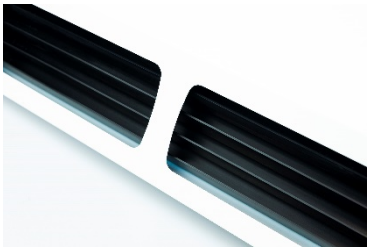
UVC Recirculating
Air Disinfection System
V-LAB

Operating Instruction

Instruction manual

UVpro V-LAB

Recirculating
Air Disinfection System



Dear customer,
You have graciously chosen an **Orca** GmbH product. This manual is intended for your safety in the handling of the system. Before mounting the components and putting the system into operation read the following statements carefully to avoid hazards caused by improper operation.
Keep this document and make all users aware of it!

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1. SAFETY INSTRUCTIONS

1.1. Danger

Misuse or incorrect operation may lead to the following:

- Electric Shock
- Exposing eyes to dangerous light
- Burns on skin
- Damage to the treatment system
- Damage or impairments of other devices, equipment, or materials, or to the production flow
- A decline or absence in the disinfection performance.

Users, installers, maintenance and cleaning personnel, must follow the instruction manual correctly and be made aware of possible dangers.

1.2. What the symbols mean

DANGER

DANGER, ELECTRIC VOLTAGE

HARMFUL UVC RADIATION

INFORMATION

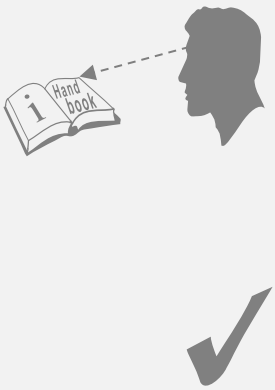
1.3. **To be aware of before usage**

Read the instruction manual

All persons who work with the set-up, use, maintenance, or repair the device must confirm that they have read and understood the instruction manual.

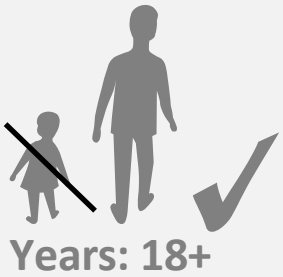
The instruction manual should at all times be available to the personnel.

The operator is responsible for any damages caused to third persons in the operating range of the model. Damages occurring due to misuse or false operation is the responsibility of the user.



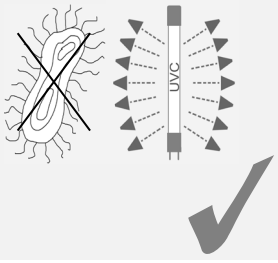
Minimum age: 18 years

One must be at least 18 years of age to operate this equipment.



UVC-Sterilization

UVpro equipment's intended use is sterilization using UVC light. Any other use is not permitted.

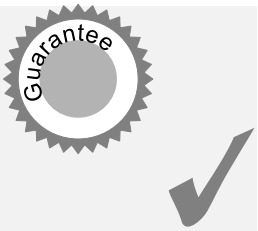


No changes

Changes made to the device from anyone other than orca GmbH are not permitted.

Warranty only with original replacement parts

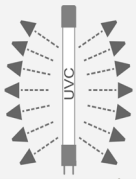
In the case of maintenance, only original replacements parts (from orca) may be used.
Ignoring this will make any warranty of the device void.



1.4. Emission

UVC-Radiation

The radiation emitted is mostly UVC light with a wavelength of 254 nm (non-visible)
There are trace amounts of ozone (in the ozone free lamps), clearly under the legal MAK-value (<<0,2 mg/m³).



λ = 254 nm (UVC)

O_3 = <<0,2 mg/m³

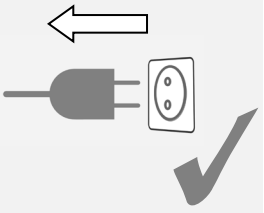
1.5. Avoiding Danger

Maintenance by authorized personnel only

Maintenance work can only be done by authorized personnel.

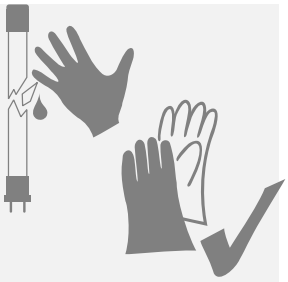
Maintenance only without power

Before any maintenance work can be done, ensure that no power is running through the equipment (turn off main switch or pull the electric plug out of the socket.)



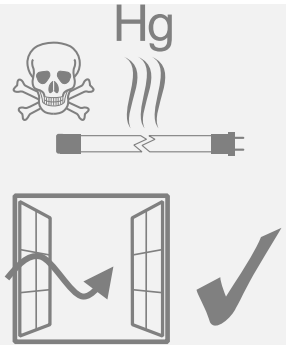
Broken glass danger

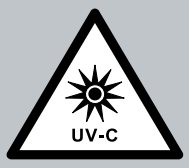
The UVC tubes are made from quartz glass, and can shatter or break. If using the UVC tubes, please wear gloves.



Guidelines if glass breaks

There is a possibility of liquid mercury leaking out from broken or damaged tubes. If this happens, please air out the room and dispose of shards, fragments, and tubes in appropriate waste systems.

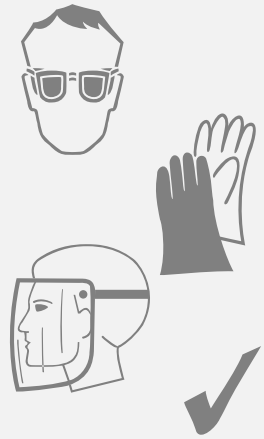




Danger via UVC

UVC radiation damages the cornea, eyes and skin after only a few seconds of exposure and these areas should therefore be protected.

