Dosimeter system
UV-Mat

manual

Version: 1.0.5

Content

1 Change history

Date	Version	Changed by	Comment
20.11.2013	1.0.0	Rau	first version
18.02.2014	1.0.1	Paravia	dimming added
07.03.2014	1.0.2	Paravia	2 channels added
12.12.2014	1.0.3	Paravia	menu changes
29.01.2015	1.0.4	Paravia	menu changes
23.07.2020	1.0.5	Paravia	Channel control only dose

2 Symbols Overview

	Meaning: Failure to observe the mentioned instructions can result in an injury of the user.

	Meaning: Failure to observe the mentioned instructions can result in a damage of the device.

	Meaning: Instructions are to be observed for the regular operation.

*	Meaning: Optional functions, not available for every device

3 General description

The UV-MAT serves for the independent dosage control of UV irradiation. Due to this sensitive area of application it is equipped with several safety functions.

Thus the microcontroller system, the maximum irradiation time and the sensor function is observed. A detected irregularity causes a warning or in the case of substantial irregularities the lamps are switched off.

The radiation is measured with two sensors. It is possible to enter a calibration factor in order to display the radiation value in another position than the sensor position.

The working with the equipment is very simple because of the use of modern microcontroller technique.

4 Components of the UV-MAT

4.1 Sensors

The sensors are preinstalled and adapted to the lamps, meaning UVC sensor for UVC lamps for example. The sensors are cosine corrected. Due to this cosine correction it is possible to measure all lamps from a one position.

4.2 Display unit

The display unit contains the power supply, the microcontroller system with display and keyboard and the output relays. The sensors are connected to the backside of the display unit.

5 Installation

Connect the display box to the chamber using the big HARTING connector. Connect the sensor/sensors to the display box.
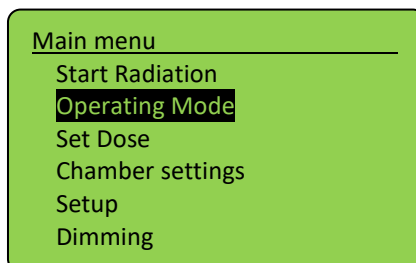
Connect the irradiation camber with the mains.

After the power on of the equipment the following start logo appears:

6 Operation

Two seconds after startup the main menu appears:

```
Main menu
   Start Radiation
   Operating Mode
   Set Dose
   Chamber settings
   Setup
   Dimming
```

Use the four cursor keys ◁, ▷, △, ▽ and the center ok key (✓) to navigate through the menu. Inverted text highlights the selected menu item.
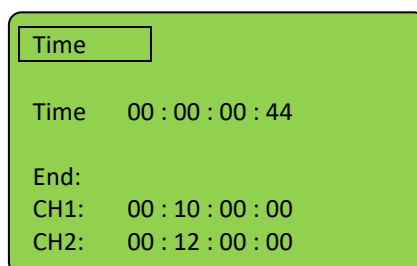
To confirm the selected function press the ✓ key.

Press the ◁ key to return to previous menu.

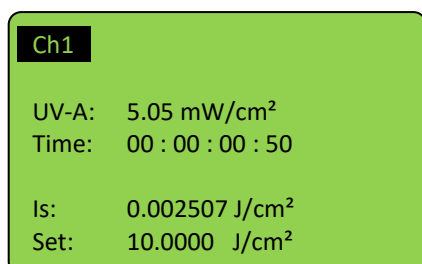## 6.1 Start / Stop Radiation

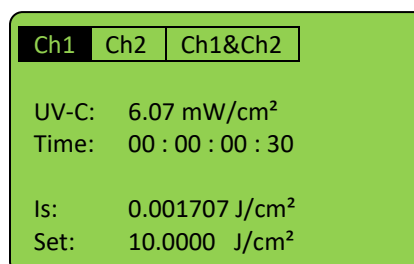Start an irradiation by selecting "Start Radiation" and press ✓.

In time controlled operation mode the current irradiation time and end time are displayed in the form DD:HH:MM:SS.

```
Time

Time      00 : 00 : 00 : 44

End:
CH1:      00 : 10 : 00 : 00
CH2:      00 : 12 : 00 : 00
```

In dose controlled operation mode the current irradiance in mW/cm², the actual irradiation time, the current dose (Is:) and the target dose (Set:) are displayed:

```
Ch1

UV-A:    5.05 mW/cm²
Time:    00 : 00 : 00 : 50

Is:      0.002507 J/cm²
Set:     10.0000  J/cm²
```

```
Ch1    Ch2    Ch1&Ch2

UV-C:    6.07 mW/cm²
Time:    00 : 00 : 00 : 30

Is:      0.001707 J/cm²
Set:     10.0000   J/cm²
```

1 channel version   2 channel version*

For 2-channel version only*:

Use to ◁ and ▷ keys to switch channel screens.

mW/cm² and J/cm² are automatically calculated.

