

SUPERSPOT™ MAX / MAX HP Model: VSM3002

**UV SPOTCURE SYSTEM
100 / 200 WATT**

TECHNICAL REFERENCE MANUAL

This product conforms to
CE Standards



See Appendix B for details

AUV\LESCO

A DIVISION OF AMERICAN ULTRAVIOLET COMPANY

WWW.LESCOUV.COM

*2355 Telo Avenue
Torrance, CA 90505*



REV.
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3/21/2012



American Ultraviolet™

UV is all we do SINCE 1960

WARRANTY AUV/LESCO EQUIPMENT POLICY

UV STANDARD PRODUCT WARRANTY:

All ultraviolet equipment manufactured by American Ultraviolet West/LESCO (AUV West/LESCO) is warranted to be free from defects in material and workmanship under normal and proper use for one (1) full year from the date of original shipment. As of October 9, 2008 normal use is based on an 8-hour work day, 5 days a week (8*5*52=2080Hrs). AUV West/LESCO will repair or replace at its option any defective parts (**excluding consumables listed below**) when returned to AUV/LESCO by the purchaser within the warranty period using a Return Material Authorization (RMA) number provided by AUV West/LESCO. The purchaser is responsible for all transportation charges for shipping the equipment to and from AUV West/LESCO. Equipment may not be returned, whether for warranty or other purposes, without an RMA number. Any equipment that is received without obtaining an RMA number will be refused and returned to the purchaser at their expense. AUV West/LESCO assumes no expense or liability for repairs made outside its plant without the written consent of an authorized AUV West/LESCO representative, or for any labor costs which are so incurred. AUV West/LESCO will not be liable for any consequential costs or damages of any kind.

If it is not feasible for the purchaser to return the equipment to AUV West/LESCO for repair, then by mutual consent the purchaser will cover the expenses for an authorized AUV West/LESCO service representative to travel to the equipment's location to perform a diagnostic evaluation and any necessary repairs. Warranty period for any and all equipment which is repaired while under original equipment warranty will remain one (1) full year from date of original shipment. Any repairs made after the original equipment warranty period has expired are warranted for ninety (90) days from the date the repaired equipment is shipped back to the purchaser. After all warranties have expired, the diagnostic evaluation fee for all non-warranty equipment is \$150.00.

PARTS AND ACCESSORIES WARRANTY:

AUV West/LESCO warrants all spare parts and accessories which are purchased separately from UV equipment to be free from defects in material and workmanship under normal and proper use for a period of 60 days.

Consumable items not covered under the warranty include Bulbs, I.R. Filters, Fan Filters, Reflectors, and Lightguides.

CONDITIONS OF WARRANTY:

For above warranty on AUV West/LESCO equipment to be enforceable, the purchaser must:

1. Be the original owner and provide proof of purchase. All warranties are non-transferable.
2. Obtain pre-authorization by calling AUV West/LESCO for RMA number at 310-784-2930.
3. Return any items suspected of being defective to AUV West/LESCO for diagnostic evaluation and possible repair. All returns must be correctly packaged and shipped via an appropriate courier. AUV West/LESCO is not liable for any damage or charges incurred as a result of improper packaging and shipping by the purchaser.
4. Keep accurate records of the time elapsed from installation to removal in sufficient detail to determine the running time and environment of equipment in question. The purchaser will allow AUV West/LESCO to verify such records if necessary.

EXCLUSIONS:

The following will void all AUV West/LESCO warranties stated above:

- Defects resulting from improper installation or use
- Unauthorized service
- Tampering with equipment
- Lack of preventative maintenance
- Acts of God, or other circumstances beyond the control of AUV West/LESCO

There are no warranties, expressed or implied, except as stated above or provided in writing by an authorized AUV/LESCO representative.



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Warranty AUV/LESCO 1000-Hour SST Bulb Policy

BULB WARRANTY:

American Ultraviolet West/LESCO (AUV West/LESCO) warrants its UV Super Spot Technology (SST) premium bulbs for 1000 hours of operation when used with AUV West/LESCO manufactured products listed below. AUV West/LESCO designs and manufactures its SST bulbs for exceptionally long service life at higher than conventional intensities. However, there are no performance guarantees beyond that the bulb will successfully ignite and maintain power; system specifications are only estimates. Bulb performance is also dependent upon the extent of degradation in the I.R. Filter and Reflector, so those components must be checked prior to concluding a defect exists in the bulb. Only bulbs supplied by AUV West/LESCO and specifically used in well-maintained AUV West/LESCO SST products are covered by this warranty. Qualifying AUV West/LESCO products:

System	Model#	Bulb#
MKIII	VSM3003	LPB1008
MAX100	VSM3002	LPB1008
MAXHP	VSM3002HP	LPB2001
Rocket LP	VRM3002	LPB1003

System	Model#	Bulb#
Rocket 225	VRM2002	LPB1002
Spectrum 100	VZM1001	LPB1014
Green Spot II	VSM5001	LPB1014

CONDITIONS OF WARRANTY:

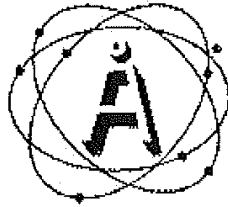
For above warranty on AUV West/LESCO bulb to be enforceable, the purchaser must:

1. Have completed the Lamp Hour Control Log inside the SST User Manual. If necessary, additional copies of the Lamp Hour Control Log can be obtained by contacting a service representative at 310-784-2930. There will be no warranty coverage for any bulb received without a Lamp Hour Control Log completed by the purchaser. The purchaser will allow AUV West/LESCO to verify such records if necessary.
2. Obtain pre-authorization by calling AUV West/LESCO for RMA number at 310-784-2930. Bulbs received without an RMA number will be returned at the purchaser's expense.
3. All returns must be correctly packaged and shipped via an appropriate courier. AUV West/LESCO is not liable for any damage or charges incurred as a result of improper packaging and shipping by the purchaser. All transportation charges to and from AUV West/LESCO are the responsibility of the purchaser.
4. All bulbs are warranted to successfully ignite and maintain power (no flickering) for the first 200 hours at full replacement.
5. Warranty period for 201 through 1000 hours is pro-rated. Providing an authorized AUV West/LESCO representative has determined a bulb is defective, the purchaser will be credited against the replacement price of the warranted bulb starting at 90% credit (@ 201 hours) pro-rated through 0% credit (@ 1000 hours).
6. There are no performance guarantees, expressed or implied, by AUV West/LESCO for UV SST bulbs; the above conditions for replacement and pro-rating are based solely on manufacturing defects, not performance. System specifications for performance are estimates only.
7. AUV West/LESCO is not liable for costs or damages of any kind due to unauthorized repairs.

EXCLUSIONS:

- Excessive lamp start/restart operations (>2 starts/day)
- Failure due to mechanical damage, breakage, mishandling, or dropping the system
- Contamination of quartz bulb envelope by oils, foreign material or other contaminants
- Damage resulting from corrosive or caustic environments
- Failure resulting from tampering with functions not intended for operator access such as polarity reversal, internal voltage, or control assemblies
- Neglect, damage by acts of God, or any other uncontrollable circumstances
- Failure to follow recommended maintenance procedures for unit airflow and cleanliness

This warranty applies to the bulb only and supersedes all previous warranties. There are no warranties, expressed or implied, except as stated above.



AUV West/LESCO

Division of American Ultraviolet Company

LAMP CONTROL LOG

Company Name:		EIT Radiometer Only (AIB1001)	Calibration Due Date:	S/N:
Contact:		Intensity measured at calibration test fixture (VSM9001)	First measure intensity using quartz fixture, then using lightguide. Difference in intensity measurement will indicate possible defects/damage in lightguide.	
Tel./Email:				

Reading should always be taken first time bulb is used. Lamp Hour Meter should be reset for each new bulb before recording data. Under normal usage of 8hrs/day, 5days/wk, readings should be taken every 2 weeks. Otherwise, if less frequent usage, readings should be taken whenever bulb is used.

MKIII Measurement Procedure
1. Adjust FEEDBACK SET potentiometer 20 turn C.C.W.
2. Set timer to 1.5sec.
3. Insert VSM9001
4. Use EIT Radiometer to measure output.
EX: Sample 3x reading and average, then record

Max Measurement Procedure
1. Set intensity to LOWEST value
2. Insert VSM9001
3. Set timer to 1.5sec.
4. Use EIT Radiometer to measure output.
EX: Sample 3x reading and average, then record

Spot Cure Model:	Spot Cure S/N:
Bulb Model:	Bulb S/N:

Date						
# Hours Indicated						
Intensity Reading						
Date						
# Hours Indicated						
Intensity Reading						
Date						
# Hours Indicated						
Intensity Reading						

Recommended to change lamp when intensity reaches 70% of original at the source in Low Power Idle or Stand-by. Contact AUV/Lesco for RA# to return warranty bulbs (under 1000hrs) with low intensity.

Contact Signature (for Warranty Return)

Date

RA#

23555 Telo Avenue, Torrance, CA 90505 Ph. (310) 784-2930/(800) 615-3726 Fax (310) 784-2929

AUV\LESCO FIBER OPTIC LIGHTGUIDES WARRANTY POLICY

WARRANTY:

Fiber optic lightguides sold by **AUV\LESCO** are warranted to be free from defects in material and workmanship under normal and proper use for 60 days from date of original shipment. This warranty applies solely to defects in material and workmanship. AUV\LESCO will repair or replace at its option, any defective fiber optic lightguides when returned to AUV\LESCO by the purchaser, all transportation paid by the purchaser, within 60 days from date of original shipment. Said lightguides may not be returned, whether for warranty or other purposes, without a RMA (Return Material Authorization) number.

AUV\LESCO will assume no expense or liability for repairs made outside its plant without written consent by AUV\LESCO, nor for any labor costs, which are so incurred.

