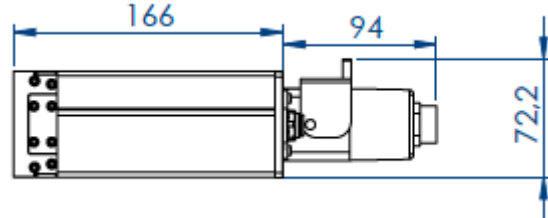
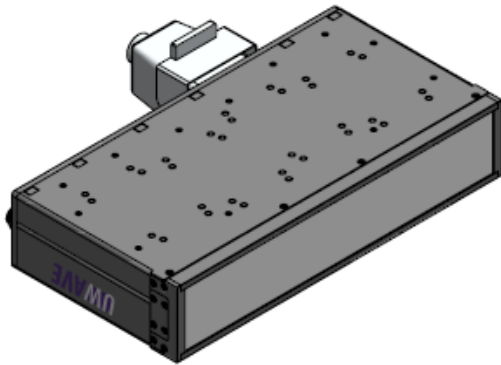
ULINE 150 mm



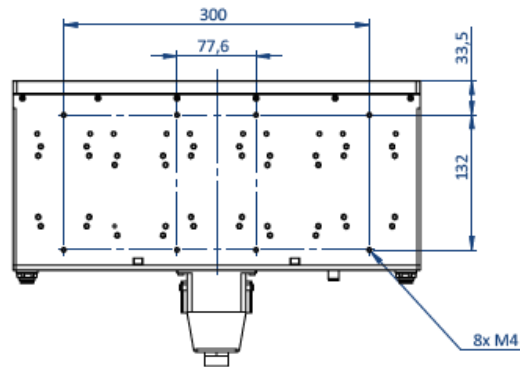
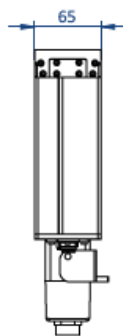
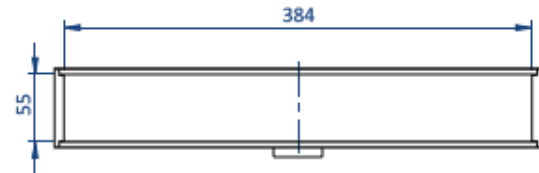
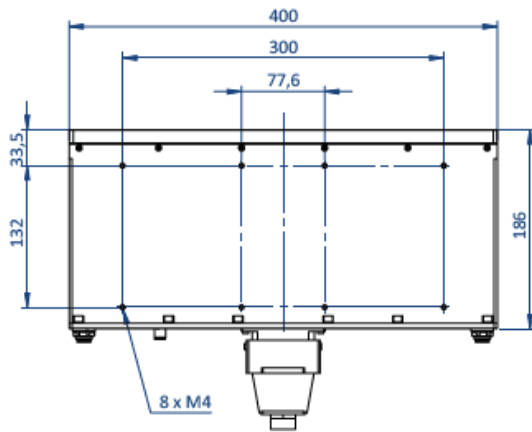
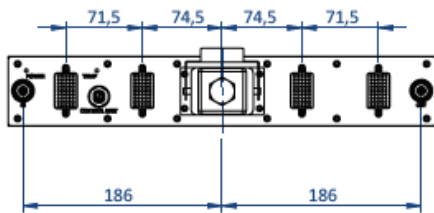
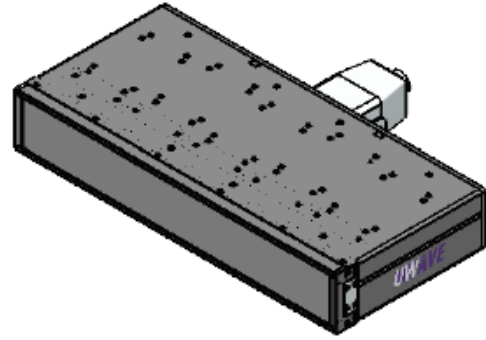
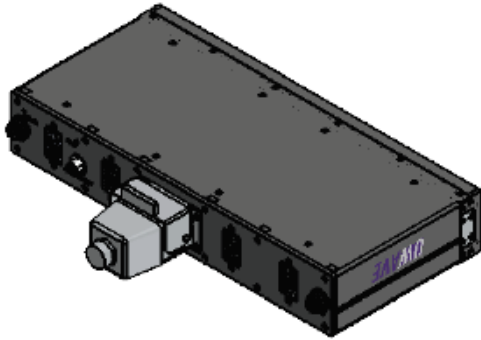
ULINE 225 mm