Stop an irradiation by pressing ✓ for at least 2 seconds.

Dimming level can be changed during active
irradiation with △ and ▽ keys, if dimming option is
available.

6.2 Operation mode

Select operating mode the select dose controlled or time controlled irradiation.

6.2.1 Controlling Mode

Select operating mode the select dose controlled or time controlled irradiation.

```
Set dose
■ Dose controlled
  Time controlled
```
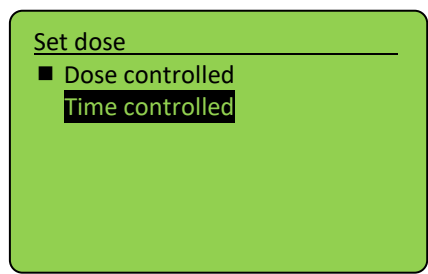
Confirm by with ✓ or ▷. With ◁ you can cancel your input and go back to main menu.

In dose controlled mode the irradiation time is automatically controlled and stops if the desired dose is reached. Note a sensor must be connected therefore.

In time controlled mode the irradiation time controlled by a timer only. On the display only the irradiation time is displayed. A sensor is not necessary.

For 2-channel version: set irradiation time is selectable for both channels individually.

6.3 Set time

Depending on the operation mode you can set the duration of irradiation:

<div style="border:1px solid #000; background:#8cc63f;">

Set duration
_____

Target duration
        DD HH MM SS
      00 : 00 : **01** : 00

</div>

Use $\triangleleft$ and $\triangleright$ keys to select day (DD), hours (HH), minutes (MM) or seconds (SS). Use $\triangle$ and $\triangledown$ to enter value and confirm with $\checkmark$.
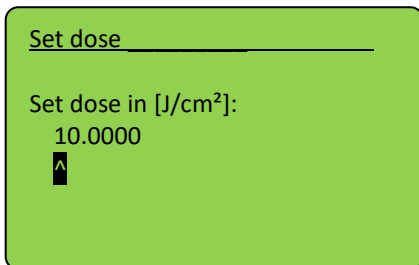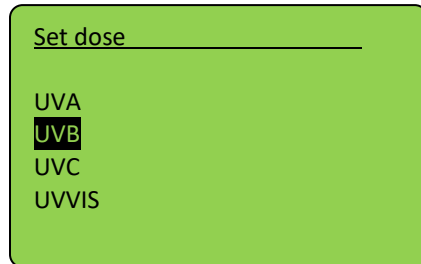

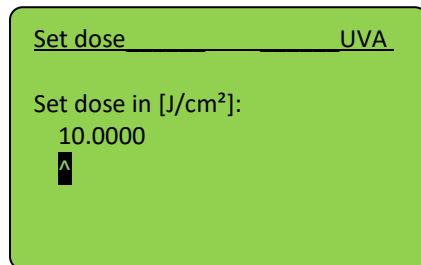The maximum duration is 99 days, 23 hours, 59 minutes and 59 seconds.

For 2-channel version: set irradiation time can be set different for both channels.

6.4 Set Dose

Set the target dose for an irradiation (or channel*):

```
Set dose_____

UVA
UVB
UVC
UVVIS
```

```
Set dose_____

Set dose in [J/cm²]:
  10.0000
^
```

```
Set dose_____UVA

Set dose in [J/cm²]:
  10.0000
^
```

1 channel version   2 channel version*

Use the ◁ key to add a digit.

Use ◁ and ▷ keys to select day (DD), hours (HH), minutes (MM) or seconds (SS). Use △ and ▽ to enter value and confirm with ✓.

6.4.1 Dimming*

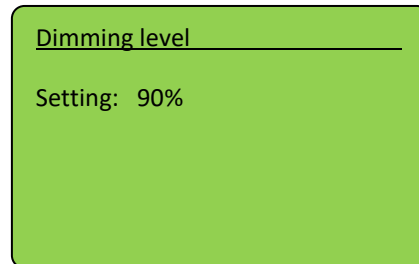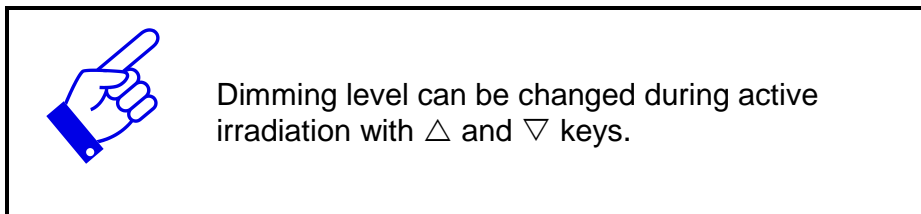Select dimming to adjust lamp output. Therefor got to menu "Dimming", select channel to be dimmed:
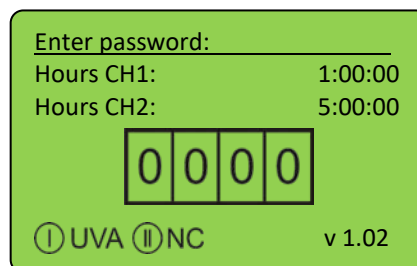
```
Dimming level

Setting:  90%
```