AUV\LESCO will not be liable for any consequential costs or damages of any kind.

CONDITIONS OF WARRANTY:

For above warranty on AUV\LESCO fiber optic lightguides to be enforceable, the purchaser must:

1. Return any lightguides claimed to be defective for inspection and action by AUV\LESCO. All returns must be pre-authorized, correctly packaged and shipped, accompanied by a RMA (Returned Material Authorization) number.
2. Keep accurate records of elapsed time, time of installation or removal in sufficient detail, to determine the running time and environment of the lightguide in question. The purchaser will allow AUV\LESCO to verify such records if necessary.

The following will void AUV\LESCO's warranty:

1. Chemical and/or mechanical damage of any kind, damage caused by excessive radiation, scratching, or damage caused by using the lightguides outside their intended service or their operating parameters,
2. Defects resulting from improper installation, storage or use,
3. Tampering with equipment,
4. Lack of maintenance,
5. Service not in accordance with AUV\LESCO *Technical Reference Manual*, or
6. Acts of God.

There are no warranties, expressed or implied, except as stated above or provided in writing by an authorized AUV\LESCO representative.

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Super Spot MAX

1.0 General Information

1.1 Scope of Manual

This manual provides information necessary for operating and maintaining the AUV\LESCO SUPERSPOT MAX UV spot curing system (the MAX). It also includes safety requirements and references to pertinent mechanical and electrical drawings.

Throughout this manual, precautions necessary to prevent injury to personnel are preceded by the heading **WARNING**; precautions necessary to prevent damage to equipment are preceded by the heading **CAUTION**. See examples below.

**** WARNING ****

(Precautions necessary to prevent injury to personnel)

**** CAUTION ****

(Precautions necessary to prevent damage to equipment)

1.2 System Description

The AUVLESCO SUPERSPOT MAX curing systems are ultraviolet (UV) light sources that provide an intense concentration of UV light for the purpose of spot curing UV sensitive materials (photo polymerization).

The MAX is the most powerful UV spot curing system that utilizes a lightguide delivery method (liquid filled or fiber type). The MAX provides intensities that allow for increased production speeds unobtainable from other units.

The MAX also incorporates a microprocessor based control platform in addition to other standard features such as a membrane keypad with digital readout, optical feedback, I/O, and RS-485 communications capability.

The microprocessor provides many additional benefits for process control and flexibility. One benefit is to statistically track and time stamp all of the process parameters related to the UV spot cure process. Some examples of this benefit include: set point intensities, duration of cure, electrical power to the lamp, and date / time stamp. It also indicates if a USER CALIBRATION was performed in the system.

The curing information is stored in the battery backup built-in memory and can be accessed through the serial communications ports, in real time (while the machine is in operation) and from up to 4,000 feet of CAT5 cable when using the RS485 interface. The available data can be used for FDA and ISO type certifications, software data logging or statistical process control.

The communications capability also allows all variable set points to be manipulated through the AUVLESCO software interface or a custom written application. When using the RS485 interface, one remote computer can communicate with up to 99 MAX systems allowing for easy large-scale production process changes.

The shutter cycle is activated by either a footswitch, a membrane keypad switch or an automation process control connected to the I/O port. One of the unit's built in microprocessors controls the duration of the UV exposure, as well as the time between exposures and the total number of cure cycles.

The MAX is an intelligent control system designed for clean room operation requiring high UV output, high-speed operation and high accuracy production applications for worldwide manufacturing.

The AUVLESCO SUPERSPOT MAX features:

- UV intensity for **100 Watt** MAX up to 25 Watts in UVA, up to 30 Watts or more total intensity (Traceable to NIST)
- UV intensity for **200 Watt** MAX HP up to 30 Watts in UVA, up to 45 Watts or more total intensity (Traceable to NIST)
- Optical Feedback for constant intensity and process control
- RS-485 and RS-232 Serial communication ports
- Membrane keypad with digital readouts
- I/O connectors for automation applications
- Distal UV sensor connection port
- Stainless steel housing
- Solid state bi-level power supply
- Liquid filled 1 Meter flexible light-guide with 5mm tip diameter (100W MAX only)
- Large selection of standard size fiber optic light-guides available, as well as custom designs.
- Remote footswitch included for automatic operation
- Air-cooled lamp and power supply with ventilation protection
- IR filter for reduced heat transmission
- DataMAX Process Validation software
- Special rubber feet designed for use in clean rooms

2.0 Safety

The AUVLESCO UV spotcure system has been designed to operate safely. They are being used in a wide variety of industrial environments worldwide without any worker safety problems or health hazards. However, this equipment can present worker safety problems if care is not taken to install and operate correctly.

****WARNING****

It is important that all personnel operating this equipment become familiar with this safety information.

The following information is provided concerning various aspects of worker safety with this equipment. All personnel should read this manual to understand the safety issues and government regulations pertaining to this equipment.

With care in installation and operation, coupled with adequate worker training, no unusual safety problems should arise.

2.1 Ultraviolet Radiation

Ultraviolet radiation (UV), which is emitted during normal operation of AUVLESCO spotcure systems, can be dangerous to the eyes and skin. All personnel within close vicinity of direct UV light should be required to wear goggles with UV certified lenses or remain behind UV blocking light shielding. Personnel should also be prevented from

allowing any skin surface from coming within close proximity of the high intensity light output(s).

Additionally, it is never advisable to stare directly at any high intensity light source whether visible or ultraviolet for prolonged periods unless precautions have been taken to reduce both visible and ultraviolet light to safe levels. Discomfort from excessive eye exposure to UV light typically occurs about six hours after exposure. Personnel who experience eye pain after possible exposure to direct UV light should see a doctor immediately. Highly focused radiation, whether UV or visible light, can ignite paper and similar combustible materials. Care should be taken to avoid this.

There is no present US government standard on worker exposure to UV light. However, there is a NIOSH (National Institute for Occupational Safety and Health) document, "Criteria for a Recommended Standard - Occupational Exposure to Ultraviolet Radiation" (No. HSM 73-11009), and several useful publications are available from the Bureau of Radiological Health of the Food and Drug Administration.

2.2 Power up

Always verify the correct voltage setting of the unit before applying power. Damage to the power supply can occur if wrong voltage is applied even momentarily. The UV bulb may also be affected. Verify the proper setting following Section 4.3.

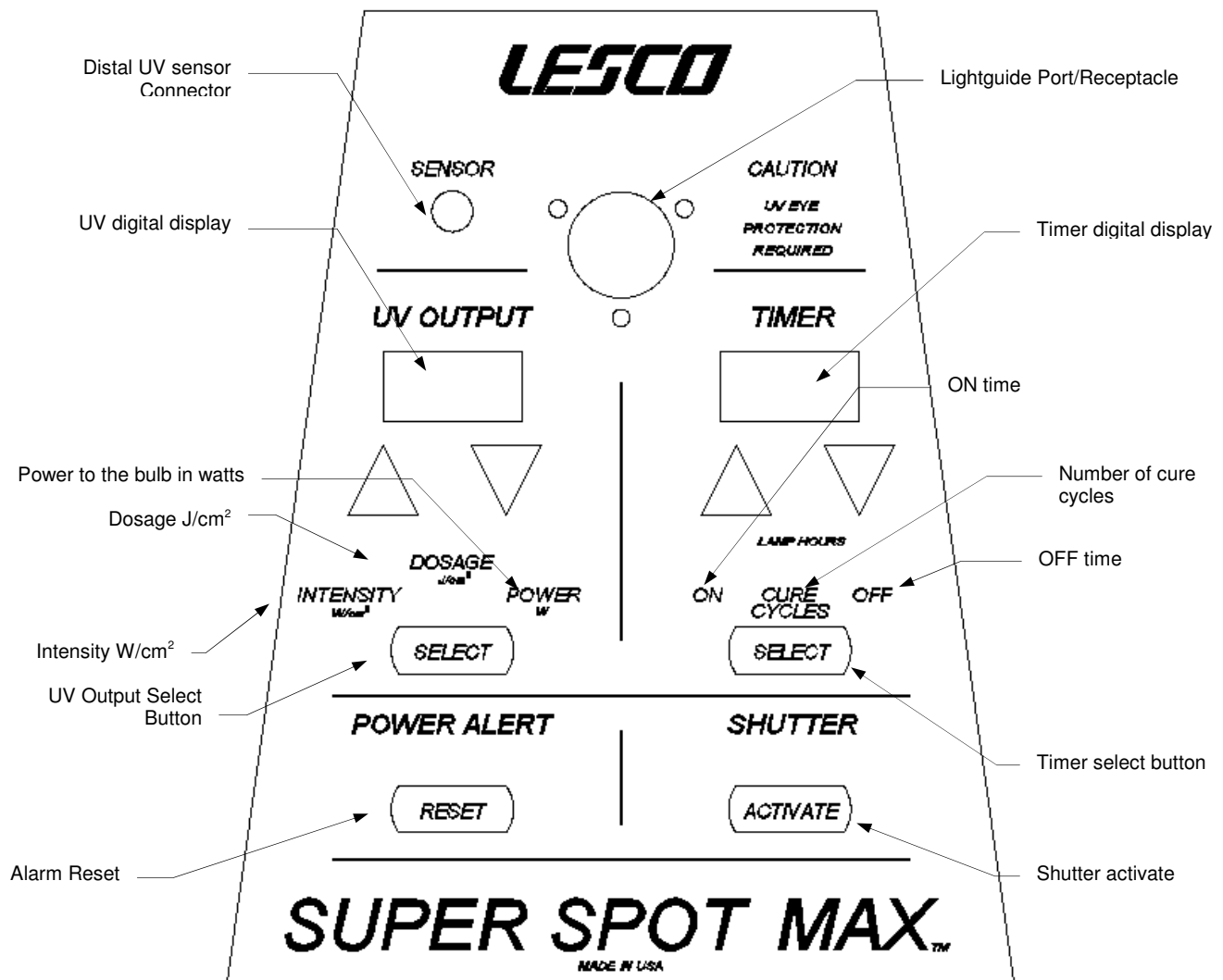
**** CAUTION ****

Disconnect power from system, or unplug system from wall or VAC power source, before connecting the footswitch adapter.