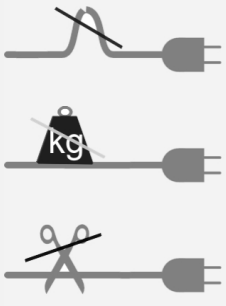
Never look at a lighted UVC source without protection. Personal protection equipment (PPE) must be worn. When controlling the function of the UVC tubes a UVC protected pair of goggles as well as gloves must be worn. Skin on arms is protected through clothing with long sleeves.



1.6. **Measurements on site**

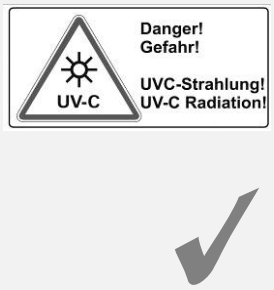
Cables carrying electricity should be undisturbed

The cables carrying electricity must be laid in a way that they are not bent, cut, underneath heavy objects, or in any other way at risk of destruction.



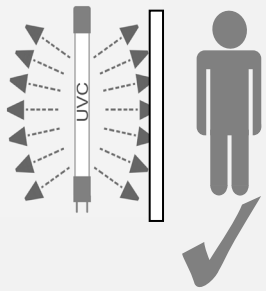
Warnings

The appropriate warnings (for example “Attention, UVC radiation: Protect eyes and skin”) Must be set up in a place where they are easy to spot before one enters the dangerous area.



Protection against UVC radiation

Install protection against UVC radiation!
Optical glass, acrylic glass, or opaque items, like sheets are impermeable to UVC radiation and will protect against it.



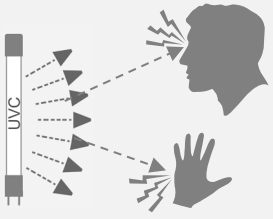
1.7. In case of emergency

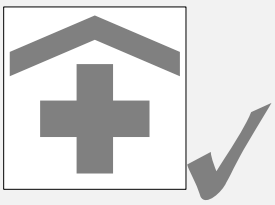
Measures in case of danger to skin/eyes

With direct contact, UVC radiation leads to painful inflammation of the eye cornea and redness of the skin.

The effect can also manifest itself after some time. In cases of emergency, see a specialist.

This is also applicable in cases of burnt skin caused by UVC radiation.





2. TECHNICAL DATA AND DESCRIPTION OF THE SYSTEM

2.1. Specifications

UV*pro*	
Type	**UV*pro* V-LAB**
In conformity with requirements	EMV, CE, IP51
Material	stainless steel: WN 1.4301 und WN 1.4305
Operating temperature [°C]	0...+40
Input power [W]	92
Current flow [mA]	400
Suitable **UV*pro*** tube	**UV*pro*** N 30-4 (2x 31 W)
Total UVC output [$W_{253,7\ nm}$]	22
Air volume [m^3/h]	50...100 (adjustable)
Noise emission [dB]	41...51 (depending on fan performance)
Hanging system	Hole pattern for wall mounting see 3.4 Positioning and dimensioning
Measurements (L x H x T) [mm]	850 x 402 x 144
Weight [kg]	13.1 kg
Tube replacement interval [h]	12,000 (75 % $^{\pm 5\ \%}$ output performance)
Life expectancy electronics	> 10 years
Supply voltage [V_{AC}]	220...240 (50...60 Hz)
Cable length [m]	5 (with safety plug)
	Technical changes reserved.

2.2. System description

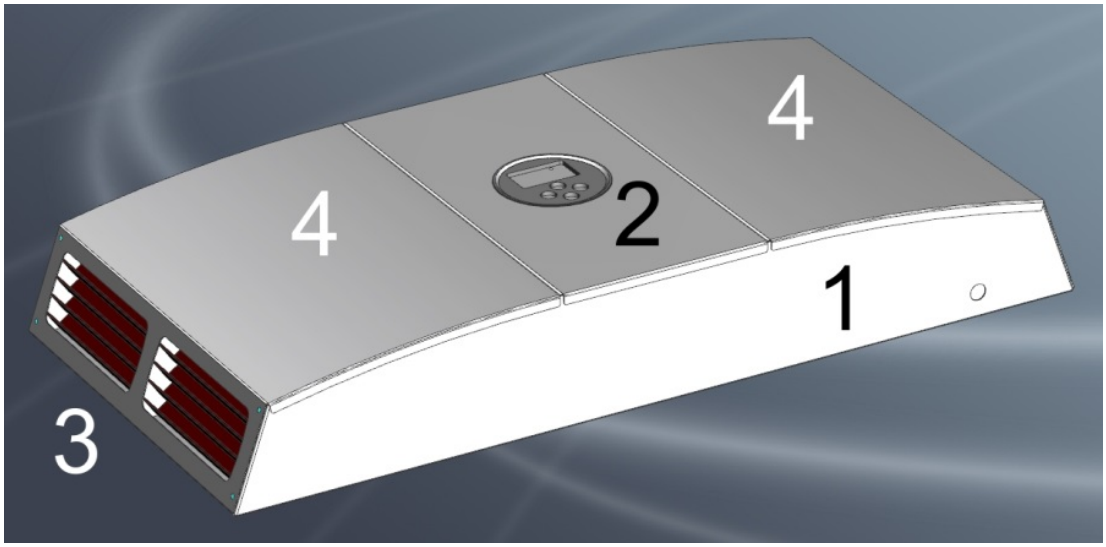
The **UV*pro*** V-LAB Recirculating Air Disinfection System is suitable for the use in laboratories, patient rooms and medical practices. The unit can be mounted on the wall and is able to disinfect rooms up to 60 m² effectively. The sterilisation rate and air circulation rate can be regulated by continuously adjustable ventilation.

