



BOEKEL UV CROSSLINKER

Model

234100: 115VAC, 175W, 1.6A

234100-2: 230VAC, 175W, 0.8A

OPERATING INSTRUCTIONS

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1.0 Safety

WARNING: To guard against injury, basic safety precautions should be observed, including the following:



Caution: Read these operating instructions fully before use and pay particular attention to sections containing this symbol.

Attention: Suivre attentivement les instructions avant l'usage et prêtez une attention particulière aux sections comportant ce symbole.



Caution: Surfaces can become hot during use, including inside of chamber and bulbs themselves.

Attention: Surfaces peuvent devenir chaudes pendant l'utilisation, incluant à l'intérieur de la chambre et les bulbes eux-mêmes.



Caution: UV Radiation Hazard. Use only with shielding in place. Protect eyes and skin from exposure to UV light.

Attention: Danger des radiations ultraviolettes. Ne pas utiliser sans protection aux rayons ultraviolets. Protéger les yeux et la peau des rayons ultraviolets nocifs.

Always observe the following safety precautions:



- Avoid exposure to direct or strongly reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.
- Use only as specified by the operating instructions or the intrinsic protection may be impaired.
- After transport or storage in humid conditions, dry out the unit before connecting it to the supply voltage. During drying out the intrinsic protection may be impaired.
- Connect only to a power supply that provides a safety ground terminal.



- Do not block the ventilation openings.
- Do not touch surfaces that become hot during operation, including bulbs and inside of chamber.
- Do not operate this unit unattended.
- Do not use this product in the presence of flammable or combustible materials.
- Ensure that the power button is easily accessible during use.
- If liquid is spilled inside the unit, disconnect it from the power supply and have it checked by a competent person.

- It is the user's responsibility to carry out the appropriate decontamination if hazardous material is spilled on or inside the equipment.
- It is the user's responsibility not to use decontamination or cleaning agents that could cause a hazard due to reaction with the equipment or material contained in it.
- Consult the manufacturer or distribution agent if there is any doubt about the compatibility of decontamination or cleaning agents with the equipment or material contained in it.
- The Boekel UV Crosslinker is equipped with a UV-protective viewing window. This window protects users from harmful UV rays that are generated inside of the unit. Do not operate the unit with the door open or attempt to defeat the safeguards on the unit.
- Do not alter the construction or design. Do not remove safety labels or devices.
- Do not use this equipment for anything other than its intended purpose, as described in this equipment manual.
- Used or broken bulbs should be disposed of in accordance with all applicable disposal laws.
- Do not position the equipment in a manner that makes it difficult to disconnect the power cord from the receptacle on the back of the unit.
- Protection provided by the equipment may be impaired if the equipment is used in a manner not specified by the manufacturer.
- Do not replace the detachable power cord with an inadequately-rated cord.

2.0 Product Information

The Boekel UV Crosslinker is designed to provide crosslinking of samples in a safe, time-efficient manner with a controlled amount of ultraviolet radiation. This unit may be used for:

- Crosslinking DNA or RNA to nylon, nitrocellulose or nylon-reinforced nitrocellulose membranes
- UV sterilization and sanitization
- Northern, Southern, dot or slot blot analysis
- Nicking of DNA in agarose gels prior to blotting
- UV curing

The Boekel UV Crosslinker is uniquely designed with a variable height adjustment which may be lowered or raised based on the size of the sample. Building up the height of samples to get them closer to the bulbs is no longer necessary. The microprocessor controls detect the exact energy of the bulbs and compensate accordingly by giving more accurate energy readings than competing products that do not

compensate for changes in sample height. The Boekel UV Crosslinker may be used in either Time Mode, in which the unit runs for a user-defined amount of time, or Energy Mode, in which the unit runs until a user-defined amount of energy has been accumulated.

This unit comes equipped and calibrated with a quantity of (5) 254 nm Shortwave bulbs. Should the need arise for use of a different UV wavelength, the bulbs can be swapped for bulbs of a different wavelength and the new wavelength can be easily selected in the Boekel UV Crosslinker Setup menu. The Boekel UV Crosslinker automatically applies calibration settings for the new bulb wavelength, maintaining accurate readings for sensed UV energy in both Energy Mode and Time Mode. There is no need for the user to manually recalibrate the unit when changing bulbs.