3.0 Component Descriptions

3.1 Front Panel

The front panel is a membrane control pad with digital displays and LED indicators. The keypad controls all the major operating features of the MAX.



3.1.1 Intensity

The digital display and LED's on the panel's left side are used to view system intensity in watts per square centimeter, Joules (total energy, or the value of the process intensity multiplied by total cure time) and electrical power in watts applied to the bulb.

The electric power displayed is the necessary excitation applied to the bulb to achieve the required intensity. It is a useful indicator to monitor the status of the bulb or its performance.

The **SELECT** button is used to change modes. Each time the **SELECT** button is pressed, a different LED illuminates the specified mode. The illuminated LED digital readout displays stored and calculated values of UV output. The directional arrow keys are for adjusting intensity values.

3.1.2 Time Functions

The digital readout and LED's on the panel's right side are used to view the system's time functions and settings. The LED's indicate *ON*, *CURE CYCLES*, and *OFF* selections. The **SELECT** button is used to change modes. Each time the **SELECT** button is pressed, a different LED will illuminate the specified mode. Using the arrow keys, set your required value. Holding the arrow keys allows for faster speed.

3.1.3 ON Time

The *ON TIME* indicates how long the shutter will remain open once activated. The *ON TIME* variable can be set by using the directional arrow keys. The presence of three bars (- - -) in the timer display indicates that the unit is currently in the manual mode, following the shutter command's duration.

3.1.4 OFF Time

The *OFF TIME* is used in conjunction with the cycle timer function and is used to control the dwell part of the cycle, meaning it controls how long the shutter should wait before it can re-cycle. The Off time can be changed with the directional arrow keys.

3.1.5 Cycles

CYCLES are used in conjunction with the ON and OFF time. *CYCLES* is the number of times that the ON and OFF times will repeat. This mode is very useful in automation and multiple curing applications where heat is a critical factor. Using the directional arrow keys can change the cycles. If set below 1, the letters **CON** in the display indicates continuous cycling. The unit will repeat the cure cycle continuously. The Alarm reset will stop the curing cycles.

3.1.6 Lamp Hour Display

Press both Timers **UP** and **DOWN** arrow keys simultaneously to display Lamp hours used. After two seconds, the MAX returns to normal operation.

3.1.7 Alarm Reset

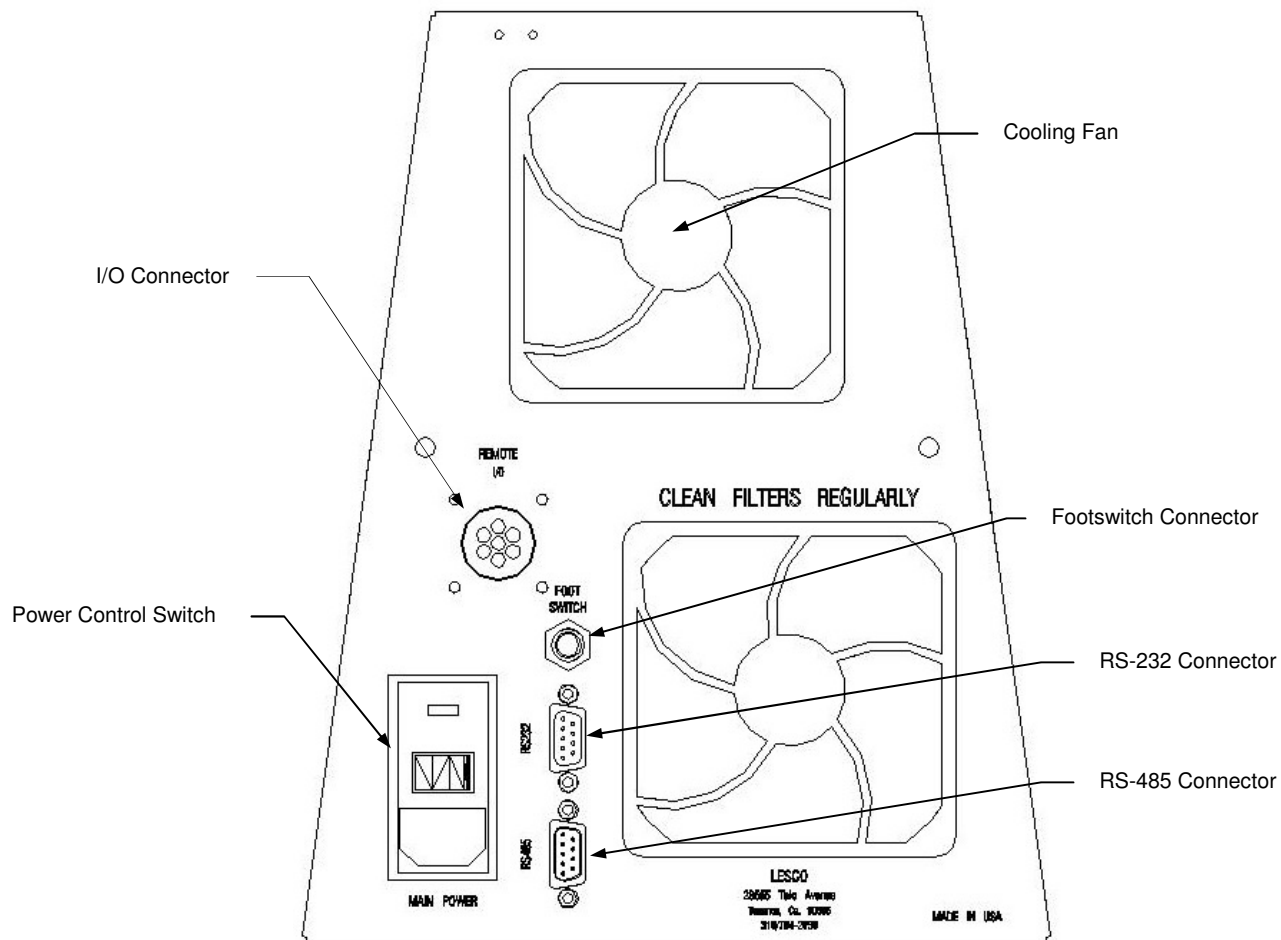
The power alarm gives an audible alert and a flashing LED signal if there are any system performance problems. The reset button silences the alarm buzzer if the alarm-latching mode is enabled. It also terminates the calibration procedure (see section 5.0).

3.1.8 Shutter Button

The shutter **ACTIVATE** button in the lower right corner triggers the shutter or a curing cycle. It will cancel an operating cycle, if pressed for more than one (1) second.

3.2 Back Panel

The MAX housing is made of stainless steel, making it ideal for clean room applications. The following parts and connections are located on the rear of the system.



**** CAUTION ****

Do not cover chassis ventilation slots.

**** CAUTION ****

Disconnect power from system or unplug system from wall or VAC power source before connecting the footswitch adapter.

3.2.1 Cooling Fans

The fan system is used to maintain the optimum temperature of the Lamp while cooling the optics and electronics. The bottom fan is used for intake and the upper fan is used for exhaust.

3.2.2 Power Entry Module

It contains the power switch, power cord socket (IEC type), main fuse, and EMI filter.

**** WARNING ****

*For continued protection against risk of fire,
replace only with the same type and rating of fuse.*

	<u>Input volts</u>	<u>Fuse rating</u>
	115-120	4A T, 250 VAC, Slow Blow
220-250	2A T, 250 VAC, Slow Blow	

3.2.3 Footswitch Connector

A standard stereo phone jack connector is used for the foot pedal plug.

**** CAUTION ****

*Disconnect power from system or unplug system from wall or
VAC power source before connecting the footswitch adapter.*

3.2.4 Nine Pin Shielded RS-232 and RS-485 Connectors

Each Nine Pin DB-9 Connector is used for RS-232 and RS-485 interface. Pin connections can be found in the schematic section.

3.2.5 Seven Pin I/O Connector

The I/O connector is used to monitor the shutter status (open or close), the optical feedback alert status, bulb ignition status and to trigger the shutter

3.3 Housing

The MAX housing is made of stainless steel, making the equipment suitable for clean room operations and allowing for easy cleaning. The housing consists of 3 main sections:

Chassis - The vertical design allows for more efficient use of counter-top space. The optical assembly is located in the upper compartment. The top cover is secured by four quarter-turn, captive Phillips head fasteners. The power supply and all the controls and accessories are located in the bottom housing.