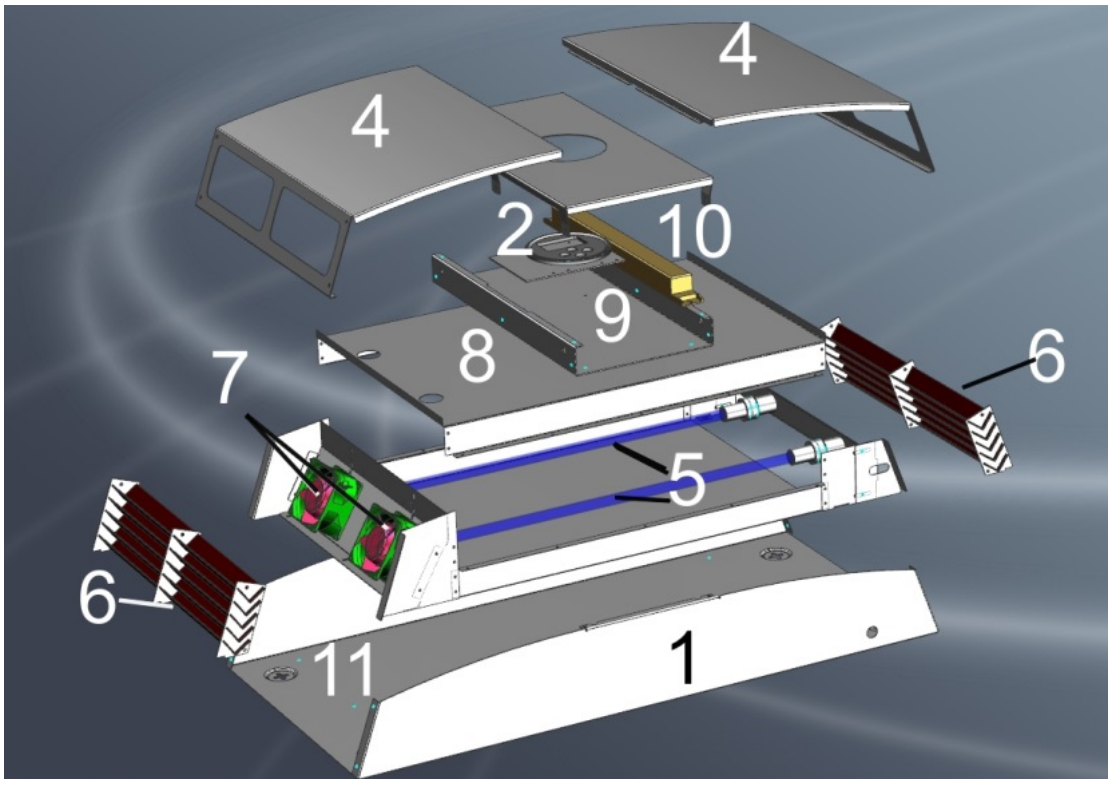
The **V-LAB (1)** consists of a housing with operating element and **display (2),** side **air outlets (3)** with **visual protection (6)** and two **service covers (4).**

UVC tubes (5) are mounted inside the **aluminium irradiation chamber (8)** and the two **fans (7)** are places opposite. The powder-coated housing can be mounted in both ways, vertical and horizontal. By means of four fixing points, the unit is attached to the **rear panel (11).** The centrally located **operating panel (2)** can be accordingly adjusted within the unit on the **retaining plate (9)**.

The **middle plate (10)** covers the operating panel from the outside. In the irradiation chamber the **UV*pro* tubes (5)** are screwed down to the fitting carrier with a union nut on one site and fixed through holding eyelets on the other side.

Outside, on both ends of the unit, there are visual protections with a **lamellar structure (6)**. The irradiation chamber is mounted in a powder-coated protective housing. Both of the **service covers (4)** are fixed through socket screws on the side of the housing. With **mounting holes (11)** on the reverse side of the protective housing, the unit can be attached on the wall.





3. ELECTRONIC COMPONENTS

3.1. Electronic components

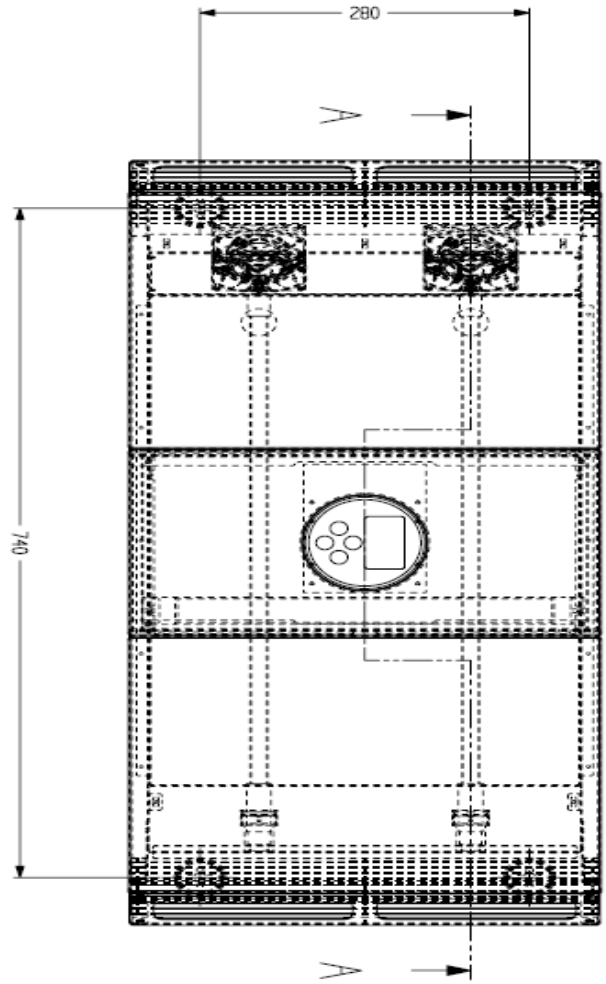
The **UV*pro*** V-LAB Recirculating Air Disinfection System has a high-quality **ballast (10)** for optimum operation of the **UV*pro*** tube. In this way maximum power, high frequent ignition and high durability can be guaranteed. The high-frequency technology ensures a very high efficiency and low power consumption. Of course, all components are in conformity with the “Low Voltage Directive” and “EMC directive”.