3.0 Assembly

Remove the packing materials carefully and retain for future shipment or storage of the unit. Inspect for damage. Report all shipping damage to the carrier immediately. Shipping damage is covered by the carrier and repair/replacement for shipping damages must be coordinated through the carrier. Complete and return the Warranty Registration Card. Each package should contain:

- 1 UV Crosslinker
- 1 Power Cord
- 5 each 254 nm Shortwave Bulbs
- Operating Instructions
- Warranty Card

4.0 Identification of Controls - See Figure 1 and 2 on Page 6

1. LCD Display
2. Power Key – used to toggle power to unit
3. Mode Key – used to toggle between Time mode and Energy mode
4. Reset Key – used to reset parameters after completion of a cycle
5. Start/Stop Key – used to start and stop cycles
6. Up/Down Arrow Keys – used to increase or decrease parameters
7. AC Power Socket – connection point for power cord
8. Height Adjustment Knob – used to adjust the height of the bulbs relative to the chamber floor

Figure 1 – Front View

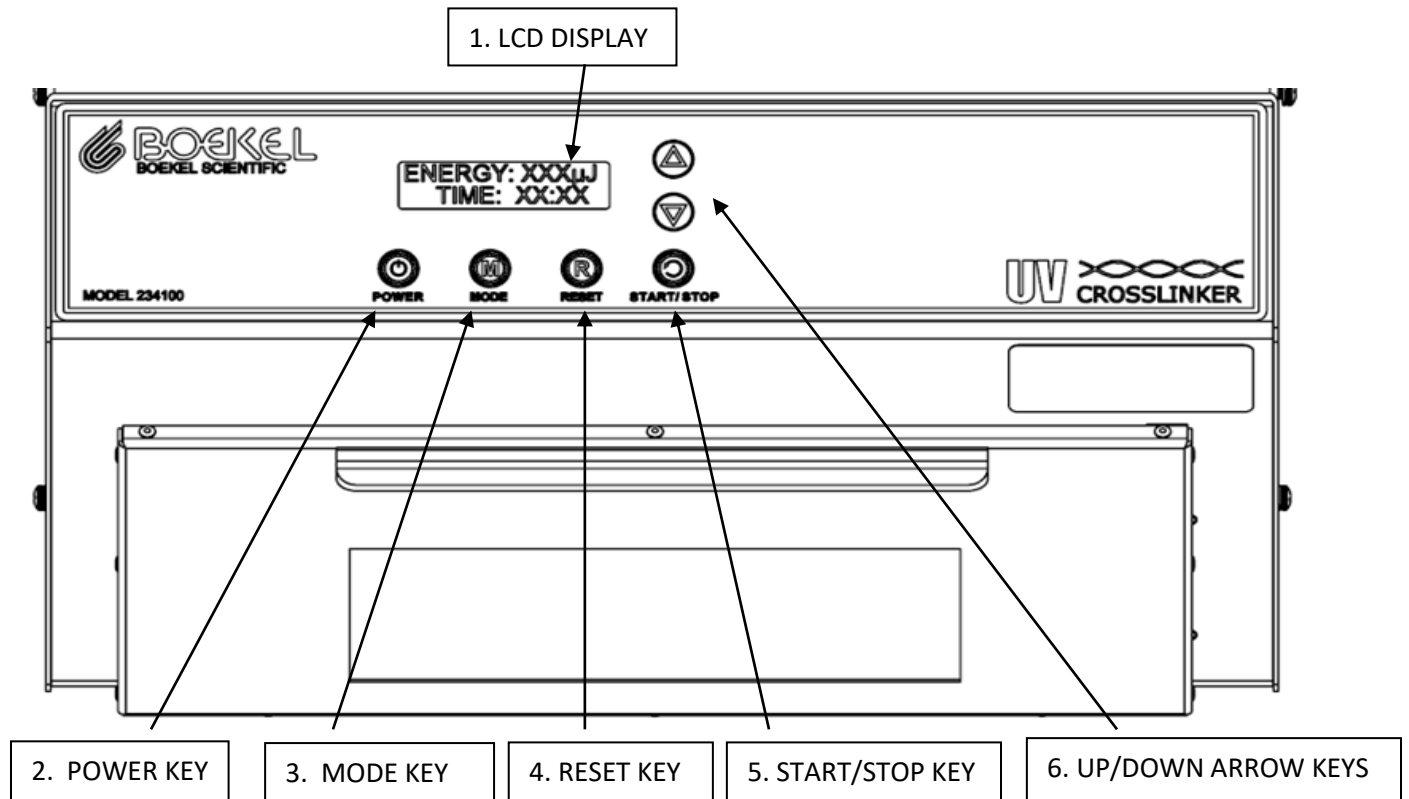
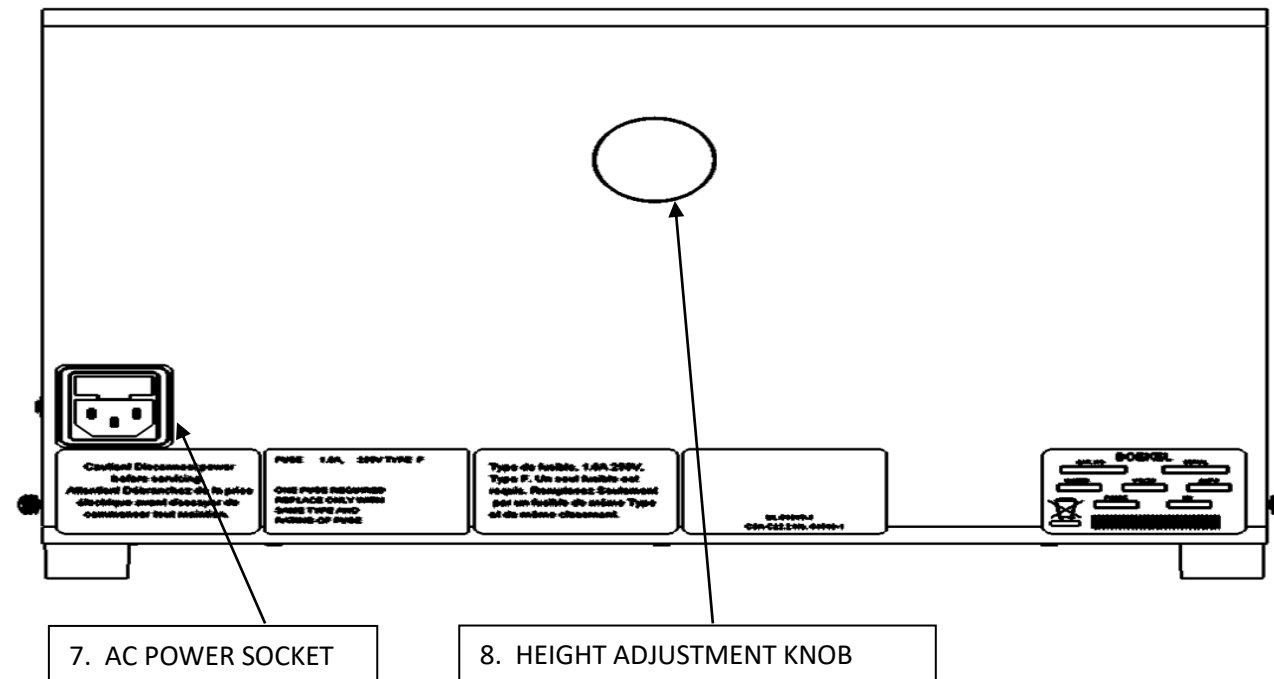


Figure 2 – Back View



5.0 Installation

- 5.1 Place the unit on a flat and stable surface.
- 5.2 Fit the power line cord, supplied with the unit, into the power socket on the rear of the unit and plug the power cord into a properly grounded outlet.

6.0 Operation

Note: Though the display displays units of energy as μJ , all readings are in $\mu\text{J}/\text{cm}^2$. The denominator of per square centimeter is truncated from the units displayed due to space constraints.

