

Operating Manual

UVP Crosslinker CL-3000, CL-3000M, CL-3000L



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General Information

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1. Basic Information

1.1. User Manual Notes

The UVP Crosslinker is intended for operation by qualified specialist personnel observing this user manual.

The user manual informs about the design and function of the UVP Crosslinker and provides the necessary know-how for the safe handling of the device and its components to personnel familiar with analysis. The user manual further includes notes on the maintenance and service of the equipment.

User Manual Conventions

Instructions for action which occur in chronological order are numbered and combined into action units and furnished with the corresponding results.

Lists which are not in chronological order are shown as itemized lists, sub-listings as bullet points.

Safety notes are indicated by pictographs and signal words. The type and source of the danger are stated together with notes on preventing the danger. The meaning of the pictographs and signal words used is explained in the chapter "Safety Instructions".

1.2. Intended Use

The UVP Crosslinker offers researchers an instrument to quickly, safely and efficiently expose samples to a controlled amount of ultraviolet radiation. The 3 different versions, each with a different UV wavelength (254nm, 302nm, 365nm), provides the following for exposed samples:

- Crosslinking of DNA or RNA to nitrocellulose, nylon or reinforced nitrocellulose
- PCR sample contamination control
- Photo nicking of DNA
- Testing RecA function
- Rapid site mapping
- UV curing

The UVP Crosslinker is designed to measure and control the ultraviolet (UV) radiation within the exposure chamber. A unique UV sensor continually measures the UV energy and

automatically adjusts to variations in UV intensity that occurs as the UV tubes age. This same UV sensor feedback measurement system allows you to set UV sample exposure, which automatically deactivates the UV sources when the set UV energy dose has been achieved.

1.3. Warranty and liability

The warranty and liability periods comply with the legal requirements and the provisions in the General Terms and Conditions of Analytik Jena. Tubes are warranted for 90 days.

Deviations from the intended use described in this user manual will result in limitations of warranty and liability in the event of damage. Damage to wearing parts or breakage of glass are not included in the warranty.

Warranty and liability claims are excluded for personal injury and property damage if resulting from one or several of the following causes:

- Use of the device other than intended
- Improper commissioning, operation and servicing of the device
- Modifications to the equipment without prior consultation with Analytik Jena
- Operation of the device with faulty safety equipment or improperly fitted safety and protection equipment
- Inadequate monitoring of the equipment components subject to wear
- Use of other than original spare parts, wearing parts or consumables
- Improper repairs
- Faults due to the non-observance of this user manual

2. Technical Data

Technical Specifications	CL-3000	CL-3000M	CL-3000L
Wavelengths	254nm	302nm	365nm
Bulbs	6 x 8 Watt		
Energy	0000.1 - 9999.9 mJ/cm ² (0 - 10 J/cm ²)		
Time	000:01 - 999:59 (>300J/cm ²)		
Temperature	15°C - 35°C		
Humidity	70% Non-Condensing		
Altitude	up to 3,000M (9,842 ft)		
Sound Level	≤ 50 dba		
Housing Surface Temp	≤ 30°C		
Startup Time	< 1 sec		
External Dim (LxWxH)	41cm x 40cm x 26.5cm		
Internal Dim (L x W x H)	35cm x 27cm x 16cm		
Weight	6.8Kg: 15 lb		
Operating Power	100 - 115VAC & 230VAC 50/60Hz		

3. Safety Instructions

3.1. General Notes

For your own safety and to ensure error-free and safe operation of the UVP Crosslinker, please read this chapter carefully before commissioning.

Observe all safety notes listed in this user manual.

Besides the safety instructions in this user manual and the local safety regulations that apply to the operation of the device the general applicable regulations regarding accident prevention, occupational health and safety and environmental protection have to be observed and complied with.

References to potential dangers do not replace the work protection regulations which must be observed.

3.2. Symbols and signal words used

The user manual uses the following symbols and signal words to indicate hazards or instructions. The safety instructions are always placed before an action.



GENERAL CAUTION

Indicates a potentially hazardous situation.