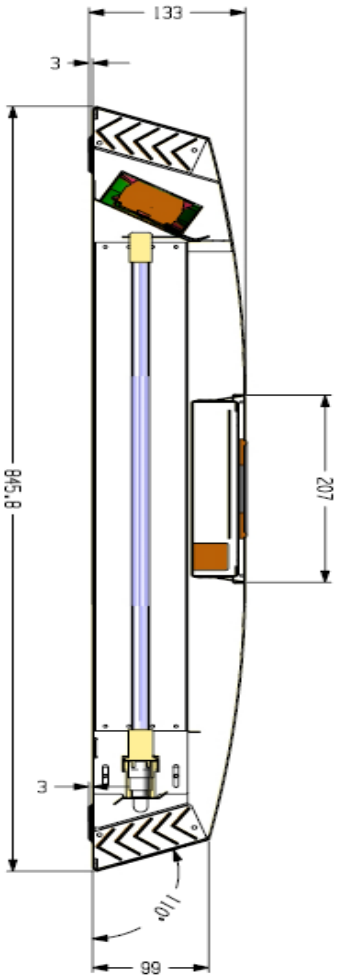
If a tube has a malfunction or in case of a defect in the wiring to or in the tube socket the ballast automatically switches the connected tube off. Thus, the circuit board will be protected and a malfunction can be detected by our monitoring units. The temperature of the square tube with the fully encapsulated ballast is a maximum of 35 °C (at room temperature). The optimum temperature is between 0 °C and +40 °C. Heating to 70 °C in a short term is possible but leads to a momentary power loss and permanently accelerates the aging of the system.

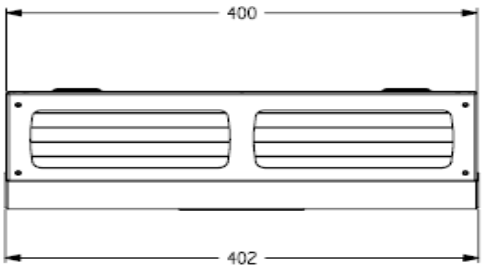
3.2. Connection directly or with UV*pro* monitoring unit

- Connection with the grid	230 V_{AC} $^{\pm 10\,\%}$. The protection of the connection via a **residual current circuit breaker** (30 mA) is mandatory.
- UV*pro* CU1	The optional monitoring unit **CU1** can be used for one **UV*pro*** device. You will find further information in the documentations of this monitoring unit.
- UV*pro* UVC-Line 8/16/24	The optional monitoring unit **UVC-Line 8/16/24** can be used for several **UV*pro*** devices. Further information can be found in the documentations of this monitoring unit.

3.3. **Dimensions and sketch**







4. COMPONENTS OF THE SYSTEM

UV*pro* V-LAB Recirculating Air Disinfection Systems are inspected visually and measured electrically before delivery. The screw joints and O-rings are pre-assembled and inserted accordingly. The UVC tubes are already mounted when delivered. While unpacking, you should verify the completeness of the delivery in view of the bill or Figure 2.2. Please inform us about damages (like broken glass) or missing components.

Please check the receipt of the shipment to ensure it is complete. If any parts are missing or incorrectly fitted, system cannot be used under any circumstances.

The **UV*pro*** V-LAB Recirculating Air Disinfection System consists of the following components:

Recirculating Air Disinfection System **UV*pro*** V-LAB	
ITEM DESCRIPTION	**ITEM NUMBER**
Irradiation chamber including supply unit, union rings and retaining clips for the tubes, reflector, fan, 2 visual protections with lamellar structure and 5 m cable	V-LAB pre-assembled
2 x UVC-radiation source, Type **UV*pro*** N30-2	2 x **UV*pro*** N30-2

4.1. Installation instructions

The **UV*pro*** V-LAB has been carefully inspected and passed a function test before shipping. The high-quality packaging should prevent damage in transit. However, even with the most careful handling damage cannot be avoided completely. The UVC-tubes made of quartz glass are most susceptible to damage during transportation. Check the UVC tube and the tube socket prior to installation. Check if the cables are damaged. We recommend that you check the completeness of the delivery against the parts listed above.

The **UV*pro*** V-LAB Recirculating Air Disinfection System weighs about 13 kg. Choose a suitable wall segment or bracket that is able to carry the additional weight.

It is necessary to note, that people and animals must be protected from UVC radiation during installation. Also, consider possible body heights of >2 m.

4.2. **Tube change**

Take into account the following assembly steps, so you can avoid damage and allow a long-standing function of your disinfection system.

The biggest risks in the assembly of UVC units are damage to the vitreous body and bending or twisting the connection pins in the tube sockets. Please adhere to the following installation instructions, so you avoid the damage to the system.

