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OPERATOR'S MANUAL

SPECTROLINE®

Microprocessor-Controlled UV Crosslinkers

Select™ XLE-1000 and SPECTROLINKER™ XL-1000 and XL-1500



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LAMP CONTAINS MERCURY
Manage in Accord with
Disposal Laws
See: www.lamprecycle.org

This manual illustrates instructions for all Spectroline microprocessor-controlled UV crosslinkers: the Spectrolinker XL-1000 and XL-1500 and the Select XLE-1000. When we cite Spectrolinker in the text, it should be understood that we are referring to both the Spectrolinker models and the Select models. **Please read the instructions in this manual carefully before using the Spectrolinker or Select UV crosslinkers.**

UNPACKING AND INSPECTION

1. Carefully unpack the Spectrolinker and inspect for damage. If any damage is noted, do not attempt to operate the unit and immediately notify the carrier and supplier.
2. We recommend that you save your carton and all packing materials to safely pack and ship the Spectrolinker should it ever require service.
3. The tubes are protected during shipment by foam blocks. Remove them from the chamber.
4. Connect the power cord provided to the rear panel of the unit.
5. Make sure the Spectrolinker operates correctly by putting it through each of the OPERATING MODES on pages 5-7.

WARNING

The Spectrolinker was designed exclusively for the purposes described in this manual. Never use this equipment in any manner not specified in these instructions because the protection provided by the equipment may be impaired.

The unit is factory calibrated at 254nm unless the customer specifies otherwise when ordering. If the user wishes to change the Spectrolinker to a different wavelength (i.e., 312nm or 365nm), the unit should be sent back to Spectronics Corporation for recalibration.

The Spectrolinker chamber door is made of a special, transparent UV-blocking material so that the user can safely observe the operation. The door has a built-in safety interlock which automatically shuts off the UV tubes when the door is not securely closed. *Never use the Spectrolinker with the safety interlock bypassed.* Moreover, the door seals must be kept clean, even from cleaner residue. Do not spill any liquid inside the chamber. When loading samples, take care not to block the photo sensor located inside the chamber at the rear.

Exposure to ultraviolet irradiation without proper protection can be hazardous to the eyes and skin.

Caution (refer to accompanying documents)

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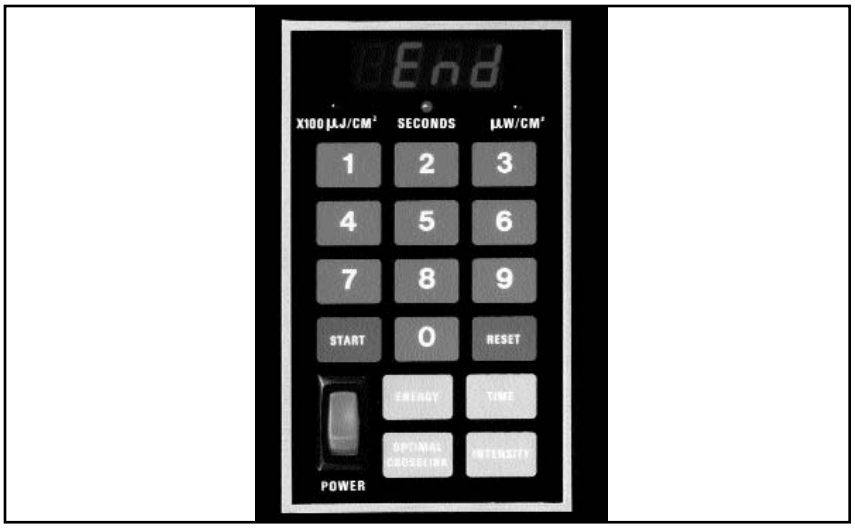
SPECIFICATIONS

	Select XLE-1000	XL-1000	XL-1500
UV Tubes	(5) 8-watt 254nm	(5) 8-watt 254nm	(6) 15-watt 254nm
OverallHousing Dimensions— W x H x D	19 x 10.25 x 9 in (48.3 x 26 x 22.9 cm)	19.5 x 10.5 x 9 in (49.5 x 26.7 x 22.9 cm)	24 x 10.5 x 14 in (61.0 x 26.7 x 35.6 cm)
Effective Inner Chamber Dimensions— W x H x D	13.5 x 7 x 7.5 in (34.3 x 17.8 x 19.1 cm)	13.5 x 7 x 7.5 in (34.3 x 17.8 x 19.1 cm)	18.25 x 6.25 x 12.5 in (46.4 x 15.9 x 31.8 cm)
Net Weight	17.75 lb (8.1 kg)	17.5 lb (7.9 kg)	26 lb (11.8 kg)
Voltage: All models available in 120V/60Hz, 230V/50Hz or 100V/50-60Hz			
Irradiance Display Resolution: ± 5µW/cm² over the entire range			