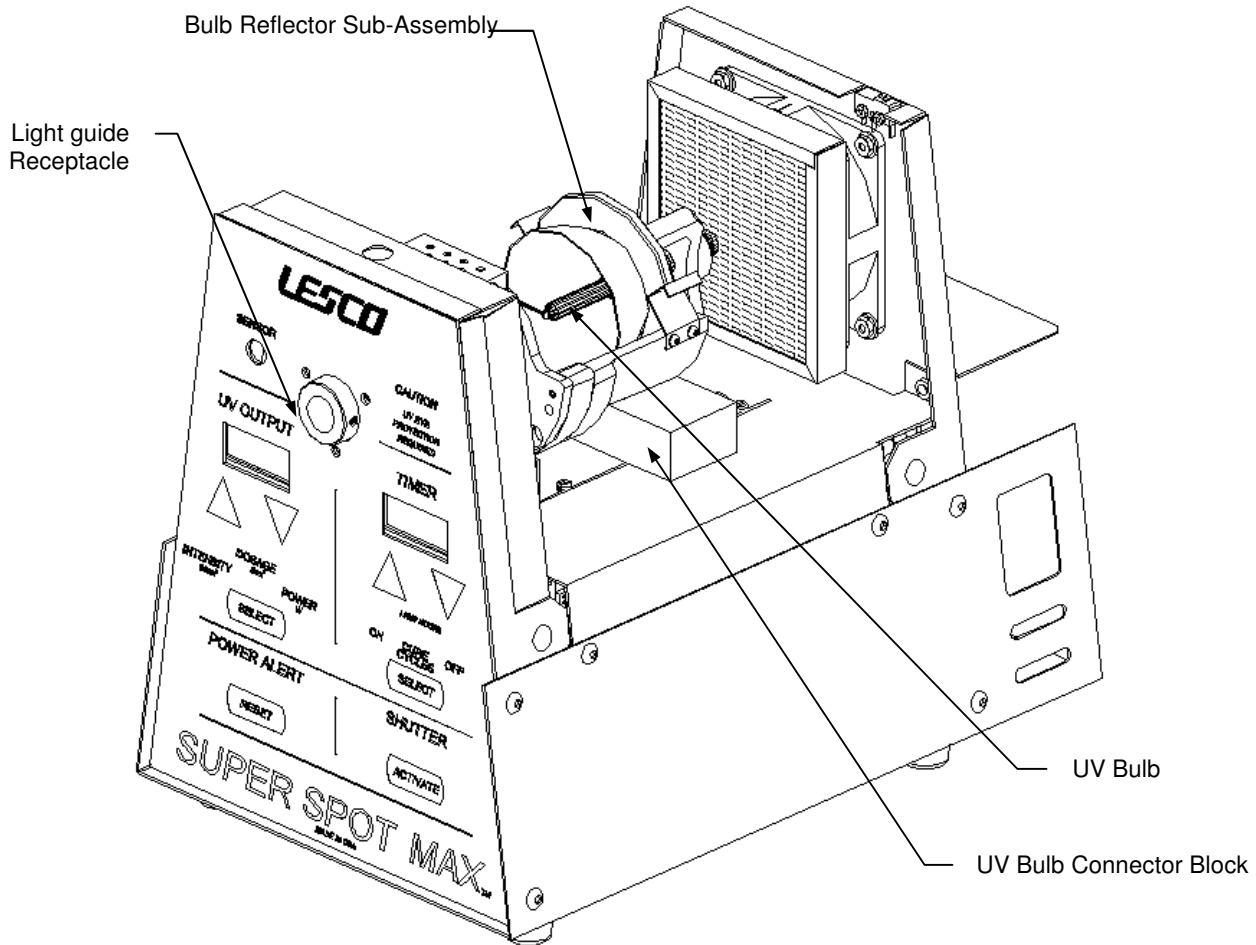
Lamp Housing - The top cover is secured by four quarter-turn, captive Phillips head fasteners. Removing it allows access to the bulb, reflector, and the IR filter assemblies.

Bottom Cabinet - The bottom side cover is fastened by six Allen head screws. Removing it allows access to the power supply for voltage setting. There are no serviceable parts inside.

The housing compartment features a recessed rear panel with air vents on the top and sides. These vents provide air access to the cooling fans even if the MAX is operated while pushed all the way against a wall.

3.3.1 Lamp Housing Compartment

This area contains the optical transmission assembly, bulb, reflector, optical feedback sensor and electrical lamp connections. The function and relationship of each component in the lamp housing is described below:



3.3.2 Shutter Assembly

The Shutter Assembly is a shutter plate that is connected to a positive open, spring return, rotary solenoid for efficient control and safety. The shutter is also connected to an interlock switch located on the lightguide receptacle where the proximal end of the lightguide is inserted.

This switch disables the shutter to ensure there is no unintentional exposure if the lightguide is missing or improperly inserted into the MAX.

3.3.3 Bulb

The MAX uses a proprietary high-pressure short arc mercury vapor bulb designed for long life at very high intensity.

3.3.4 Reflector

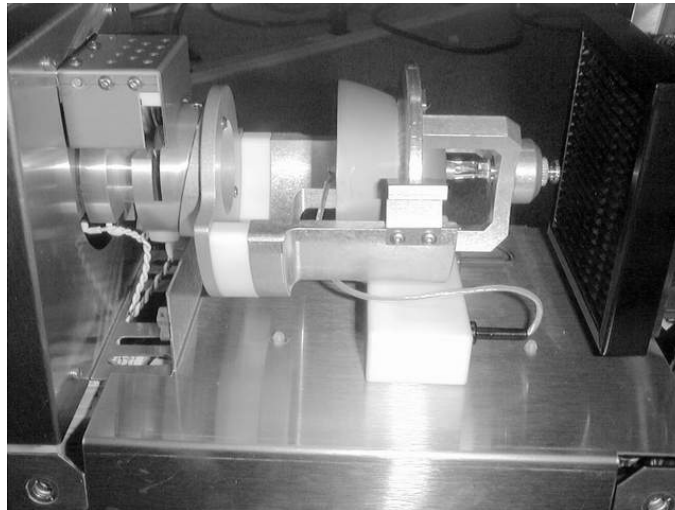
The reflector is a high precision, first surface elliptical reflector used to gather and focus the highest concentration of the available energy from the bulb.

3.3.5 Bulb Reflector Sub-Assembly

The Bulb Reflector Sub-Assembly is detachable, and it consists of the bulb holder and an elliptical metal-formed reflector. The Bulb is optically aligned within the reflector to reflect the energy through the IR filter to the end of the lightguide.

3.3.6 Bulb Connection

The black lead wire coming from the bulb and the red lead wire from the reflector holder assembly correspond to the same colored sockets located in the reflector support block. Please ensure that the black lead wire runs through the access hole on the bottom of the reflector holder, as pictured below.



Bulb Connection

3.3.7 Optical Feedback Sensor

The optical feedback sensor is located on the bottom of the lightguide receptacle and operates in a standby mode until the shutter is triggered. This signal is sent to the power supply located in the lower housing (refer to Section 3.4), which internally monitors the intensity set point. The power supply will make minor adjustments to maintain that intensity set point.

3.3.8 Light guide Receptacle

The Lightguide Receptacle is a precision mechanical assembly that aligns the bulb, bulb reflector assembly, and lightguide for optimal focal point location. It also supports the shutter assembly, optical feedback sensor, lightguide safety switch, and infrared filter.

3.4 Special Features

Here are several special features that can be accessed via the front panel.

3.4.1 Lamp Hours

The current amount of hours the bulb has been running can be displayed and reset to zero. In order to display the Lamp hours perform the following steps:

- a. Press both Timer Up-Down arrow keys at the same time.
- b. The Right hand display will show the current running time in hours.
- c. To reset the lamp hours to zero press both Timer Up-Down arrow keys at the same time for approximately 5 seconds.

3.4.2 Front Panel Lockout

The front panel keys can be locked out, inhibiting the user from changing the settings. There are two ways to achieve this lockout:

1. Through the Front Panel:

- a. Press both select keys and the reset key at the same time.
- b. When the front panel is locked, the front panel displays LOC for 1 second.
- c. When the front panel is unlocked, the front panel displays UL for 1 second.

2. Through the Serial Port Communication:

There are two levels of restriction and must be programmed using the serial interface. Please see Section 7.1 for further explanation. In order to lock and unlock the front panel perform the following:

- a. Send a Serial command of the form Uaa,L <ENTER> (aa being the address of the unit) to inhibit the UV and Timer setting functions.
- b. Send a command Uaa,A <ENTER> (aa being the address of the unit) to inhibit only the SHUTTER ACTIVATE button.
- c. Send a command Uaa,U <ENTER> to unlock the front panel from either level previously selected.

3.4.3 Alarm Latching

The High Limit Alarm indicator can be latched on. If an alarm is latched on, it will remain set on until power is turned off. The *Alarm Reset* button will silence the beeper sound only. When the non-latching mode is selected, the Alarm indication (both visual and audible) will extinguish upon shutter closure. The Alarm Latching mode must be programmed using the serial interface. In order to latch or unlatch the power alarm performs the following steps:

- a. Send a serial command of the form *Saa,Y<ENTER>* (*aa* being the unit address) to set the Alarm Latch Mode.
- b. Send a command *Saa,N<ENTER>* to cancel the Alarm Latching Mode.

Please see section 7.1 for further explanation.

3.4.4 Setting RS485 Address

This serially programmable value sets the unit's address to allow it to be accessed on an RS485 network or RS232 interface. The address is a unique number from 0 to 99 (Default = 0). In order to set the RS485 address performs the following steps:

- a. Send a Serial command of the form *Eaa,XX <ENTER>* *aa* being the current address of the unit and *XX* the new address wishing to program.
- b. If the command is sent without a new address, the unit will respond with its current address to help define its proper location.

The unit will display its current address upon power momentarily during boot up before turning the lamp on. This parameter will also be available via the serial interface. The initial print out is an automatic broadcast feature that includes all programmed parameters in memory.

3.4.5 Display Firmware version Number

This parameter is available via the serial interface, as part of the initial automatic broadcast feature that includes all programmed parameters in memory.

This simply displays the current version of the firmware. Please consult the factory for available upgrades or latest releases of firmware.

3.5 Interior Control Components

The interior control system contains the following 3 sub-systems.

3.5.1 Display/CPU Board

The Display/CPU board is located directly behind the front membrane switch panel. It is protected from direct UV light and EMI by a magnetic stainless steel shield on the back. The Display/CPU board is connected to the membrane switch panel and provides the external interface.