Abbildung	Beschreibung
	Switch of the unit and disconnect it from its power source. Place it on a flat surface and remove all four screws of the right cover.
	The easiest way to open the cover is to grip through the ventilation hole and drag the extreme front corners carefully.
	Now the visual protection can be removed. Pull it up for removal on the ends of the slats.

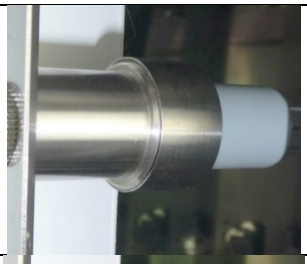
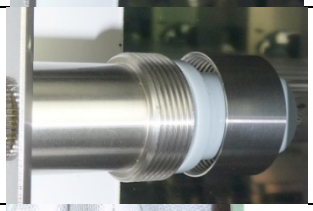
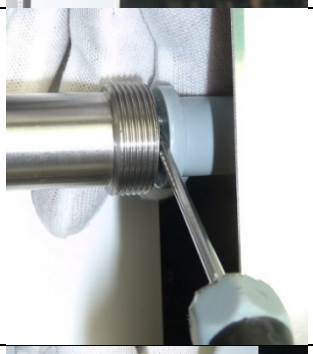
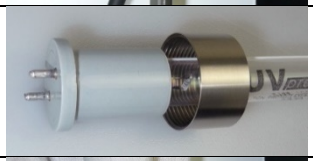
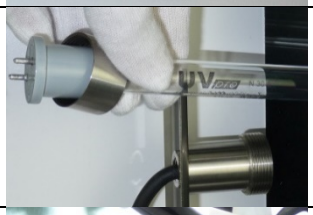
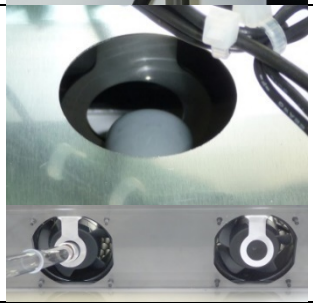
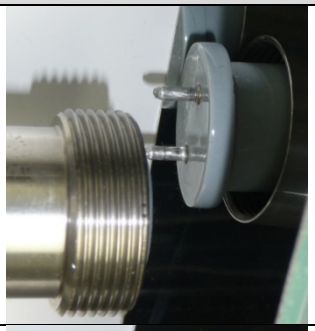
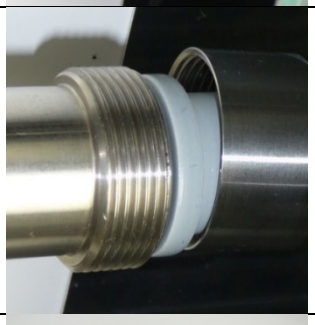
	The holder of the UV tubes is accessible now.
	Turn the retaining ring and remove it from the tube. You can easily access the tube now.
	Detach the tube carefully from the holder. A narrow tool (e.g. screwdriver) can be helpful to loosen the tube from the holder.
	The tube can be removed from the unit now.
	Pull the retaining ring over the new tube to the end of the plug.
	Insert the new tube with retaining ring into the unit.
	Be sure, that the lamp tube end will be positioned correctly into the matching holder. The left service cover can also be removed to have a better view of the holder.

Abbildung	Beschreibung
	Place the tube close to the port, so that the pins and the matching holes are located opposite each other.
	Plug the tube into the holes and screw the retaining ring tight over the threads.
	Place the visual protection into correct position. Make sure that the notched edge of the metal frame is at the front.
	You can now fix the covers to the unit again.

4.3. **Electrical connection**

The electrical connection of the ventilation air disinfection unit is, under the relevant requirements (EN 60 598-1), to be carried out by authorised personnel only.

The device may only be connected by a specialist (electrician).

The circuit must be fused with a ground fault circuit interrupter (30 mA).