If it is not prevented light or minor injuries and material damage can result.



WARNING: ULTRAVIOLET RADIATION

Indicates the presence of high-intensity, ultraviolet radiation. Protect skin and eyes.

3.3. Safety Markings on the UVP Crosslinker

Safety symbols have been attached to the UVP Crosslinker whose content must always be observed. Damaged or missing safety symbols can cause incorrect actions leading to personal injury or material damage. The safety symbols must not be removed. Damaged safety symbols must be replaced without delay.

The following safety symbols have been attached to the UVP Crosslinker:



General Caution



Warning: Radiation, Ultraviolet

3.4. Technical Condition

The UVP Crosslinker corresponds in its design and construction to the current state of the art technology. Unauthorized modifications or changes, especially such that affect the safety of the staff and the environment, are generally not allowed.

Observe the following notes:

The operator must only operate the device in a sound and operationally safe condition. The technical condition must always comply with the legal requirements and regulations.

Prior to every use, the device must be checked for damage and sound condition.

Any changes in the device affecting its safety must be reported by the operating personnel to the operator without delay.

3.5. Requirements for the operating personnel

Observe the following notes:

The device must only be commissioned, operated and serviced by trained personnel instructed in technical safety.

The operation or servicing of the device by minors or individuals under the influence of alcohol, drugs or medication is not permitted.

It must be ensured that only authorized personnel work at the device.

The operating personnel must be familiar with the dangers arising from samples to be used. The appropriate protective equipment must be used.

The unit includes shortwave UV, which is a powerful source of UV radiation that will cause damage to unprotected eyes and skin. Before operating any unit, ensure all personnel in

the area are properly protected and that instructions for use of this equipment are followed.

3.6. Safety instructions – transport and assembly

- Clean and decontaminate the UVP Crosslinker.
- Allow for a sufficient cool-down of the light tubes before transport.
- Protect the instrument against moisture.

3.7. Safety instructions – operation

The UVP Crosslinker is designed with function, reliability, and safety in mind. The unit includes shortwave UV, which is a powerful source of UV radiation that will cause damage to unprotected eyes and skin.

For your own safety observe the following notes:

The device must only be operated if all protective equipment is present, properly installed and fully operational. Protective and safety equipment must never be removed, modified or decommissioned during operation.

The sound condition of the protection and safety equipment must be checked regularly. Any defects must be corrected as soon as they occur.

Even though the UV protection door protects against UV light, UV blocking eyewear should be worn during operation.

The UVP Crosslinker must only be connected to a power supply with the indicated voltage (100 V, 110 V or 230V).

Free access to the power plug on the back of the unit must be ensured.

Covered vents may cause the device to break down or may cause damage to it.

3.8. Handling of auxiliary and operating materials

The operator is responsible for the selection of substances used in the process as well as for their safe handling. This is particularly important for radioactive, infectious, poisonous, corrosive, combustible, explosive and otherwise dangerous substances.

Observe the following notes:

Hazardous substances have to be handled according to the biosafety level of the laboratory. The relevant regulations and the notes in the EC safety data sheets of the

manufacturers have to be observed as well as the national and international guidelines (WHO, "Laboratory Biosafety Manual").

Wear protective equipment when operating the UV light.

Obey all security instructions for decontaminating the UVP Crosslinker.

3.9. Safety instructions – maintenance

Observe the following notes:

- Disconnect the power supply before servicing the UVP Crosslinker.
- Allow for a sufficient cool-down of the light tubes before maintaining them.

3.10. Behavior during emergencies

In case of emergency disconnect immediately the plug of the UVP Crosslinker from the outlet.

Because a rapid response can save lives during an emergency, the following has to be ensured:

The operating staff must be familiar with the location of safety equipment, accident and danger alarms, first aid and rescue equipment as well as their handling.

The operator is responsible for the respective training of the operating staff.

All equipment for first aid (first-aid kit, eyewash bottles, stretcher, etc.) as well as equipment for firefighting (fire extinguishers) must be within reach and easy to access. All equipment has to be in a sound condition and should be checked at regular intervals.