ULINE 300 mm








ULINE 375 mm





How to use: with a power supply

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

| Steps | Photo description |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>Fix the product in the machine using the dimensions given in the “mechanical dimensions” part.</p> | |
| <p>Link the ULINE to the water-cooling system thanks to 8mm diameter pipes. ➔ Verify that there is no water leakage in the hydraulic system.</p> | |
| <p>Put the UPOWER™ in place. ➔ Pay attention to leave a 20cm space next to the ventilation holes.</p> | |
| <p>Link the product to the UPOWER™ with the cable. ➔ SUBD for ULINE 75 & 150 mm ➔ EPIC + M12 8pins for ULINE >150mm</p> |  |
| <p>Make sure every security connector is plugged on the back of the UPOWER™ (PLC security, chiller security, ...)</p> |  |
| <p>Plug the UPOWER™ into the wall and press the red button to power it up. ➔ Status LED on the ULINE must be on.</p> |  |
| <p>Set up the power thanks to the potentiometer and the insolation time thanks to the TIMER located on the front side of the UPOWER™.</p> |  |
| <p>Press the START button to launch UV insolation. In case of emergency, press the STOP button.</p> |  |

➔ These steps are made for a quick understanding. Please refer to the UPOWER and the CHILLER datasheet for further information.

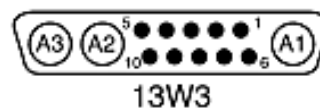


How to use: with a PLC

ULINE 75 mm and ULINE 150 mm

The ULINE 75 and the ULINE 150 can be used without the UPOWER™ in order to directly supply it by yourself by using a PLC. To connect your PLC to the UV product, use the cable by following the board below.

The connector for the ULINE 75 mm and the ULINE 150 mm is a SubD 13W3 connector.



Female SubD 13w3 Connector

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

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

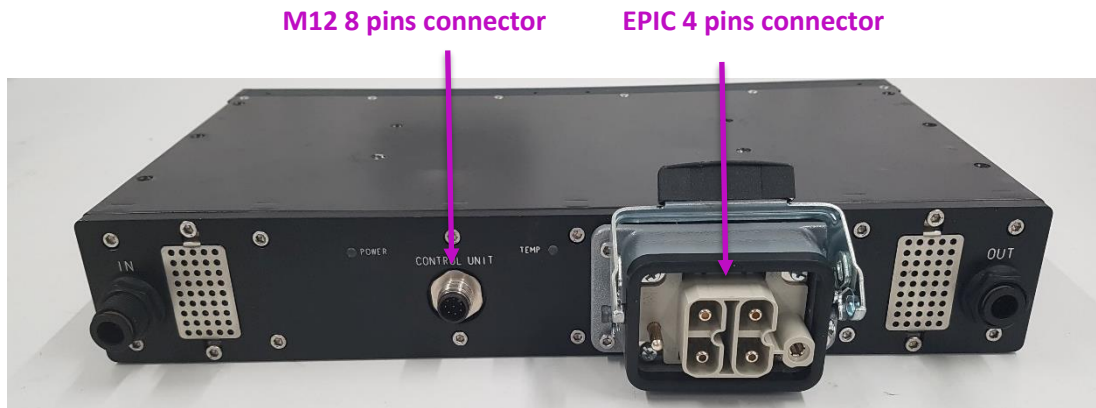
ULINE 225 mm, 300 mm and 375mm

The ULINE 225 and the ULINE 300 and the ULINE 375 can be used without the UPOWER™ in order to directly supply it by yourself by using a PLC. To connect your PLC to the UV product, use the cable by following the board below.

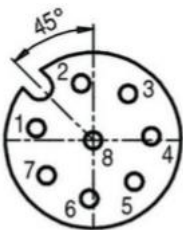
The connectors for the ULINE 225 mm and the ULINE 300 mm are:

- One EPIC 4 pins for the power signal
- One M12 8 pins for the control signal

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

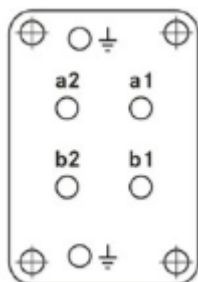


M12 8 pins connector



| Pin number | Cable color | Designation | Signal |
|------------|-------------|---------------------|----------------------------------------------------------------------|
| 1 | White | DIM | 0 – 10V or look at the graph in section "signals" |
| 2 | Brown | Common ground | 0V |
| 3 | Green | Temperature + | Reading of the thermistor value For more information, contact us. |
| 4 | Yellow | Temperature - | |
| 5 | Gray | Enable + | Dry contact |
| 6 | Pink | Enable - | |
| 7 | Blue | Default Temperature | 0 – 6V -> Default; 16 – 24V -> No Default |
| 8 | | Do not use | |