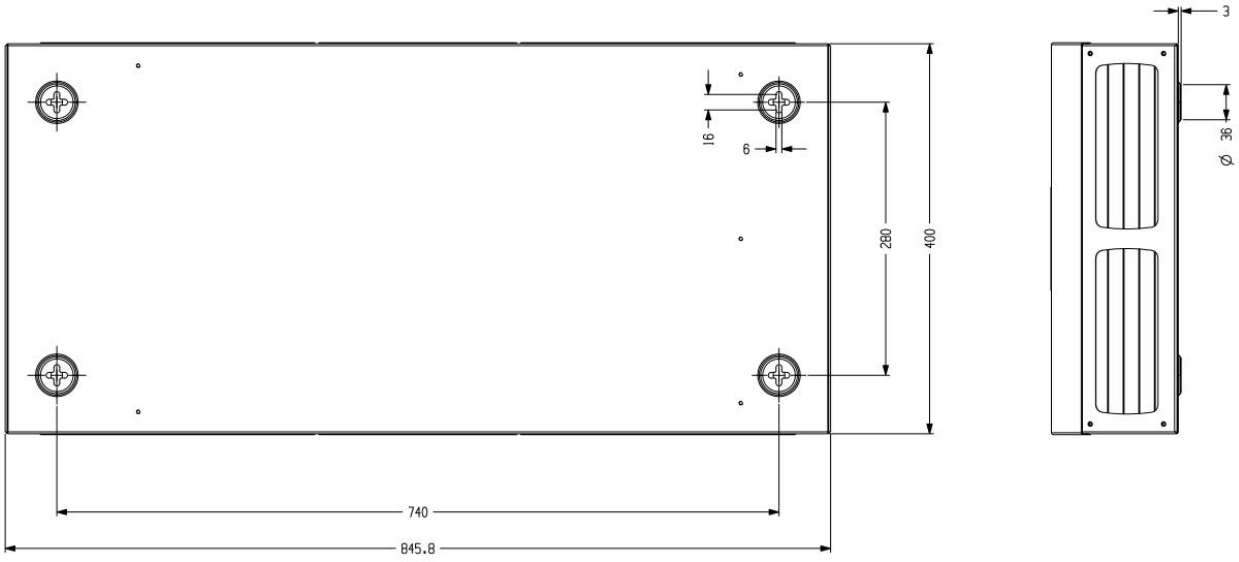
4.4. **Positioning and dimensioning**

The correct dimensioning and positioning of the V-LAB is essential for the success of the disinfection. It is preferably so placed that the outlet opening points towards the larger part of the room and the distance between the wall and the outlet is not less than 1 m. We recommend to mount the V-LAB over the doorframe if possible. Make sure that the unit is easily accessible in future (e.g. with a ladder) and can be easily kept clean.

After proper mounting and positioning no further work is immediately necessary. Nevertheless a regular visual inspection of the UVC tube for calcifications and other deposit should be done. Dirt and other deposits on the quartz sleeve reduce the UVC performance significantly.

After 12,000 hours, the tubes have reached about 75 % of the output power and have to be exchanged. (See chapter 7.2 “Replacing tubes”).

4.5. **Sketch hole pattern**



5. OPERATION AND PROGRAMMING

After plugging in the device plug, the V-LAB is in stand-by mode. Via programmable timer it can be programmed in a daily or weekly rhythm or switched on manually.

The start menu shows the device name, the time, the operating status and the set intensity. The depicted example shows a unit in manual mode (Man) with a set intensity of 100% ventilation.
The background colour of the start menu indicates the operating status and possible errors. Please find the colour key in the figure below.
When the tubes are cold, the set reporting threshold for errors of the tube monitoring exceeds. Due to this, it is possible that the display colour is purple when switching on the unit. As soon as the tubes reach the operating temperature, the display turns green.

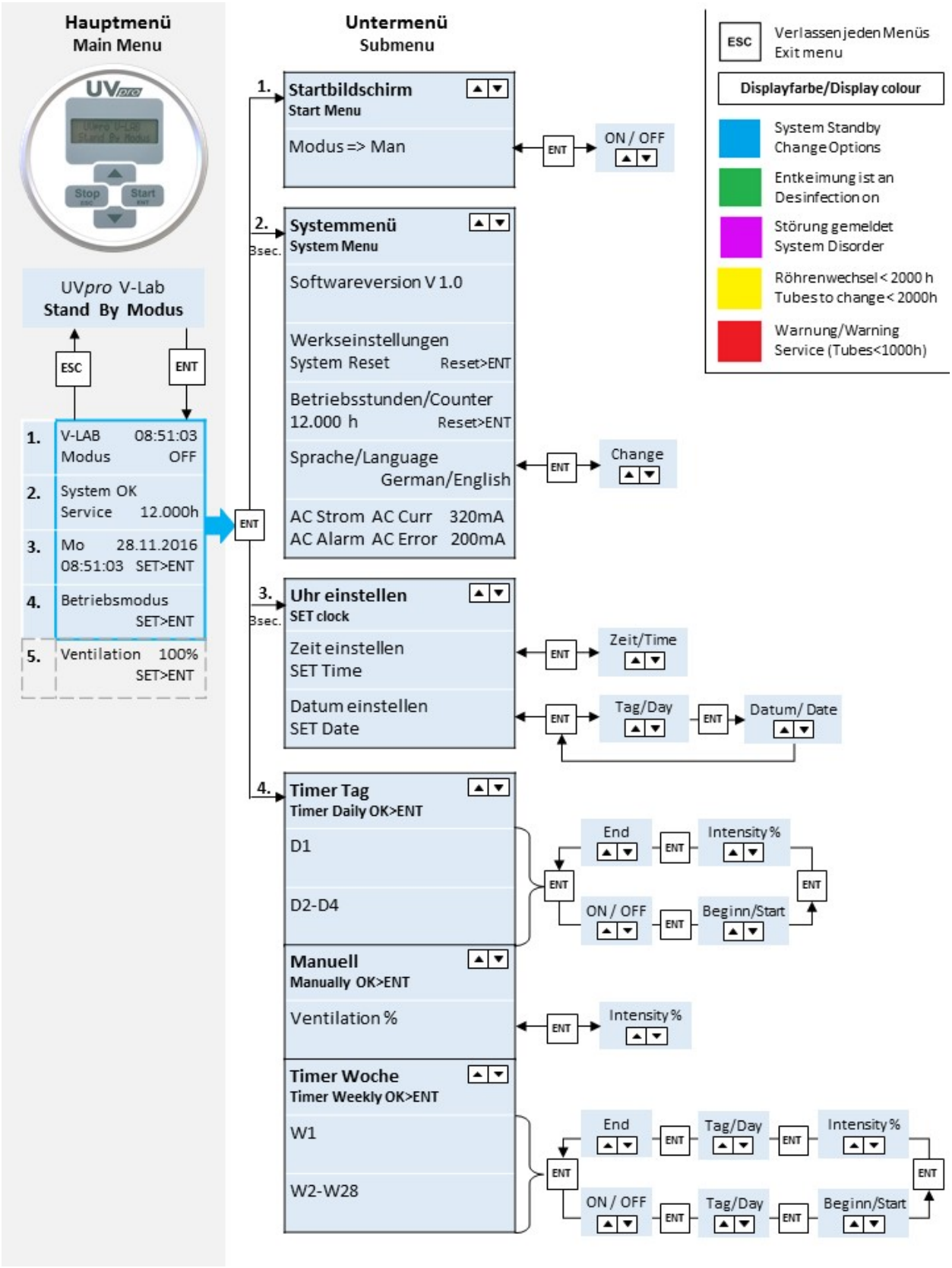


Figure 1 - Menu navigation V-LAB

5.1. Commissioning and menu navigation

In addition to the following instructions, fig. 1 visually depicts the menu navigation of the V-LAB.
After plugging in the device plug, the V-LAB is in stand-by mode. Press the enter button to switch on the unit. The display lights up and you can see the main menu (see fig. 1, blue frame). It consists of these four menu items: 1. start menu, 2. system service, 3. date/time, 4. operating mode. Navigate through the menu with the arrow buttons to change settings.
Press the enter button to choose the respective item and to open the submenu. To exit the chosen menu, press the escape button.