4. System Design

The UVP Crosslinker features:

- Microprocessor controlled/UV sensor feedback system
- Multiple set functions:
 - Preset UV energy exposure
 - Present UV time exposure
 - User set UV energy exposure
 - User set UV time exposure
- Maximum UV energy exposure setting of 9999.9 mJ/cm²
- Maximum UV time exposure setting of 9999:59
- Internal safety interlock
- Large LCD readout
- Tactile membrane switch keypad
- UV blocking viewing window
- Large interior UV exposure chamber
- Dual safety fused
- Removable power cord
- Laydown type door

5. Set-Up

Place the UVP Crosslinker on a level work surface. Be sure there is enough room in front to open the door.

Plug the female end of the power cord into the UVP Crosslinker.

Plug the male end of the power cord into a properly grounded electrical outlet. The proper voltage of the UVP Crosslinker is found on the product information label.

Note: For 230 V models, or those requiring special power cord connectors, ensure that the proper configuration of the male connector or the plug has been properly connected to the power cord.

6. Operating the Crosslinker



WARNING: ULTRAVIOLET RADIATION

Ultraviolet Crosslinkers are a powerful source of ultraviolet radiation. Even though they are not easily accessible, do not attempt to disengage or override the internal safety interlocks. Exposure to the UV radiation may result.

The unit will not operate with the door open. Opening the door during a cycle aborts the cycle. If the UV sources remain on when the door is open, the unit is malfunctioning and use should be discontinued until the unit is serviced.

Do not expose unprotected eyes or skin to UV radiation. Always disconnect the UV Crosslinker from its electrical supply before servicing.

- Turn the On/Off switch to the ON position.
Note: When turned on, the UVP Crosslinker defaults to the last used UV exposure setting.
- The last UV exposure setting will now be displayed on the LCD. The last function setting will be noted by glowing red spot(s) on the display panel.
- Two operational Crosslinker settings are available:
 - Preset UV Energy Exposure: provides a measured dose of UV exposure to the sample.
 - Preset UV Time Exposure: measures exposure time without regard to exposure intensity; therefore, when the unit is used in the Preset UV Time Exposure mode, there is no sensor involvement and thus there is no stated intensity value being delivered to the sample.

The UV Crosslinker can be operated on the following settings:

- Preset UV Energy Exposure Setting (A)
- Preset UV Time Exposure Setting (B)
- User-Defined UV Energy Exposure Setting (C)
- User-Defined UV Time Exposure Setting (D)

6.1. Preset UV Energy Exposure Setting (A)

1. Push the buttons **PRESET** and then **ENERGY** on the tactile touch pad.
2. The red light at each position should now be lit. The preprogrammed UV exposure setting is displayed in the LCD. For example, if the UV exposure setting is of 1000.0 mJ/ cm², is displayed in the LCD as 1000.0
3. Push **START**.
4. After a slight delay to energize the UV tubes, the LCD will begin to count down. The unit automatically stops at the end of the exposure cycle and will beep five times.
5. Exposure is now complete.

Note: Though the preset mJ/cm² value is factory set, it can be changed if necessary, as follows:

6. Press and hold the **PRESET** button on the tactile touch pad until you hear an audible signal. Push the button **ENERGY**.
7. Set your new preset UV exposure by pushing the numbers on the touch pad.
8. The new setting will appear on the LCD display.
9. Push **ENTER** on the touch pad.
10. The new setting is now installed.

6.2. Preset UV Time Exposure Setting (B)

Note: For best exposure performance, turn the system on and allow 1-2 minutes for the UV tubes to warm up immediately prior to exposing the sample.

Note: UV tube output intensity decreases with use over time. This change is not accounted for in UV Time exposure applications

1. Press the buttons **PRESET** and then **TIME** on the tactile touch pad.
2. The red light at each position should now be lit and the preprogrammed UV exposure time should be displayed in the LCD.
3. Push **START** on the touch pad.
4. After a slight delay to energize the UV tubes, the LCD will begin to count down.

Note: The time exposure is set in minutes and tenths of a minute.