Use △ and ▽ keys to set desired value. Confirm with ✓.

> Dimming level can be changed during active irradiation with △ and ▽ keys.

6.5 Setup

Using this menu you can set the system settings. Therefore enter the PIN code, *see chapter technical data*, must be entered.

```
Enter password:
Hours CH1:              1:00:00
Hours CH2:              5:00:00

        0 0 0 0

ⓘUVA ⓘⓘNC          v 1.02
```

Even without PIN the operational hours, connected sensors and firmware version are displayed. After entering PIN and confirmation with OK you can change system settings:

```
Setup
Sensorfactors
Safty time
Operating hours
```
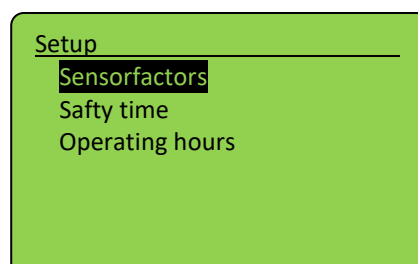
6.5.1 Sensor factors

In this submenu the sensor specific adjustments are placed. It is possible to do the sensor calibration and set the upper and lower limits. In all three submenu points you have to decide first for which sensor port you want to do the adjustment, if Your UV-Mat version is capable of more than one sensor.

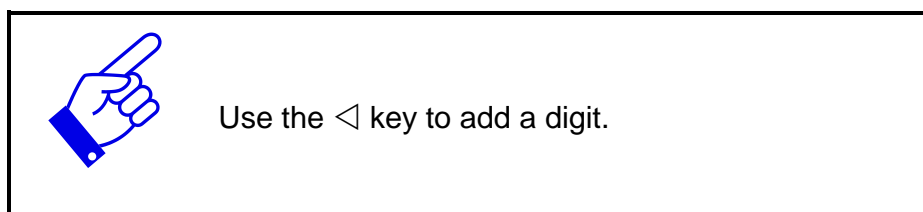### 6.5.2 Calibration / Calibration each spectral range*

The calibration factor is used to calculate the irradiance for another place then the senor place. For example:

```
Calibration factor UVC

Set:
  1.0000
  ^
```
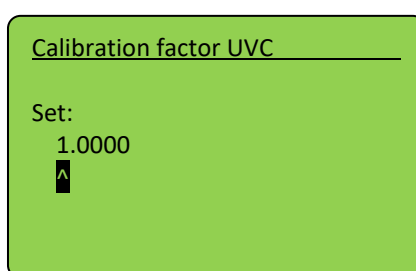
The standard value for this is 1.000 (one). Therefore the irradiance is the irradiance at the sensor place.

If you want to convert the reading for another position you have to measure the irradiance in the target position and in the sensor position. The result of the division from the target value and the sensor value is the necessary calibration factor.

Navigate with $\triangleleft$, $\triangleright$ and set value with $\triangle$, $\triangledown$. Confirm with $\checkmark$ to go back to setup menu.

> Use the $\triangleleft$ key to add a digit.

6.5.3 Upper and lower limit / Calibration each spectral range*

The upper and lower limits have the function of monitoring the sensors. For example:

```
Upper limit UVC

Set in [mW/cm²]
  200.0000
  ^
```
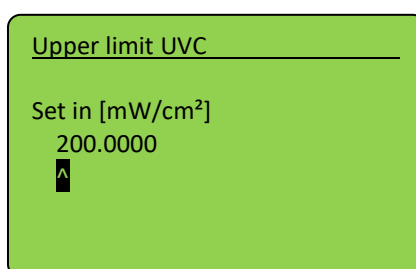
For the determination of the limit values you have to set the upper limit on 200 mW/cm² and the lower limit on 0 mW/cm². No error can occur with this setup (if the calibration

factor is set to 1.0). After an adequate warm up time you have to read the values and can now adjust the upper and lower limit e.g. ±25% of the sensor value. Strong fluctuations during the warming up should be faded out with the delay time.