The Display/CPU board allows setting of the UV output; shutter ON/OFF times and number of desired exposures, power alert and reset, hour meter and provides access to user calibration procedure. All these functions are explained in Section 3.0.

The CPU on this board and the battery back up SRAM allow data storage for up to 5 years, which is accessible through the serial communications ports located on the rear panel (see Section 3.2). The board also contains opto-couplers for all remote inputs and outputs interface.

The Display/CPU Board during normal operation acts as a translator from the user input into digital commands that are used to control the daughter card for UV output and shutter operations.

3.5.2 Daughter Card

The Daughter Card plugs directly into the power supply via a 20 contact card connector. The daughter card has inputs for the photodiode located in the optics assembly and for the optional distal sensor.

These inputs allow the daughter card to close the loop between the user input, the power supply, and the actual UV output generated by the bulb. The built in microprocessor monitors all pertinent variables and report them to the front panel CPU.

3.5.3 Power Supply

The highly efficient solid state switching power supply provides electrical power to the bulb, depending upon the incoming power command from the daughter card. The power supply is capable of running at either 120 VAC or 220 VAC 50/60 Hz selected via a simple jumper. The power supply also provides 24 VDC to control internal cooling fans and shutter operations.

****WARNING****

*High voltages are present within the unit.
Remove the AC power cord from the MAX prior to removing the cover.*

4.0 Installation/Start Up

Before unpacking the system, inspect the shipping container for any damage such as broken corners, deformity, holes and tears.

After unpacking the system, examine the equipment for any damage i.e. unusual dents or rattling of components. Check components against the packing list to make sure all components were shipped correctly.

Should one find any major damage immediately inform the shipping company and AUV\LESCO. **Note:** Any delay in reporting damage may invalidate the claim.

Make sure to keep the shipping container in case there is a need to ship the system or components back to AUV\LESCO.

4.1 System Components

The MAX comes with the following separately packaged components:

- A High pressure mercury short arc bulb
- Lightguide (Optional)
- Footswitch
- UV safety glasses
- I/O connector and pins
- MAX Manual

The MAX must never be placed with the front panel facing downwards. This places the cathode of the lamp in an unfavorable orientation and will cause premature bulb failure.

**** CAUTION ****

Do not cover chassis ventilation slots.

4.2 Bulb Installation

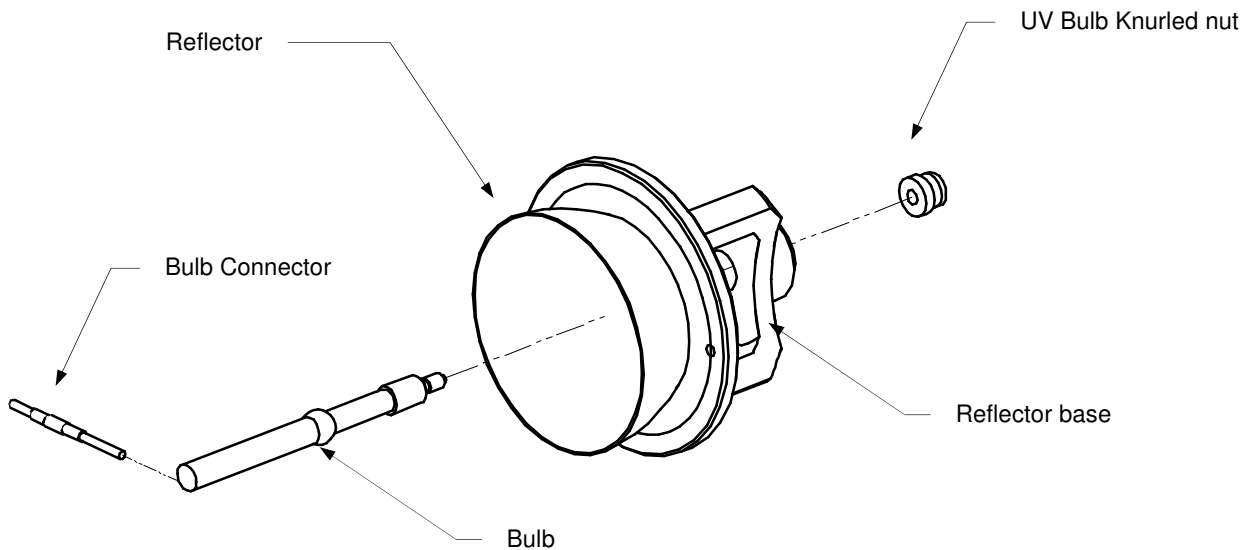
**** WARNING ****

Disconnect power and unplug unit from wall before installing or removing bulb or servicing unit.

The following procedures will allow for proper operation of the MAX system.

1. Using a Phillips screwdriver, loosen the four quick connects that are on the sides of the top cover.
2. Lift the cover straight up off of the chassis. This will allow access to the bulb reflector assembly.
3. Remove the packing material from the bulb and the nut from the bulb base. Then insert the bulb into the base of the reflector. Be careful not to touch the bulb with your bare fingers. Use alcohol to clean it if necessary.

4. Replace the nut on the end of the bulb and tighten against the reflector base. Then, using serrated pliers tighten the nut 1/8 to 1/4 turns.



**** CAUTION ****

Lamp surface is hot during normal operation. Avoid contact.

5. Plug the leads into the matching colored sockets and replace the housing.

(NOTE: Be certain the black bulb lead wire is **NOT** pinched between the housing and retainer clips. Lead wire should be free of pressed contact from bulb to socket.) Re-attach the cover to the main unit. Next connect the power cord to the rear of the MAX and into the power outlet.

6. Insert the lightguide into the receptacle located in the upper center section of the front control panel of the MAX.

**** WARNING ****

Do not look into the emitting end of the lightguide. Use proper shielding at all times. Safety glasses are provided with each system. Avoid exposing skin to UV light. Shielded UV enclosures and safety glasses are available for purchase from AUVLESCO.

**** CAUTION ****

Check input voltage and set input power module switch before plug in.

4.3 Voltage Setting

**** WARNING ****

Disconnect power and unplug unit from wall before installing or removing lamp or servicing unit

**** CAUTION ****

*Risk of electrical shock, do not remove cover.
Refer servicing to qualified service personnel*

**** CAUTION ****

Check input voltage and set input power module switch before plug in.

Verify the voltage of the power line the MAX will be connected to.

Remove the bottom side cover by undoing the six button head screws. The voltage selector connector is located on the motherboard of the power supply near the front of the unit. See Figure 1 on the next page.

The factory setting is 120 VAC and it corresponds when the connector is aligned with the socket. To convert the unit for 220 VAC simply remove the jumper connector and reinstall it leaving the rear pin empty. See Figure 1A. Voltage setting on the following page.

**** WARNING ****

For continued protection against risk of fire, replace only with the same type and rating of fuse.

	<u>Input volts</u>	<u>Fuse rating</u>
	115-120	4A T, 250 VAC, Slow Blow
220-250	2A T, 250 VAC, Slow Blow	

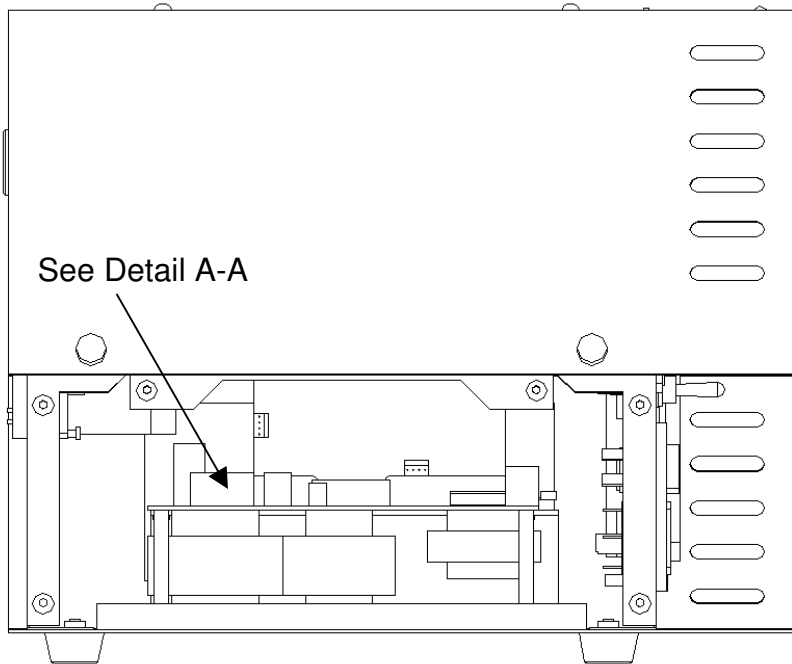


Figure 1.

Detail A-A

To change from 120VAC to 240VAC input, move the connector shown in Detail A-A 1 pin position forward as shown below.

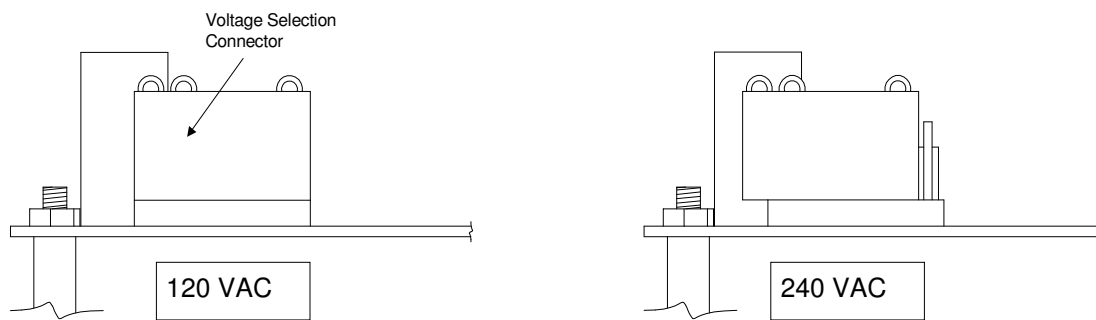


Figure 1A. Voltage Setting.