5. The unit will automatically stop at the end of the exposure cycle and will beep five times.
6. Exposure is now complete.

Note: Though the preset ultraviolet time exposure is factory set, it is possible to change this if necessary, as follows:

7. Push and hold the **PRESET** on the touch pad until you hear an audible signal, then push **TIME**.
8. Set your new preset UV time exposure by pushing the numbers on the tactile touch pad.
9. The new setting will appear on the LCD display.
10. Push **ENTER** and the new setting will be installed.

6.3. User-Defined UV Energy Exposure Setting (C)

Sometimes it may be necessary for you to set your own standards for exposure. This is easily accomplished as follows:

1. Press the button **ENERGY** on the tactile touch pad then set your energy exposure requirements by pushing the numbers on the touch pad.
2. The energy exposure settings should now be displayed on the LCD in flashing mode.
3. If settings are correct, push **ENTER** on the touch pad.
4. Push **START** on the touch pad.
5. After a slight delay to energize the UV tubes, the LCD will begin to countdown. The unit will stop automatically at the end of the exposure cycle and will beep five times. Exposure is now complete.

6.4. User-Defined UV Time Exposure Setting (D)

Note: For best exposure performance, turn the system on and allow 1 - 2 minutes for the UV tubes to warm up immediately prior to exposing the sample.

Note: UV tube output intensity decreases with use over time. This change is not accounted for in UV Time exposure applications.

1. Setting your own UV time exposure can be achieved as follows:
2. Press the button **TIME** on the tactile touch pad and then set your requirements by pushing the numbers.
3. Your time exposure settings will be displayed on the LCD in flashing mode.
4. Remember that your time exposure settings are set in minutes and tenths of a minute.
5. If your settings are correct, push **ENTER** on the tactile touch pad.
6. Push **START**.
7. After a slight delay to energize the UV tubes, the LCD will begin to countdown. The unit will stop automatically at the end of the exposure cycle and will beep five times.
8. Exposure is now complete.
9. At the end of the exposure cycle, simply open the door and remove your sample.

Operational Notes:

- For best exposure performance when using a UV Time exposure, turn the system on and allow 1-2 minutes for the UV tubes to warm up immediately prior to exposing the sample.
- To abort an exposure, press **STOP** on the tactile touch pad. The LCD will display the remaining exposure.
- To restart an aborted exposure, press **START** on the touch pad. The exposure will continue from the point at which the exposure was aborted.
- To reset an aborted exposure, press the button **RESET**. The LCD and touch pad will return to the used last setting.
- The unit will not operate with the door open. Opening the door during a cycle aborts the cycle. Reclosing the door will reset the cycle to the last entered cycle used. To restart, press the **START** key.

7. Applications

The UVP Crosslinker is a multi-purpose ultraviolet exposure instrument for use in the laboratory. A wide variety of applications for ultraviolet radiation exist in the laboratory.

- UV crosslinking of DNA and RNA by covalently binding nucleic acids to transfer membranes nitrocellulose, nylon or nylon-reinforced nitrocellulose membranes after Northern, Southern, slot or dot blotting.
- A UV dose of 120 mJ/cm² for this laboratory purpose. This setting has been found to be the optimal dose for DNA retention and hybridization-signal sensitivity.
- Nicking ethidium-bromide stained DNA in Agarose Gels
- Gene Mapping for creating cleavage-inhibiting thymine dimers
- Testing RecA function
- Eliminating of PCR contamination
- UV Curing
- Fluorescence of materials

8. Maintenance, replacement parts/accessories

8.1. Care and cleaning



CAUTION: Risk of electrical shock

- Unplug the unit before cleaning the instrument
- Wipe any water from inside and outside the unit with a soft cloth or sponge
- Use soap and water with a soft cloth or sponge to clean the unit
- Do not allow chemicals to remain on unit surfaces
- Never clean unit with abrasive pads or cleaners
- Never clean unit with acetone or chloroform
- Clean the UV sensor regularly with a soft cloth and alcohol

8.2. Changing the UV wavelength

A UV Crosslinker is purchased with shortwave, long wave or midrange tubes. However, if user requirements and applications change, the UVP Crosslinker provide you with the unique ability to change the ultraviolet wavelength and recalibrate the UV sensor and microprocessor to the new UV wavelength. This is accomplished by purchasing six tubes of the new UV wavelength and the proper Analytik Jena calibration sensor (see Section "Replacement parts and accessories").