CONTROL PANEL DISPLAY DESCRIPTION

1. **Power** — ON/OFF switch. When "ON," the Spectrolinker electronics are in the WAKE state before receiving value or operational mode instructions.
2. **Optimal Crosslink** — Sets energy dose to the optimal value of 120 µJ/cm².
3. **Time** — Enter time up to 9,999 seconds. NOTE: The minimum interval for value entry is 1 second.
4. **Energy** — Select energy dose up to 0.9999 J/cm². NOTE: The minimum interval for value entry is 100 µJ/cm² (0.1 mJ/cm²).
5. **Intensity** — Measures UV irradiance inside the chamber.
6. **Start** — Initiates the selected operation (i.e., ENERGY, TIME, OPTIMAL CROSSLINK, or INTENSITY). This pad turns on the UV tubes after the mode and value are entered.
7. **Reset** — Clears all previously entered instructions and returns the Spectrolinker electronics to the WAKE state.
8. **Numeral Pads** — Selects desired time or energy level. This must be done after mode selection.
9. **X100 µJ/cm²** — Lit LED indicates "ENERGY" or "OPTIMAL CROSS-LINK" mode operation.
10. **Seconds** — Lit LED indicates "TIME" mode operation.
11. **µW/cm²** — Lit LED indicates "INTENSITY" mode operation.
12. **Display** — Displays selected values of time, energy, or intensity level as well as the following useful prompts: "DOOR" for open door, "BULB" for intensity level under 1,500 µW/cm², and "END" for completed operation.

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USEFUL CONVERSIONS

Energy per unit area (µJ/cm²) = Intensity (µW/cm²) x Time (seconds)
1mJ (millijoule) = 1000µJ (microjoules)

⚠ OPERATING MODES

The user can operate the Spectrolinker in any of the four modes mentioned in this section. An audible beep confirms each key entry *to avoid errors or accidental entries.* Press "RESET" at any time to abort any operation or to correct an error. The function must be selected before the value is entered. If the value is entered first, it will have to be re-entered after the function is selected.

NOTE: We recommend a five-minute warm-up period, from a cold start, before using the unit. This allows the UV tubes to stabilize for more accurate operation. We recommend an intensity check each day before using the Spectrolinker to ensure that it operates at proper intensity. The UV tubes must be replaced periodically since their intensity output declines with use. If unit displays "BULB," refer to 3. Intensity Mode.

1. **Energy Mode** — When the Spectrolinker is in the ENERGY mode, the X100 µJ/cm² LED lights. The value displayed or to be entered is in microjoules per unit area. Energy dosage may be set using the number pad to a maximum of 0.9999 J/cm². The minimum interval for value entry is 100 µJ/cm². A built-in UV integrator computes the energy dosage delivered, thereby *automatically* compensating for the decline in UV intensity output of the tubes as they age.

⚠ **Caution (refer to accompanying documents)**

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The desired dosage should be entered on the number pad after pressing the “ENERGY” pad. Press “START” to begin operation. After the dosage is delivered, the Spectrolinker beeps four times and the display flashes “END.” Open the door at this point, and the display will oscillate between “DOOR” and “0.”

The Spectrolinker is designed to make repetitive operations easy. So, when the door is closed after an operation, the Spectrolinker remains in the ENERGY mode and displays the last energy dosage entered. To repeat the previous dosage, just press “START.”

To alter a previously entered dosage, press “RESET,” enter the new value and then press “START” to begin the operation.

When the chamber door is opened during an operation, the display will oscillate between “DOOR” and the energy dose remaining. To resume the operation, close the door and press “START.” Otherwise, press “RESET” to return the electronics to the WAKE state.

2. **Optimal Crosslink Mode** — When this is selected, the unit is pre-programmed to deliver an energy dosage of 120 millijoules per unit area (120,000μJ/cm^2) and “1200” appears on the display. This is considered the optimal dosage for most membranes [1]. All the number keys are deactivated in this mode. Press “START” to begin operation. After the dosage is delivered, the Spectrolinker beeps four times and the display flashes “END.” Open the door and the display will oscillate between “DOOR” and “0.”

   To repeat the previous operation, just press “START” after you close the door. The Spectrolinker remains in the OPTIMAL CROSSLINK mode and displays “1200,” i.e., 120mJ/cm^2. Otherwise, press “RESET” to return the electronics to the WAKE state.

   When the chamber door is open during the operation, the display oscillates between “DOOR” and the energy dose remaining. To resume the operation, close the door and press “START.” Otherwise, press “RESET” to return the electronics to the WAKE state.