5.0 Operation

Turn on the power switch located on the back of the MAX above the power cord receptacle. After an initial hardware check, indicated by the sequential illumination of the front panel indicators, the system shows its serial address in the front displays as **Adr XX** and then ignites the bulb. If the bulb fails to start, the unit indicates this in the front panel, the I/O connector and the serial interface. To reset, turn the power off, wait ten seconds and then restart the unit.

After bulb ignition, the displays show the bulb increasing power as **XX Pct** and then a stabilization delay until the warm-up is completed. The display then shows the last set of parameters and the unit is now ready for use. During the warm up cycle, the shutter operation is disabled.

The operating parameters can now be changed if required, either by the front panel input or via the serial interface. The last set of values used before shut down are stored in memory and will be used as the next initial setting.

The front control panel allows access to all of the following functions:

- Calibration (section 6.0.)
- Intensity level (section 3.1.)
- Timer setting (section 3.1.)
- Cure cycles (section 3.1.)
- Shutter activation (section 3.1.)
- Alert reset (section 3.1.)
- Lamp hours display (section 3.1.)

5.1 Max Power Alert Functionality

The MAX constant intensity control loop adjusts the power transferred to the UV bulb to maintain a constant output during operation. As the output from the bulb diminishes with age, the electric power applied to it will increase compensating and canceling the losses.

In order to protect the bulb and the control devices, there is a high safety limit to the adjustable power band. When this limit is reached, the compensation is not longer possible and there will be a reduction in the bulb's output over time.

The MAX control circuit will indicate the limiting condition by its Power Alert Alarm. This will alert the operator or an external control device to replace the bulb.

The Alarm can be programmed in latching and non-latching operating modes. Please refer to section 3.4.3. for setting instructions.

5.2. Alarm Latching (Al)

The Optical Feedback Alarm is set when the control loop can no longer operate. When the Alarm Latching mode is selected, the indicator will remain ON until power is turned off, including the ALARM LED blinking, the I/O connector output and the serial interface. The buzzer will also sound, but it may be silenced by pressing the ALARM RESET button.

If the Alarm Latching Mode is set OFF, the indicator will remain ON until the next shutter closure event. The sequential memory records will indicate the Alarm condition in each cure event regardless of the setting selected.

6.0 Calibration

Customer calibration should be performed whenever the bulb or lightguide is changed. The calibration procedure is used to set the upper and lower UV output limits that are stored in the CPU. The CPU values are the actual UV wattage per square centimeter exiting the lightguide. These values set the limits for normal operation.

The MAX unit UV sensor adjustment range is divided into 1024 equal steps. The calibration procedure will find the lower and higher step count of the unit operating range with the bulb and light guide used during its execution.

6.1 User Calibration Procedure

1. To enter the user calibration, **with a lightguide inserted**, depress and hold the two UV output arrow keys simultaneously.
2. The Display will show

- - -

CAL

3. **Depress and hold the footswitch or shutter activate button while the CAL sequence is executing.** Failure to do so will abort the calibration process and the complete sequence must be repeated. The shutter will automatically close at the end of this sequence.
4. The UV output Display will start counting up from zero, until the low count of the calibration is found. This value corresponds to the minimum output from the bulb as the electric power increases in value.

LLL

CAL

(A number value will appear here, e.g. 190)

5. Once the Low value is found, that number will freeze in the left-hand display and the right-hand display will continue the count until the high value is found. The high value corresponds to the highest bulb output at the power supply maximum setting. **Once these values are found, the shutter will close automatically.**

LLL

HHH

(A number value will appear here, e.g. 275)

6. The values will remain displayed until the footswitch or SHUTTER ACTIVATE button is released.
7. Release the footswitch. The Display will Change to:

XX.X

(Enter your value here, e.g. 12)

LO

8. Open the shutter, take a reading using a radiometer and enter that value into the left-hand display.
9. Press the UV Output select key and toggle to the Cal Hi.

YY.Y

(Enter your value here, e.g. 20)

HI

10. Open the shutter, take a reading using a radiometer and enter that value into the left-hand display.

THE UNIT IS NOW CALIBRATED.

PRESS THE RESET KEY TO RETURN TO NORMAL MODE.

6.2 Calibration Error

The built-in microprocessor will perform the automatic sequential stepping of the electric power to determine the operating limits of the bulb/reflector and light guide combination used during the procedure.

If the proper sequence is interrupted by the operator, the unit will abort the calibration and restore the last set of values from memory. If the internal microprocessor controller is unable to complete this routine, it will indicate it with an error E23 in the timer display. After few seconds, repeat the procedure. If the condition remains, please consult the factory for assistance.

6.3 Terminating Procedure

Pressing the RESET button in the lower left quadrant of the front panel stores the calibration values and sets the unit back into normal operating mode. Pressing the reset button at any time prior to entering both LO or HI values terminates the calibration procedure and the unit will have to be recalibrated for proper operation.

7.0 Serial Communication DataMAX

7.1 Serial Communication

The Super Spot Max has remote data acquisition access and control capability. It is possible to connect up to 100 Super Spot Max units when using a multidrop RS485 serial communications link. Each unit has to be individually addressed 0 to 99 and each system will respond to a command when its address appears in the command.

It is also possible to interface serially with each unit using the RS-232 interface, with the exact same command structure and syntax. Please note the individual address of the MAX unit displayed during power up before lamp ignition.

Please refer to the Serial Interface Document, AUV\LESCO Part No. KMD1043, that details all the available commands and their functionality and programming. The lists of available commands are:

Front Panel Controller

A	Activate Recipe
B	Manually Activate Shutter
C	Auto-Calibrate Setting
D	Print All Stored Records
E	Change Address
F	Factory Calibration
Gx	Log in
H	Help
I	Test and Initialize Memory
L	Reset Lamp Hour Timer
M	Store Recipe
Nx	"Recipes"
O	Monitor Photodiode
P	Print Last Record
Q	Query Command
R	Reset All Stored Records
S	Alarm Latching
T	Real Time Clock
U	Front Panel Lock
Vx	Lamp On-Off
X	Halt Shutter Activate
Z	Diagnostics

Daughter Card Controller

A	Average Restart
B	Read Feedback Photodiode
D	Load DAC
F	Feedback Gain
H	Help
I	High Limit Threshold
L	Low Limit Threshold
M	Monitor Gain
O	Open/Closed Loop Mode
P	Read Lamp Power
R	Read Monitor Photodiode
S	Limit Status
T	Lamp Start Bit

7.2 Data MAX Interface

There is a Virtual Instrument (VI) interface to help communication to the MAX unit using a standard computer or a laptop. The available kit includes the software and cables required to connect the computer to the unit. Please see AUV\LESCO Document KRM1011 for DataMAX Software Instructions and detailed description of the kit components.

8.0 Maintenance

8.1 Housing

The MAX is a simple, rugged unit and does not require complicated routine maintenance. Routine maintenance consists of keeping the unit clean, periodical cleaning of air filters, and periodical UV output measurements to ensure that the unit performs optimally.

8.1.1 Cleaning

****WARNING****

Make sure the main power switch is turned off and the power cord is unplugged before cleaning the unit.

To clean, unplug the unit and wipe down outer surfaces with a damp, clean cloth. If necessary, use mild detergent, acetone, or alcohol. Let unit air dry before applying power.

****CAUTION****

Use of any other chemical may result in rust or tarnish to the surface, and void the warranty.

8.1.2 Air Filter Cleaning

The MAX has two fans located at the rear panel; each of the fans is equipped with a removable air filter. To remove the air filter, snap off the flexible plastic fan cover. The air filter is easily removable from the fan opening. Wash the filter with warm water and air dry. When dry, place the filter inside the plastic cover and snap shut over fan.

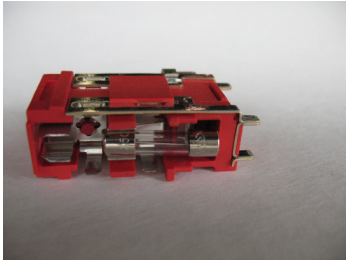
8.1.3 Fuse Replacement

The external fuse is above the power switch on the rear panel. Remove power cord and open the power control switch cover and small red drawer located above the power switch using a small flat screwdriver.