6.5.4 Safty time

Timing values can be adjusted in menu "safty time". See delay time, max. time and waiting time.

6.5.4.1 Delay time

The delay time is the time, which the UV-AB-Mat waits until it starts to monitor the sensor signal. It should be as long as the lamps need to get on a constant irradiancy delivery.

6.5.4.2 Max. time

Max. time is a safety function. After reaching this time the irradiation is stopped. This value should be programmed carefully, because it can be very important e.g. sunburn through a wrong input of the dose can be prevented.

6.5.4.3 Waiting time

The waiting time is the time after the irradiation which must be waited to start a new irradiation. This time should be so long, that double irradiation is to be excluded. Maybe some lamps also need a cool-down phase, so "waiting time" may prevent hot-reignition. It should be set at least to **3 seconds** to prevent immediate user restart of the lamps.

6.6 Operating hours

The user may reset the lamps operating hours using the menu item. Reset must be confirmed by pressing ◁ for at least 2 seconds.

Note that the displayed operating hours are only stored if an irradiation is stopped by UV-MAT. If the UV-MAT / irradiation chamber is switched off during irradiation the operating hours aren't stored and so faulty.
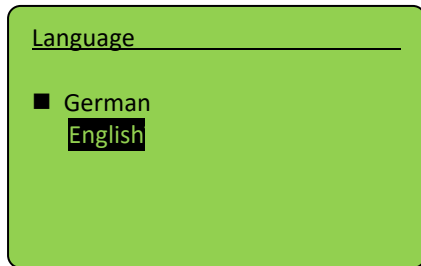
Use the hardware operating hours display on the chamber front side to control the lamp aging if necessary.
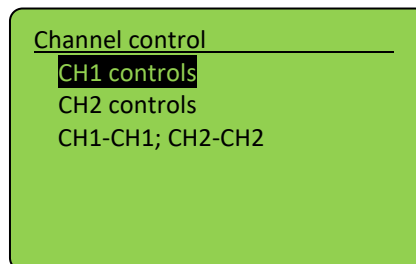
6.7 Chamber settings

6.7.1 Language

The UVMAT comes with a menu in the German and English language.

Select the desired language with the keys ▽ and △ and confirm with ✓.

6.7.2 Channel control
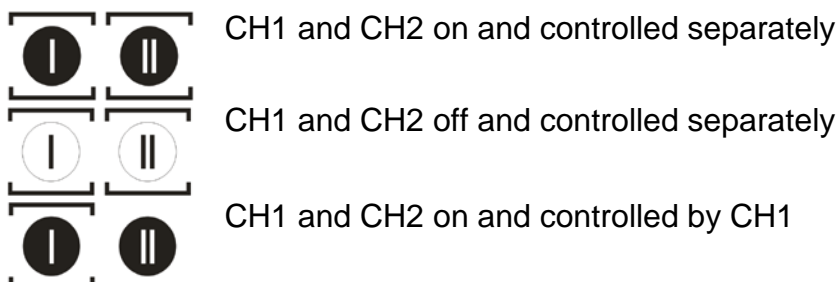
Use channel control to select mode

CH1 controls: all lamps controlled by CH1 by reached dose

CH2 controls: all lamps controlled by CH2 by reached dose

CH1-CH1; CH2-CH2: odd-numbered lamps controlled by CH1, even-numbered lamps controlled by CH2. The lamps are controlled by each sensor using this mode. This setting makes sense, while other setting may be for special applications.

Note, that the channel control is displayed during irradiation in the upper right corner. Here the icons have e.g. the following meaning:

 CH1 and CH2 on and controlled separately

 CH1 and CH2 off and controlled separately

 CH1 and CH2 on and controlled by CH1

7 Technical Data

7.1 Radiometer UV-MAT

Size (L x W x H)	250 x 185 x 100 mm³
Weight	2,6 kg
Power	85-264V /47-440Hz / 12VA
Operational temperature	0 - 30°C
Storage temperature	0 - 60°C
Humidity	< 80%, non-condensing
Display	graphical, 128 x 64 px
Dose calculation	for all irradiance readings > 0,1 mW/cm² to avoid offset failure

7.2 Sensor

Weight	150g
Operational temperature	0 - 40 °C
Storage temperature	-10 - 40 °C
Humidity	< 80%, non-condensing
Spectral range, UVC	200 – 280 nm
radiometric measurement range	0 – 19,9 mW/cm²
Cosine correction	yes
Calibration	yes, traceable to PTB / NIST
frequency of checks (Recalibration)	12 months

7.3 Code number

CODE NUMBER	7243