3. **Intensity Mode** — To initiate this mode, press “INTENSITY” and then “START.” The value displayed is the irradiance level at the center of the chamber. The unit remains on until “RESET” is pressed, returning the electronics back to the WAKE state. When the Spectrolinker is in the INTENSITY mode, the μW/cm^2 LED lights. All the number keys are deactivated in this mode.

   In this mode, the unit displays “BULB” when the intensity level falls below 1,500 μW/cm^2, indicating that the UV tubes need replacement. When the chamber door is opened during the operation, the display oscillates between “DOOR” and “0.” Then, if the door is closed, the Spectrolinker will remain in the INTENSITY mode. Press “START” to resume operation or “RESET” to return the electronics to the WAKE state.

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4. **Time Mode** — When this mode is selected, the SECONDS LED lights to indicate that the value displayed or to be entered represents seconds. Enter the exposure time desired to a maximum of 9,999 seconds (2 hours, 46 minutes and 39 seconds). The minimum value that can be entered is one second.

   The desired time should be entered on the number pad after the ‘‘TIME’’ pad is pressed. Press ‘‘START’’ to begin operation. After the time has expired, the Spectrolinker beeps four times and the display flashes ‘‘END.’’ Open the door at this point and the display will oscillate between ‘‘DOOR’’ and ‘‘0.’’

   If you want to repeat the previous operation, just close the door and press ‘‘START.’’ The Spectrolinker remains in the TIME mode and displays the last time entered.

   To alter a previously entered time, press ‘‘RESET,’’ enter the new value and then press ‘‘START’’ to begin the operation.

   When the chamber door is opened during an operation, the display will oscillate between ‘‘DOOR’’ and the time remaining. To resume the operation, close the door and press ‘‘START.’’ Otherwise, press ‘‘RESET’’ to return to the WAKE state.

APPLICATIONS

CROSSLINKING OF DNA/RNA

The Spectrolinker can be used to covalently bind nucleic acids to membranes after Northern, Southern, slot or dot blotting, and colony or plaque lifts. Studies [1,2,3] indicate that 120 mJ/cm^2 is an optimal dosage for attachment of DNA or RNA in any of these procedures to nylon or nitrocellulose membranes. In order to obtain the best results following the DNA or RNA transfer step, the membrane should be placed inside the Spectrolinker chamber after the membrane is dried. Place the membrane with the side to which the nucleic acids are attached facing upwards (i.e. towards the light source) so that the nucleic acids are directly irradiated. Select an energy value or press ‘‘OPTIMAL CROSSLINK’’ followed by ‘‘START’’ to initiate the desired function.

NICKING DNA

The Spectrolinker can be used to nick the ethidium-bromide-stained DNA in agarose gels in place of a depurination wash [4].

GENE MAPPING

The Spectrolinker can be used to create thymine dimers prior to treatment with a restriction enzyme. The formation of dimers at or near the recognition site inhibits cleavage [5].

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TESTING AND SCREENING RecA

The Spectrolinker can be used for testing and screening RecA mutation which can prevent repair of UV-induced damage on cells, thereby retarding their growth [6].

UV STERILIZATION

When the Spectrolinker is equipped with short wave (254nm) tubes, various sterilization processes can be undertaken for laboratory purposes [7,8,9].

ELIMINATING PCR* CONTAMINANTS

The Spectrolinker can be used to eliminate contaminants that may occur during PCR tests [10,11,12].

MISCELLANEOUS USES

The Spectrolinker can also be used whenever a metered UV dosage is required. Either short wave (254nm), medium wave (312nm), or long wave (365nm) UV tubes may be used for such applications. In the INTENSITY mode, the unit may also be used to monitor intensity inside the chamber. In this mode, however, the lamps remain on until either the "RESET" button is pressed or the power is turned off.

CLEANING PROCEDURE

Immediately clean all spilled materials from the Spectrolinker and wipe dry. If necessary, moisten a cloth with soap and water and clean the unit. Do not use any harsh chemical cleaners. **Do not attempt to clean the unit while it is plugged into a power source.**

TROUBLESHOOTING

1. If the display does not light:
   a. Make certain that the power cord is properly plugged into the wall outlet and the back of the unit.
   b. Check the fuse inside the line-filter housing. The fuse can be accessed from the back of the unit. If blown, unplug the unit and replace with a 2A F fuse in the XLE-1000 and XL-1000 models and a 5A F fuse in the XL-1500 model. See ELECTRICAL SPECIFICATIONS.
2. If the display does not count after "START" is pressed:

   Mode (ENERGY, TIME or INTENSITY) and/or value have not been selected. OPTIMAL CROSSLINK, however, *automatically* selects the ENERGY mode.