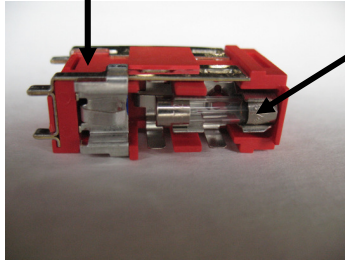


For 120vac

Fuse 4A in first line

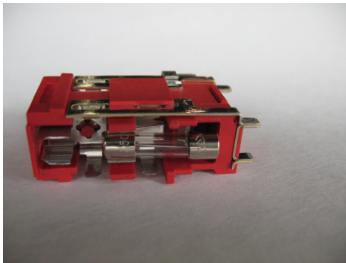


Jumpered in second line. Spare fuse 4A

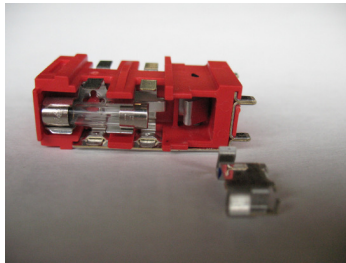


For 220vac

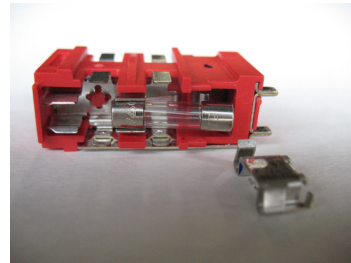
Fuse 2A in first line



Remove the jumper

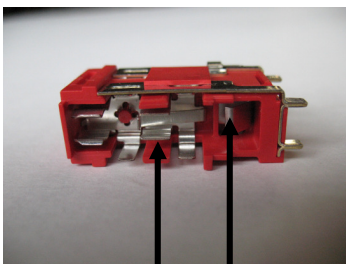


Install a 2A fuse in second line



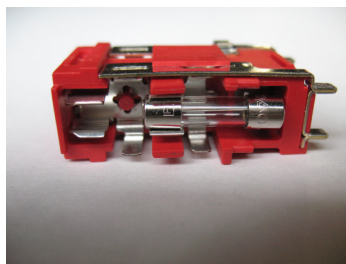
Correct fuse placement in holder

No fuse

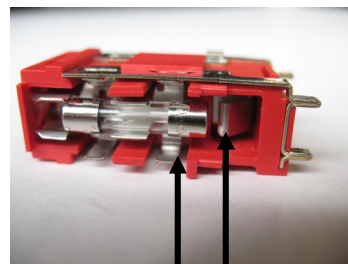


Contacts

Correct



Incorrect



Fuse not making contact

8.2 Optical Components

The optical components are the reflector assembly, the shutter, the IR filter and the light guide.

8.2.1 Reflector Assembly

The reflector is a highly important component of the “optical train” since it collects all of the light output from the bulb. The reflector focuses the collected light into the light guide. When the reflector is new, it has a very high efficiency, but with time and temperature, it slowly decays to lower levels. Always inspect the reflector when replacing bulbs. A discoloration or lack of clear shiny surface indicates a worn out reflector. AUV\LESCO recommends replacing the reflector assembly every 6-12 bulb changes or earlier if required. Many factors influence its performance, such as air humidity, room temperature, and potential corrosives/particulates content within the ambient air.

8.2.2 Shutter

The shutter is actuated by a high MTBF (mean time before failure) rotary solenoid. Under normal operating conditions, this should not need any maintenance or replacement. However, on high duty cycle applications, it should be replaced to prevent failures or misoperation every 10 million operations.

8.2.3 IR Filter

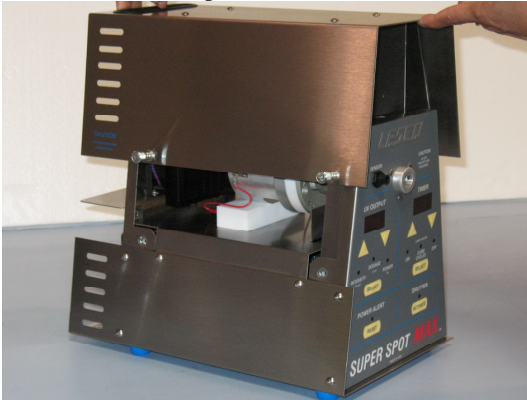
The IR filter is a specially coated, high quality quartz plate. The filter is a critical component, since all of the UV light must pass through it before being transmitted by the light guide.

There are a variety of filters available for different applications. Please refer to Appendix C “IR Filter Descriptions” or call AUV\LESCO for an appropriate choice.

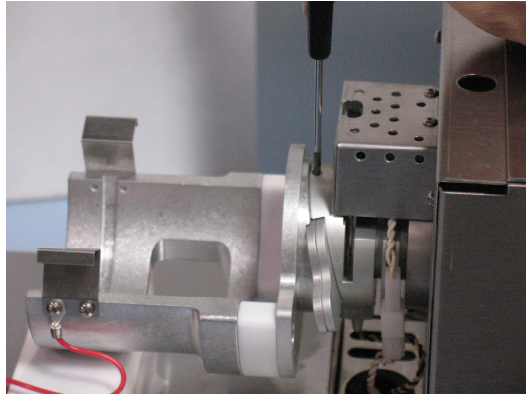
Always check the filter when re-lamping by removing the filter holder. Make sure the coating side of the IR filter faces the lamp/bulb. Inspect it for blemishes and/or cracks. It is recommended to replace the filters every 4-8 bulb changes or when necessary.

INSTRUCTIONS TO REPLACE THE IR FILTER

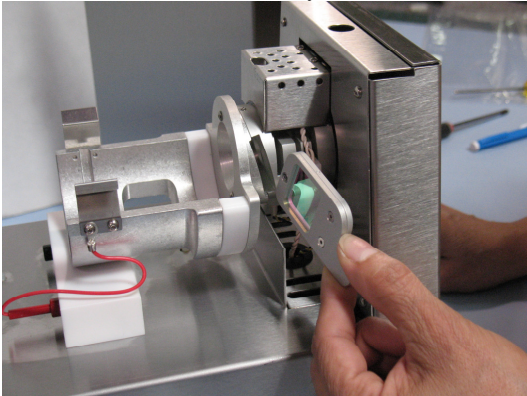
1. Remove the top cover



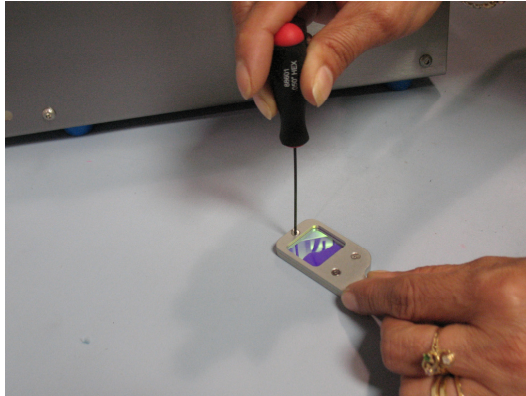
2. With a flat screwdriver loose the set screw



3. Remove the filter assembly



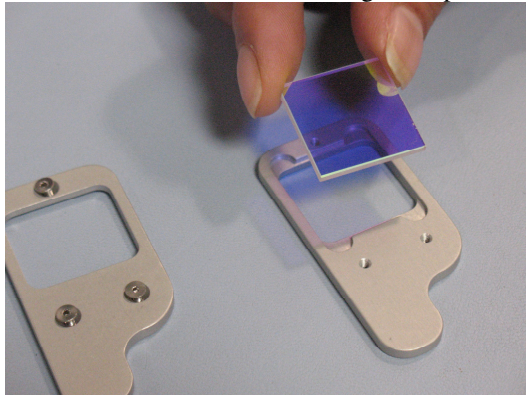
4. With a .050" Hex Driver remove the three screws



5. Remove the filter rear holder and IR Filter



6. Install the new IR Filter with the coating side up.*



7. To reinstall the IR Filter assembly following the preceding instructions in backwards order.

NOTE: *Do not touch the coating of the IR Filter with your finger only on the edges.
*By checking the edge at an angle you can tell which side has coating and which side doesn't.

8.2.4 Light guides

AUV\LESCO light guides are available in either “liquid-filled” (LF) or “fiber optic” (FO) types.

Liquid-filled Light guides

The standard light guide shipped with most AUV\LESCO SUPERSPOT cure products is a 1M x 5mm LF model. This device allows flexible delivery of high intensities of light with approximately 80% transmission efficiency in the UV “A” and visible ranges. 1.5M and longer LF versions are available as are bifurcated (dual outputs), trifurcated (3 outputs), and 8mm or 3mm diameter models. AUV\LESCO also offers a variety of custom light guides for special purposes. These include special models optimized for high transmission in the UV “B” and UV “C” range (230 to 390 nm). Contact AUV\LESCO for price and delivery of special products.

AUV\LESCO’s precision-built LF light guides are high quality optical instruments, but their performance will degrade with time. Under normal operating conditions, the user can expect anywhere from 1 to 2 years of use from a LF light guide if cared for properly. However, normal degradation will be greatly accelerated with aggressive radiation and/or extreme heat levels. For a given dosage, it is well established that high intensity for short time periods is the preferred method for producing maximum cure strength for the majority of applications. This will normally not damage the light guides.

However, care must be taken to minimize very high intensity levels for sustained periods of exposure time. Also, the special IR reduction filter in AUV\LESCO SUPERSPOT cure systems must not be removed if working with moderate to high levels of intensity and exposure time. If either of these conditions occurs, the LF light guide may suffer irreparable damage or have its service life reduced dramatically. Special duty AUV\LESCO FO light guides are available for extreme intensity/dosage applications (contact factory at 1-800-615-3726).

Fiber-optic

AUV\LESCO fiber optic (FO) lightguides are used for applications where long run lengths, tight end clearances, or multiple outputs are required. FO lightguides are available in almost endless configurations for specialized applications. Popular standard products also are Bi-, Tri- and Quad furcated lightguides. AUV\LESCO FO lightguides can be ordered with 10 or more output ends arranged in circular, line, or random configurations.

All lightguides can be damaged or suffer impaired light transmission if not used properly. Minimize bending a lightguide radically (i.e. – more than 90° over a 6” radius for a LF). Be extremely careful not to scratch, mar or accidentally apply curable material to the guide end tips. One may (and should) clean the quartz end tips with alcohol on a regular basis and check transmission levels at least every 100 operating hours (more often if end tips are not fixtured). Transmission losses can be easily determined by using an AUV\LESCO Quartz Calibration Fixture and radiometer.

Refer to Troubleshooting Section “Low UV Output” for further details.

8.2.6 *Lightguide Maintenance*

Your Fiber Optic Light Guide (FOLG) is designed to provide a long life of dependable and consistent UV energy transmission. In order to sustain the high levels of throughput and extend its useful life, the FOLG must be properly maintained.

Following are some general maintenance guidelines for your reference. If you need any additional help or have further questions, please contact AUV\LESCO with your request.