8.3. UV Wavelength calibration procedure

1. After disconnecting the unit from the electrical supply, install the six new wavelength Tubes as directed. (see Section "Changing the tubes").
2. Plug the corresponding UV calibration sensor into the top hole just inside of the door at the upper right.
3. Place the UV calibration sensor in the middle of the floor of the exposure chamber.
4. Close the UVP Crosslinker door.
5. Invoke the calibration mode of the UVP Crosslinker by pushing/holding down **STOP** on the tactile touch pad and turning the power to the unit ON.

6. A sequence of tones will be heard from the UVP Crosslinker and a 180-second count will display on the LCD when the calibration procedure has started.
7. No calibration occurs during this 180-second period. This period allows a UV tube warm-up and stabilization period.
8. Upon completion of the 180-second period, measurements are automatically made with the UV calibration sensor and the UVP Crosslinker sensor. These measurements are compared to limits of acceptability and/or if sensor operation is within range.
9. If sensor readings are unacceptable, an error code (01, 02, 03 or 04) will flash on the LCD. Press any key to stop.
10. Check all connections and redo calibration. If the same error message appears, call Analytik Jena.
11. The previous calibrated operation of the UVP Crosslinker will continue following any unsuccessful recalibration.
12. Replace the new UV wavelength tubes with the previously removed old wavelength tubes.

Successful recalibration to the new UV wavelength changes the values in the microprocessor and numeric setting value is displayed on the LCD. To return to original or another wavelength the proper UV calibration sensor is needed.

8.4. Crosslinker calibration procedure

If you require to recalibrate the UVP Crosslinker, the unit will need to be sent to Analytik Jena US facility. Please contact Analytik Jena US customer service to receive further instructions.

8.5. Replacement parts and accessories

For replacement parts or components not shown here, please call Analytik Jena Customer Service or place of purchase. Please have the Crosslinker model number available when you call.

Replacement Part Description	Part Number
OPERATIONS WITHOUT TEMOVING THE TOP COVER (UV Tubes)	
254nm UV Tube, 8W	34-0007-01 (6 required)
302nm, UV Tube, 8W	34-0042-01 (6 required)
365nm, UV Tube, 8W	34-0006-01 (6 required)
SENSORS - WAVELENGTH CHANGE*	
UVX-25, 254nm Shortwave	97-0016-01
UVX-31, 302nm Midrange	97-0016-04
UVX-36, 365nm Longwave	97-0016-02
GENERAL ITEMS	
Fuses, 1.5A	56-0022-04 (2 required)

*To use UVX sensor, a UVX Radiometer (P/N: 97-0015-02) needs to be acquired

9. General servicing procedures

9.1. Operations without removing the top cover

9.1.1. Changing tubes

1. It is recommended to change all six 8-Watt UV tubes at the same time. The unit does not require recalibration if you are replacing the old sources with new sources of the same wavelength.
2. Purchase six tubes from AnalytikJena.
3. Unplug the unit from the electrical supply.
4. Reach up to the inside top of unit and carefully rotate each UV tube a ¼ to 1/3 turn and pull gently downward.
5. After removing all six old tubes, carefully install the six tubes.
6. Dispose the old UV tubes properly.

9.2. General Items

9.2.1. Changing fuses

1. The fuses are located on the back panel and are marked with a self-adhesive sticker.
2. Turn fuse cap 15 degrees anti-clockwise.
3. Pull fuse and cap from the holder.
4. Pull fuse from the cap.
5. Replace the fuse.
6. Replace fuse cap and fuse into holder and turn 15 degrees clockwise.

10. Disposal

At the end of its service life of the UVP Crosslinker and all its electronic components must be disposed of in accordance with the applicable regulations as electronic waste.