1. Start menu

The **start menu** shows the device name, the time, the operating status and the set intensity. In the lower left corner, you can see the set operating mode: Manual (Man), Timer Daily (D-Timer) or Timer Weekly (W-Timer). In the mode *Manual,* the sterilisation and ventilation can be started by pressing the enter button and stopped by pressing escape.

2. System service

Under the menu item **system service,** you can enter the **system menu** by pressing the enter button for 3 seconds to see and change basic settings of the system. You'll find details about the software version, the reset to the factory settings, operating hours of the tubes, language options and the alert threshold for detecting tube failures.

3. Date/time

The third menu item **date/time** leads you to the subitems "set time" and "set date" by pressing the enter button for 3 seconds. Select the respective subitem and set the time by pressing the arrow buttons and press enter to confirm. Under "set date" you can select and confirm the day and date in the same way.

4. Operating mode

Choose between **manual, daily timer** and **weekly timer** under the fourth menu item.
The sterilisation can be started and stopped manually in the mode „manual". The mode "daily timer" enables to set four daily repeating sterilisation times and under "weekly timer" it is possible to make day- and week-specific settings regarding the sterilisation period. Please find the detailed descriptions of these modes below.

5.2. Manual

In this mode, the sterilisation and ventilation can be started by pressing the enter button and stopped by pressing escape. By scrolling further through the menu, you will reach the menu item "ventilation" to set the intensity between 0% and 100%.

5.3. Daily timer

This menu item allows you to set four different daytimes and intensities of the ventilation to sterilise the air. Navigate to the end of the main menu and select one of them, e.g. D1. Now you can activate (on) or deactivate (off) it, set the starting time, the intensity, and the finishing time of the sterilisation. To confirm these settings, press enter. Four different settings (D1-D4) can be made per day that will repeat automatically every day

5.4. **Weekly timer**

It is possible to make 28 different settings for one week in total which means up to four settings per day on 7 days. In this mode, the memory locations have to be made in correct order so that further free memory shows up. Initially you will see four selectable settings (W1-W4). W5 only shows up if all four previous ones are used. The approach to enter settings is similar to the daily timer and only differs by an additional option of the weekday.

6. PROBLEMS, CAUSES AND SOLUTIONS

In the case of tube failure, the electronic ballast switches the tube off so the board is protected, and the malfunction is detected through our monitoring units.

Problem	Cause	Solution
Immediately after switching on the device, the ground fault circuit interrupter (GFCI) trips.	The device has a power shortage and is no longer operational.	It is possible water entered into the product. The power supply must be interrupted and the system has to be replaced. It has to be subjected to a thorough check by the manufacturer.
The device is switched on, but the tube does not ignite.	No power supply.	Are the connections of the power supply properly connected?
	Gas pressure drop through fine cracks in the tube or damage of the pins on the tube socket.	Check the tube and the socket for its integrity and abnormalities in the tube socket.
The device is turned on and the tube flashes briefly, but does not ignite.	The electronic ballast is trying to ignite the tube, but the process is aborted because the gas pressure of the tube is too low.	Ignite the unit with a replacement tube, the fault is in the tube.
The tube is new.	In case of a new tube it is a manufacturing defect.	We will gladly replace this tube free of charge
The tube runs for more than 12,000 hours.	In older tubes (>12,000 hours) the gas composition has changed, an ignition is no longer possible.	The tube life is exceeded, the tube must be replaced.

Problem	Cause	Solution
The **UV*pro*** tube will not ignite and has in the area of filament silver mirror or blackening. The life span is still below 12,000 hours.	By frequently switching the tube on and off it ages faster than in continuous operation. At each ignition particles are blasted off from the filament, which settle as the inner lining on the glass tube. As a rule of thumb one hour lifetime can be calculated per ignition. The tube must be replaced.	The tube life is exceeded, the tube must be replaced.
There is condensation between the UVC tube and the cladding tube.	The outer sheath could be damaged. If no cracks are visible, water must have entered through the screw joint.	Check the glass for cracks. Inspect the area of the tube base for moisture. Dry the socket and replace the O-rings. After commissioning the tube should be controlled frequently (daily) for moisture.
The disinfection performance decreases and no longer corresponds to the calculation. The operation duration is under 12,000 hours.	After 12,000 hours, the tubes still produce about 75 % of the output power. Designing of facility is calculated for this value. The tubes are dirty.	The tubes must be replaced. Clean the tubes by following our cleaning instructions.
When do the **UV*pro*** tubes need to be cleaned?	The UVC output drops significantly when contaminated (e.g. calcifications or grime. That's why regular inspections and solid cleaning intervals are useful and encouraged	The right time depends on the water quality. Check a new installation frequently (2-3 months) to get a feel for the cleaning intervals.