The Boekel UV Crosslinker is equipped with a UV-protective viewing window. This window protects users from harmful UV rays that are generated inside of the unit. Do not operate the unit with the door open or attempt to defeat the safeguards on the unit.

Upon Pressing the Power Key, the Startup Screen is displayed.

After the Startup Screen is displayed for 1 second, the Main Screen is displayed. The colon for energy blinks, showing that Energy Mode is selected. The Up and Down keys are used with a speedup algorithm to set the desired target energy value.

If the "Mode" key is pressed, the colon for time blinks, showing that Time Mode is selected. Pressing the "Mode" button toggles between Energy and Time Modes. The Up and Down keys are used with a speedup algorithm to set the desired countdown time value. The default time setting is 2:00 minutes. The default energy setting is 120,000 μJ .

If Energy Mode is selected and the "Start/Stop" Key is pressed, the controller sounds a brief beep and the display shows the following for 1 second:

STARTING CYCLE ENERGY MODE

The following screen is then displayed.

TIME: 02:00	UV
ENERGY: 120000	μJ

ENERGY blinks briefly every two seconds to remind the user that they are in Energy Mode. A small UV icon appears in the upper right corner of the display to show the user that the UV bulbs are energized. While in Energy Mode, the display shows the accumulated energy and the calculated target time to reach that energy level.

If Time Mode is selected and the "Start/Stop" key is pressed, the controller sounds a brief beep and the display shows the following for 1 second:

STARTING CYCLE TIME MODE

The following screen is then displayed.

TIME: 02:00	UV
ENERGY: 120000 uJ	

TIME blinks briefly every two seconds to remind the user that they are in Time Mode. A small UV icon appears in the upper right of the display to show the user that the UV is energized. While in Time Mode, the display shows the countdown time and the accumulated energy.

Pressing the "Start/Stop" key during a cycle shows the following for 1 second:

CYCLE PAUSED

The user is returned to the main screen in paused mode where they can adjust the target energy or time. "CYCLE PAUSED" blinks every 2 seconds to remind the user that the cycle is paused. Once the user is finished adjusting they can press the "Start/Stop" key to continue the cycle.

Pressing the "Reset" key sets the time back to the last entered setting and the display shows the following for 1 second. Important: This also resets the accumulated energy.

CYCLE RESET

When the set time reaches zero in the Time Mode or the target energy is reached in Energy Mode, the display shows "CYCLE COMPLETE" and

the alarm beep is energized 3 times. The user is returned to the main screen and CYCLE COMPLETE is flashed every 3 seconds until a key is pressed.

7.0 Technical Specifications

This equipment is for indoor use, with maximum relative humidity of 80% non-condensing. Installation category II (transient voltages). Pollution degree 2 in accordance with IEC 664. For operation at altitudes of up to 6500 feet.

Ambient Temperature Operating Range	16°C to 28°C
Maximum Time Setpoint	999m 59s in 1 second increments
Maximum Energy Setpoint	9,999,900μJ in 100μJ increments
Supply Ratings	Model 234100: 120VAC±10%, 50/60 Hz Model 234100-2: 230VAC±10%, 50/60 Hz
Power Rating	175W
Net Weight	30lb
Exterior Dimensions (maximum)	15 1/8"W x 14 3/8"D x 10 1/4"H
Interior Dimensions (maximum)	11 1/2"W x 12 1/2"D x 4.1"H
Door Opening	11"W x 4"H



This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

8.0 Maintenance and Service

8.1 Calibration

This unit has been programmed and calibrated to work with 254nm-, 306nm-, and 368nm-wavelength bulbs, available from Boekel Scientific. Switching between these wavelengths does not require manual recalibration of the unit. The proper wavelength simply needs to be selected from the setup menu.

Note: Using third-party bulbs may compromise the accuracy of the unit, as the Boekel UV Crosslinker has been programmed and calibrated to work with Boekel part numbers as listed in the following table:

254nm Bulb – Clear	Boekel Part Number 920-0305
306nm Bulb – White	Boekel Part Number 920-0306
368nm Bulb – Black	Boekel Part Number 920-0307

Should the unit require recalibration for any reason, please return both the unit and the bulbs being used to Boekel Scientific. See Section 11 on page 12.