3. If the countdown is slower than normal:
   a. Be sure that the UV sensor is not blocked during operation.

*The polymerase chain reaction (PCR) process is covered by patents issued to Hoffman La Roche.

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b. Look through the window in the chamber door during unit operation to see if all the tubes are lit. And, in the INTENSITY mode, make sure the irradiance is greater than 1,500 μW/cm². Should ‘‘BULB’’ be displayed, the UV tubes need to be replaced.

c. If, after changing bulbs, the unit countdown continues to be slower than normal or “BULB” is displayed, then the Spectrolinker should be sent back to Spectronics Corporation for recalibration.

NOTE: Over time the output of the tubes will degrade and the countdown will become slower.

TUBE REPLACEMENT

If a tube fails to operate or its UV intensity does not meet desired levels and tube replacement is necessary, take the following steps:

1. Unplug the Spectrolinker from the power source and allow the tubes to cool.
2. Grasp the tube by the metal bases located at each end. Applying even pressure, gently rotate the tube a quarter turn until it loosens. The tube may now be easily removed from its sockets.
3. Install the new tube by reversing the above procedure.

MAINTENANCE

The Spectroline microprocessor-controlled UV crosslinkers are factory calibrated for monitoring the intensity inside the chamber to provide years of trouble-free operation. However, should problems eventually develop with regard to intensity measurements (as may occur with *all* light meters), the unit should be returned to Spectronics Corporation for recalibration. Be sure to contact the Customer Service Department at Spectronics for shipping instructions. **Do not attempt to service the unit.**

The chamber door is made of a special, transparent UV-blocking material to facilitate the viewing of all of the tubes when the unit is on. The user can replace one or more tubes should they fail to light. Replacement tubes (254nm, 312nm or 365nm) can be purchased from Spectronics Corporation (see Ordering Information on page 11).

If the chamber output falls below 1,500 μW/cm² with all tubes lit, it is recommended that you replace the *complete* set of tubes.

NOTE: The Spectroline UV crosslinkers are factory calibrated at 254nm unless specified otherwise by the customer when ordering. If the user wishes to change the tubes to 312nm or 365nm, the unit should be sent back to Spectronics Corporation for recalibration at the selected wavelength.

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ELECTRICAL SPECIFICATIONS

MODEL	VOLTS	HZ	AMPS	FUSE
XLE-1000 Series	120	60	1.0	2.0A F
XLE-1000/F Series	230	50	1.0	2.0A F
XLE-1000/J Series	100	50-60	1.0	2.0A F
XL-1000 Series	120	60	1.0	2.0A F
XL-1000/F Series	230	50	1.0	2.0A F
XL-1000/J Series	100	50-60	1.0	2.0A F
XL-1500 Series	120	60	3.0	5.0A F
XL-1500/F Series	230	50	3.0	5.0A F
XL-1500/J Series	100	50-60	3.0	5.0A F

Different wavelengths may be specified when ordering. Series models without a letter are 254nm (UV-C). Series models with the letter A are 365nm (UV-A), and Series models with the letter B are 312nm (UV-B).

ENVIRONMENTAL CONDITIONS

The Spectroline UV crosslinkers are designed to be safe under the following conditions.

- Indoor use;
- Altitude up to 2,000 m (6,562 ft);
- Temperature 5°C to 40°C (41°F to 104°F);
- Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F);
- Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage;
- Installation Category II;
- Pollution Degree 2.

WARRANTY

The warranty policy for the Spectrolinker XL-1000 and XL-1500 and the Select XLE-1000 is provided on the Certificate of Limited Warranty enclosed separately with each unit.

NOTE: For assistance of any kind, including help with a unit under warranty, contact the Customer Service Department at Spectronics Corporation. In the U.S. and Canada, call toll-free 1-800-274-8888. Give full details of the difficulty and include the model and serial numbers of the unit and the date of purchase. Spectronics will make available, on request, circuit diagrams and component parts lists for any model unit.

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If return of the Spectrolinker to the factory is deemed necessary, shipping instructions will be provided. If an estimate of charges for nonwarranty work or other service work is required, a quote will be furnished upon evaluation of the unit. Out-of-warranty service work will not be performed without customer approval.

ORDERING INFORMATION

Description	Part No.
TUBE, Replacement, 8 Watt, 254nm	BLE-8T254
TUBE, Replacement, 8 Watt, 312nm	BLE-8T312
TUBE, Replacement, 8 Watt, 365nm	BLE-8T365
TUBE, Replacement, 15 Watt, 254nm	BLE-1T155
TUBE, Replacement, 15 Watt, 312nm	BLE-1T158
TUBE, Replacement, 15 Watt, 365nm	BLE-1T151

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