7. MAINTENANCE

7.1. Safety instructions for repair work

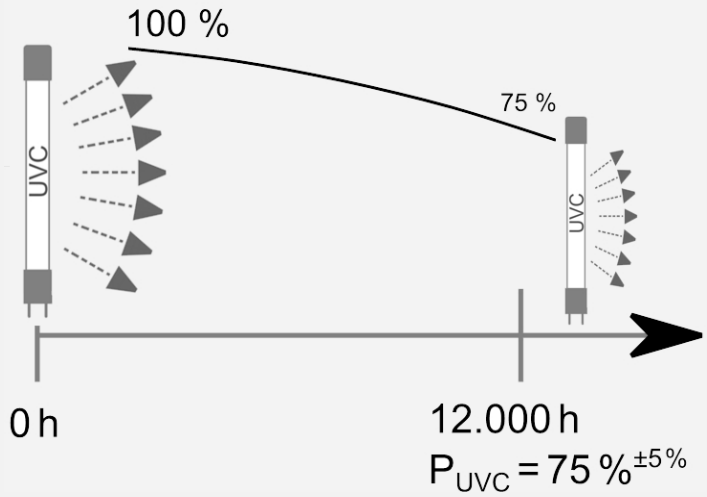
Make sure there is no current flowing through the device, before starting any work or cleaning process on the tubes. The UVC tubes should also be turned off during visual inspections.

In the case of a visual control of the UVC-system, do not under any circumstances look at the ignited tubes without visual protection. Protect your skin through covering clothing, and never touch the tubes without wearing gloves.

Before service work the system must be disconnected from a current and the network. Only touch the glass tubes with gloves.

Eyes and skin must be protected from UVC radiation. While working near ignited tubes, please wear protective goggles, gloves, and covering clothing.

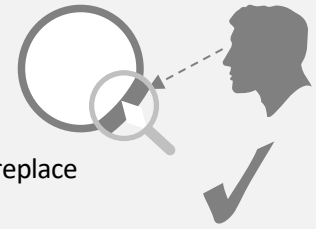
7.2. **Operating time of the UVC tubes**



UVC tubes have a limited life span. They are subject to a continuous aging process. The life of a UVC tube is, with normal usage, ca 12,000 h (Output 25 % $^{\pm 5\ \%}$ To the nominal UVC emissions of the respective UVC source).

The effective radiation is far outside the visible range, and the UVC emissions decreases continuously. It is recommended to add the operating conditions and replacement date in a maintenance plan.

Checking the O-rings when replacing tubes



While replacing tubes, check the seals, clean them, and replace them if damaged.

In order to prevent fingerprints and fat traces on the tube, we recommend to always wear cloth gloves when working with the tubes.

While changing tubes, please always wear gloves made from soft fabric

The impermeability of the UVC system is dependent on the O-rings and their care. When replacing tubes, the O-rings are often damaged. On top of this, O-rings are subject to high intensity UVC radiation. For this reason, a complete and thorough inspection of every O-ring is recommended each time the UVC tubes are replaced. In sensitive areas, the tube-sided O-rings should be replaced.

Replacing the O-ring is recommended to do every time the quartz glass tube is replaced. At the very least, a thorough visual inspection of the O-ring should be made.

7.3. Maintenance of components

The quartz glass of the UVC tubes must be regularly controlled and maintained. We recommend a soft, lint free piece of cloth. **Careful: the UVC tubes are made from Quartz glass and are breakable!** When cleaning the tubes, thin cloth gloves should be worn, in order to protect skin from damage, and also to avoid fatty fingerprints on the tubes. The UVC tubes can be cleaned using cleaning products and de-calcifying products. For the metal parts, we recommend using a normal steel cleaning agent.

To avoid fatty fingerprints, you should never touch the UVC tubes with bare hands! Fingerprints form an almost impenetrable layer of the ultraviolet radiation. Before using the system for the first time we recommend cleaning the tube's surface with alcohol-based cleaning agents.

7.4. Original accessories and spare parts

UV*pro* systems include only high quality components. Only with this we can ensure the consistently high performance and quality. For a long operating life and reliability, we ask you to consider the instructions in this manual for handling these components. In the procurement of spare parts, please make sure that it is original accessories of **UV*pro*** or the **orca** GmbH. Even with accessory components, we recommend that you use genuine parts from **UV*pro***. The improper use of the equipment or the use of unauthorised components can lead to health risks and damage!

8. WARRANTIES

Our general delivery conditions can be found in our warranties. Please do not hesitate to contact us.

9. DISPOSAL OF COMPONENTS

9.1. UV*pro* tube

UVC tubes, like fluorescent tubes, must be disposed of in special waste because they contain mercury. There are also free collection points in your local community where you can dispose of your exchanged or defective tubes.

9.2. Electronic ballast with screw joint

The square tube with electronic ballast can be disposed of in the electronic waste at the local garbage and recycling station.

10. ADDITIONAL INFORMATION

10.1. EC declaration of conformity

Declaration of conformity

We,

orca GmbH, Hungenbach 1D, D-51515 Kürten
Phone: +49 2268/90830-0

Hereby we declare that the products listed below conform to, in their design, construction and sale, the basic safety and health requirements of the EC directives. Any unauthorized modification of the product will result in this declaration's loss of validity.

Type:

UV*pro* V-LAB

Applicable EC directives:

- EMC Directive (2014/30/EU)
- Low Voltage Directive (2014/35/EU)
- RoHS Directive (2011/65/EU)

Applied harmonised standards:

- **EN 55015**
- **EN 61000-3-2**
- **EN 61000-3-3**
- **EN 61347-1**
- **EN 61347-2-3**
- **EN 61547**

Kürten, 2016-03-24
Place / Date

R. Orbach
Signature managing **orca** GmbH