8.2 Changing Bulbs

- 8.2.1 A bulb is removed from a bulb socket with a quarter turn of the bulb and then a slide straight downward (toward the floor of the chamber,) and should **only** be performed after unplugging the power cord from the rear of the unit and allowing the bulbs sufficient time to cool if they were recently powered on. Raising the ceiling to its maximum height is recommended to allow more working room and access to the bulbs. Installing a bulb is done the same way as removing one, but in reverse. Align the two pins at each end of the bulb so that both pins slide vertically into the bulb sockets. Once in position at both ends, a quarter turn of the bulb will lock it into place. Always check for secure and proper placement of pins in sockets at both ends of each bulb that is installed.
- 8.2.2 To use a different wavelength, the entire set of 5 bulbs must be replaced with a set of 5 bulbs of the desired wavelength. See Section 8.1 for available wavelengths and part numbers.
- 8.2.3 Once all bulbs have been changed to the desired wavelength, the user must select the desired wavelength in the setup menu of the UV Crosslinker.
- 8.2.4 To access the Setup menu, ensure that the unit is powered off. Press and hold both the “Start/Stop” key and the “Mode” key while pressing the “Power” key. The unit will power on and default to the Setup menu, where the Up and Down arrows select between the three wavelengths. The physical color of the bulb has been displayed in the menu text along with the wavelength to aid in distinguishing between the three options.

- 8.2.5 Caution: Bulbs are fragile and should be handled accordingly only by qualified personnel. Used or broken bulbs should be disposed of in accordance with all applicable disposal laws. Bulbs are not covered under warranty of the product and should be replaced after usable lifespan.

8.3 Cleaning

- 8.3.1 Disconnect the power cord prior to cleaning and let the unit and bulbs cool down.
- 8.3.2 If a spill occurs, use appropriate clean-up procedures as required for control of the materials being cleaned.
- 8.3.3 Use a cloth dampened with warm water to clean the outer housing.
- 8.3.4 Never use any cleaning agents other than mild soap and water on the viewing window, as damage to the window may result.

8.4 Contrast Adjustment

- 8.4.1 To increase or decrease the contrast level of the display, power the unit on and press the Up or Down arrow keys, respectively, while holding the "Mode" button.

8.5 Fuse Replacement

- 8.5.1 To replace the fuse, remove the power cord from the back of the unit. Open the fuse cover which is located on the power cord receptacle on the back of the unit.
- 8.6.1 Replace fuse with a 1.6A, 250V, Type F fuse. Reinstall the fuse cover.

9.0 Fault Diagnosis / Troubleshooting

Symptom	Possible Cause	Action Required
Unit does not operate	a. Unit not powered on b. Unit not plugged into power supply c. Blown fuse d. Power supply failure e. Door is open	a. Press "Power" key b. Plug in and power on c. Replace fuse (see Section 8.5) d. Check circuit operation e. Close door
LCD display is too bright or too dim	a. Display need contrast adjustment	a. Refer to Section 8.4, Contrast Adjustment
Accumulated energy in Time Mode significantly lower than usual	a. Blown bulb(s)	a. Ensure all light bulbs are operational and replace blown bulbs as needed
Duration of Energy Mode significantly longer than usual for given amount of energy	a. Blown bulb(s)	a. Ensure all light bulbs are operational and replace blown bulbs as needed

10.0 Warranty

When used in laboratory conditions and according to these operating instructions, Boekel warrants this product to be free of defective material and workmanship for a period of two years from the date of manufacture. The liability of Boekel for any defective equipment during the warranty period shall be limited to the repair of such equipment or replacement thereof with charge for parts or labor. The UV Bulbs are not covered under warranty for damage from mishandling, replacement error, or storage placement.

11.0 Service

It is required to obtain a Return Material Authorization (RMA) number prior to the return of any Boekel product, for any reason. A Decontamination Certificate must be completed, signed by the user and returned to Boekel Scientific in order to receive the RMA number.

Please be sure to mark the outside of the returned goods package with the RMA number, in order to ensure prompt handling.

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