EPIC 4 pins connector

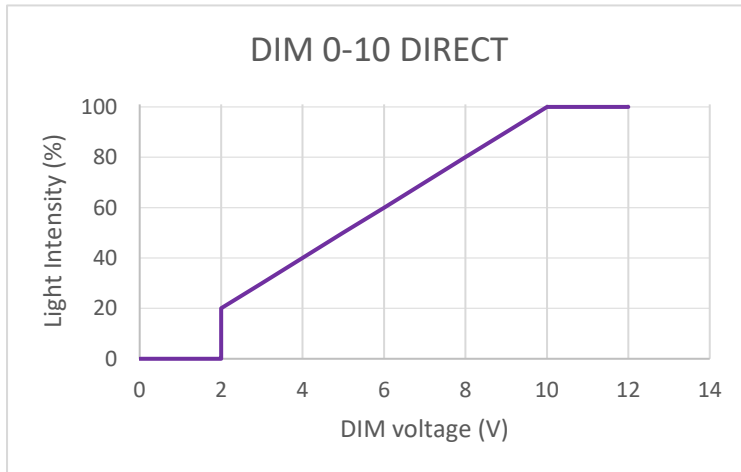


| Pin number | Cable color | Designation |
|------------|-------------|-------------|
| A1 | Gray | 48V |
| A2 | Black | GND |
| B1 | Brown | 48V |
| B2 | Blue | GND |



Signals

Intensity Control



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

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

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

Max DIM power consumption: 50 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

Thermistor Value

This product has a thermistor giving the temperature value near the LEDs. The thermistor value can be read using the pins 2 and 5. You can find the board of conversion on the manufacturer website: Vishay, using the reference of the supplier: NTCS0805E3103JMT.

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



Accessories

| Name and photo | Description |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Cables SubD 13W3 for the ULINE™ 75/150</p>  | <p>Both sides connectors (UPOWER™ link):</p> <p style="text-align: right;">2 } Reference: UCAB-SUBD-FM-5-DD-L5 } Depending on 10 } the length you need (in meters)</p> <p>One side with bare wire (towards automate):</p> <p style="text-align: right;">2 } Reference: UCAB-SUBD-FD-5-D-L5 } Depending on 10 } the length you need (in meters)</p> |
| <p>Cables M12 for the ULINE™ 225/300/375</p>  | <p>Both sides connectors (UPOWER™ link):</p> <p style="text-align: right;">2 } Reference: UCAB-SUBD-FM-8-DD-L5 } Depending on 10 } the length you need (in meters)</p> <p>One side with bare wire (towards automate):</p> <p style="text-align: right;">2 } Reference: UCAB-M12-FD-8-D-L5 } Depending on 10 } the length you need (in meters)</p> |

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Cables EPIC for the ULINE™ 225/300/375</p>  | <p>Both sides connectors (UPOWER™ link):</p> <p style="text-align: right;">2 } 10 }</p> <p>Reference: UCAB-SUBD-FM-5-DD-L5 } Depending on the length you need (in meters)</p> <p>One side with bare wire (towards automate):</p> <p style="text-align: right;">2 } 10 }</p> <p>Reference: UCAB-SUBD-FD-5-D-L5 } Depending on the length you need (in meters)</p> |
| <p>UPOWER™</p>  | <p>To help you integrating the ULINE in your process, UWAVE can provide you an easy-to-use power supply: UPOWER™</p> <p>Recommended UPOWER: ULINE 75 mm → UPOWER-0600-48 ULINE 150 mm → UPOWER-1500-48 ULINE 225 / 300 / 375 mm → UPOWER-3000-48</p> <p style="text-align: center;"><i>To build the one adapted to your needs please contact us at sales@uwave.fr</i></p> |
| <p>Chiller</p>  | <p>The ULINE™ is cooled down by a water system for a better stability over time and a higher irradiance. Depending on the length of the product, UWAVE is able to provide you the right chiller from SMC company.</p> <p>References: CHILLER HRS012-AF-20 } Power: 1200W CHILLER HRS018-AF-20 } Power: 1800W CHILLER HRS024-AF-20 } Power: 2400W CHILLER HRS030-AF-20 } Power: 3000W</p> |