1. Inspect the FOLG regularly. A visual inspection of its ends will detect most problems associated with build up of residues or signs of deterioration. To inspect it, use a bright incandescent lamp. It is better to cover the opposite end to prevent back illumination. The surface should look black and very shiny. If it looks dull or not glossy, there is residue on it and it should be cleaned.
2. Never use a sharp object to clean the fiber surfaces. Use only high quality solvents. We recommend using reagent grade acetone. Do not use regular acetone as it may leave residues.
3. Use a clean Q-tip or Clean-wipe to scrub the surface when applying the solvent. Make sure no material “bleeds” from the surface, as this is an indication that there has been mechanical damage.
4. Be careful not to expose the mono-coil jacket (black flexible tubing) surface to the acetone. Do not use any solvents that can dilute epoxy adhesives. Use alcohol to clean any deposits on the mono-coil surface.
5. If the fiber surfaces cannot be cleaned or continue to release material, please return the FOLG to AUV\LESCO for repair. It may be necessary to re-polish the surfaces or rebuild the ends.
6. Always inspect the IR filter in the Super Spot unit, since it is essential for the protection of the proximal (entrance) end of the FOLG. Using the FOLG with a damaged, broken, or removed filter will cause serious damage to the fiber.

Following these general guidelines and proper preventive maintenance will give you the expected long life of your FOLG. Please make sure you keep it clean and working properly to benefit from its unmatched performance.

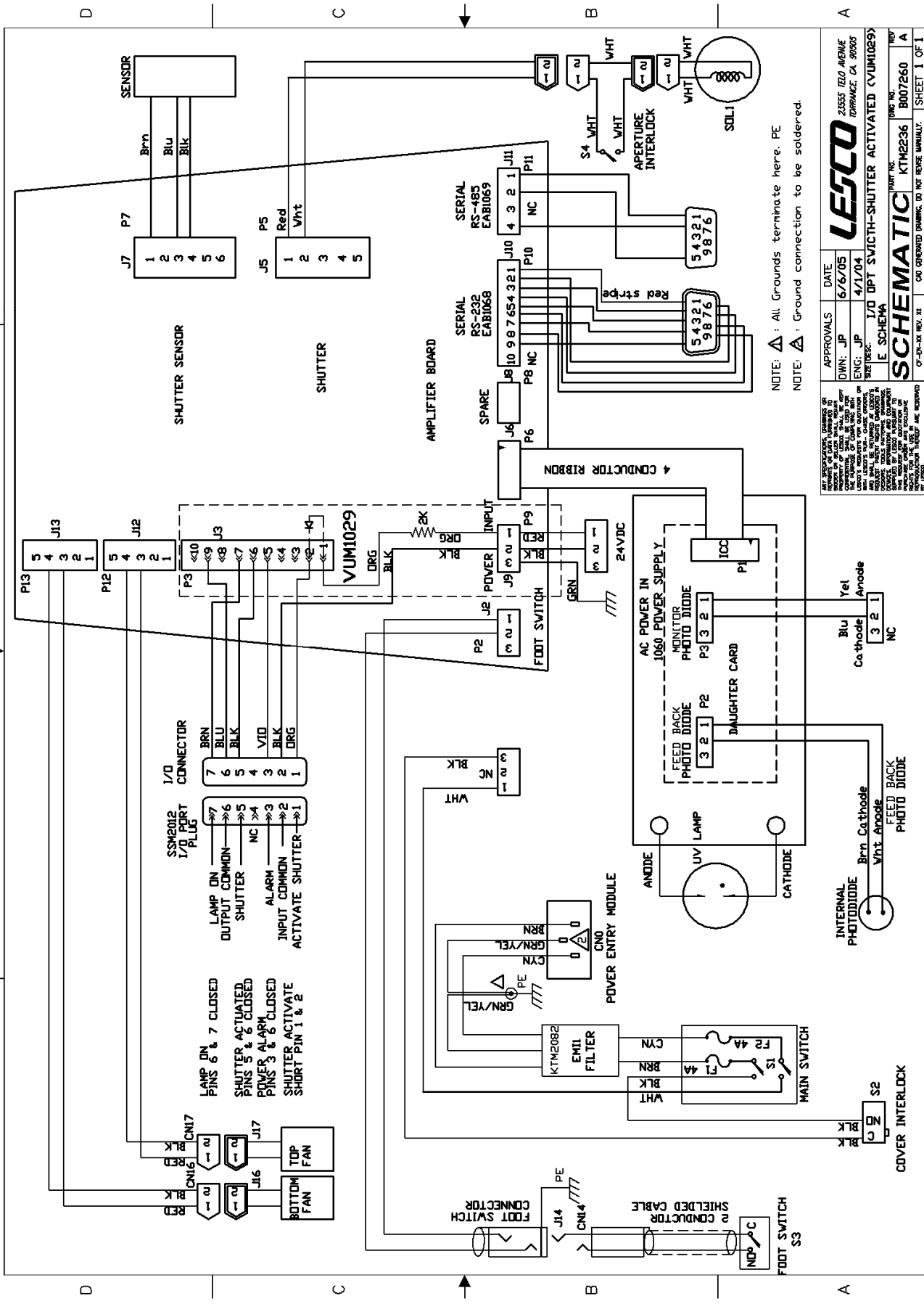
9.0 Drawings/Schematics

The following section is a set of drawings and schematics complete with specifications for the MAX system and accessories.

9.1 Main Schematic

KTM2224 Electrical Schematic

1 2 3 4



NOTE: Δ : All Grounds terminate here. PE
 NOTE: \triangle : Ground connection to be soldered.

APPROVALS		DATE
DWN: JP	6/6/05	
ENG: JP	4/1/04	

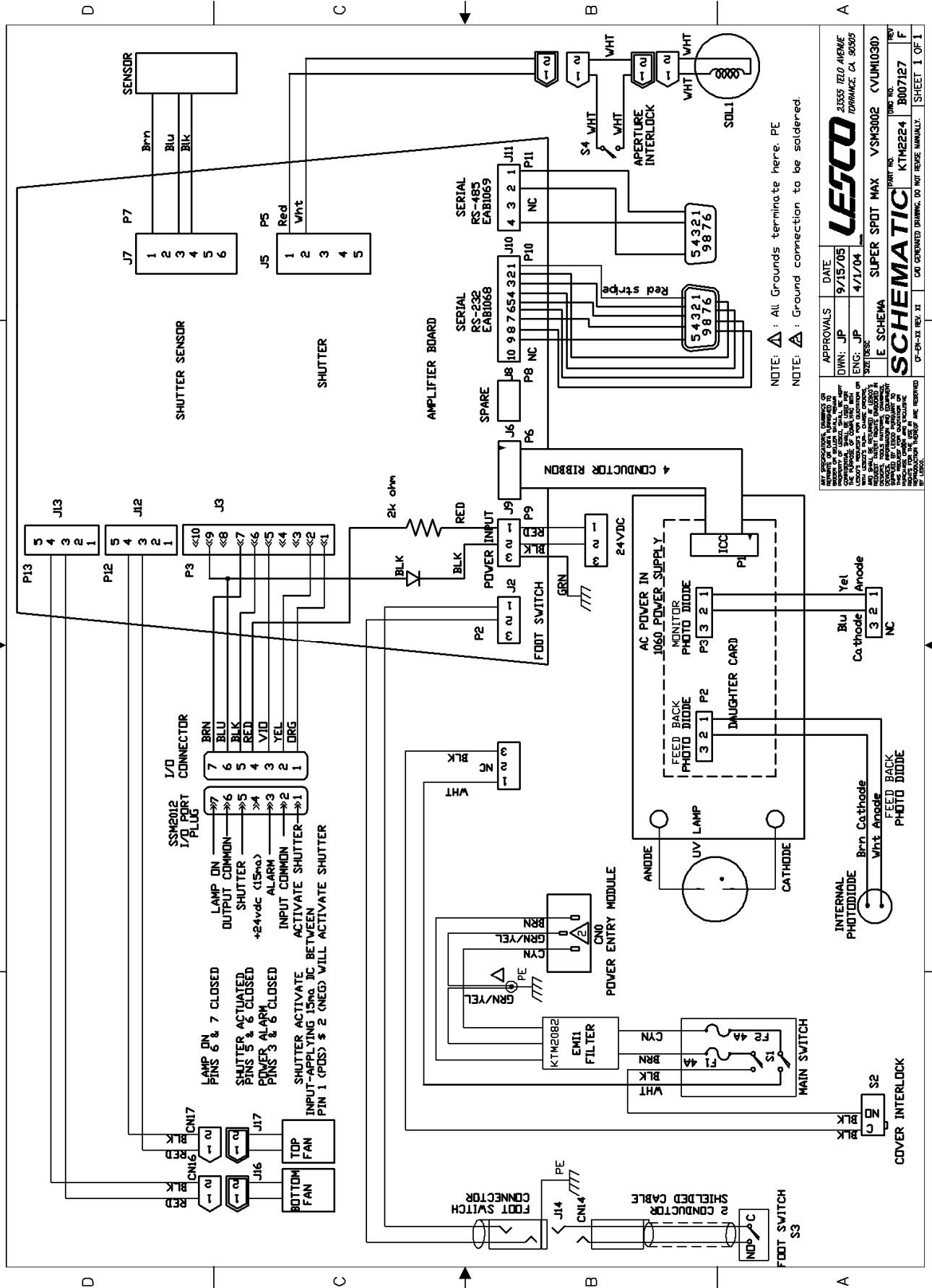
REV: 1/0 DPT SWTCH-SHUTTER ACTIVATED (VUM1029)
 E SCHEMA

2555 180 AVENUE
 TORRANCE, CA 90505

LESCO

REP: KTM2236 B007260
 PART NO: KTM2236
 QTY: 1 OF 1

1 2 3 4



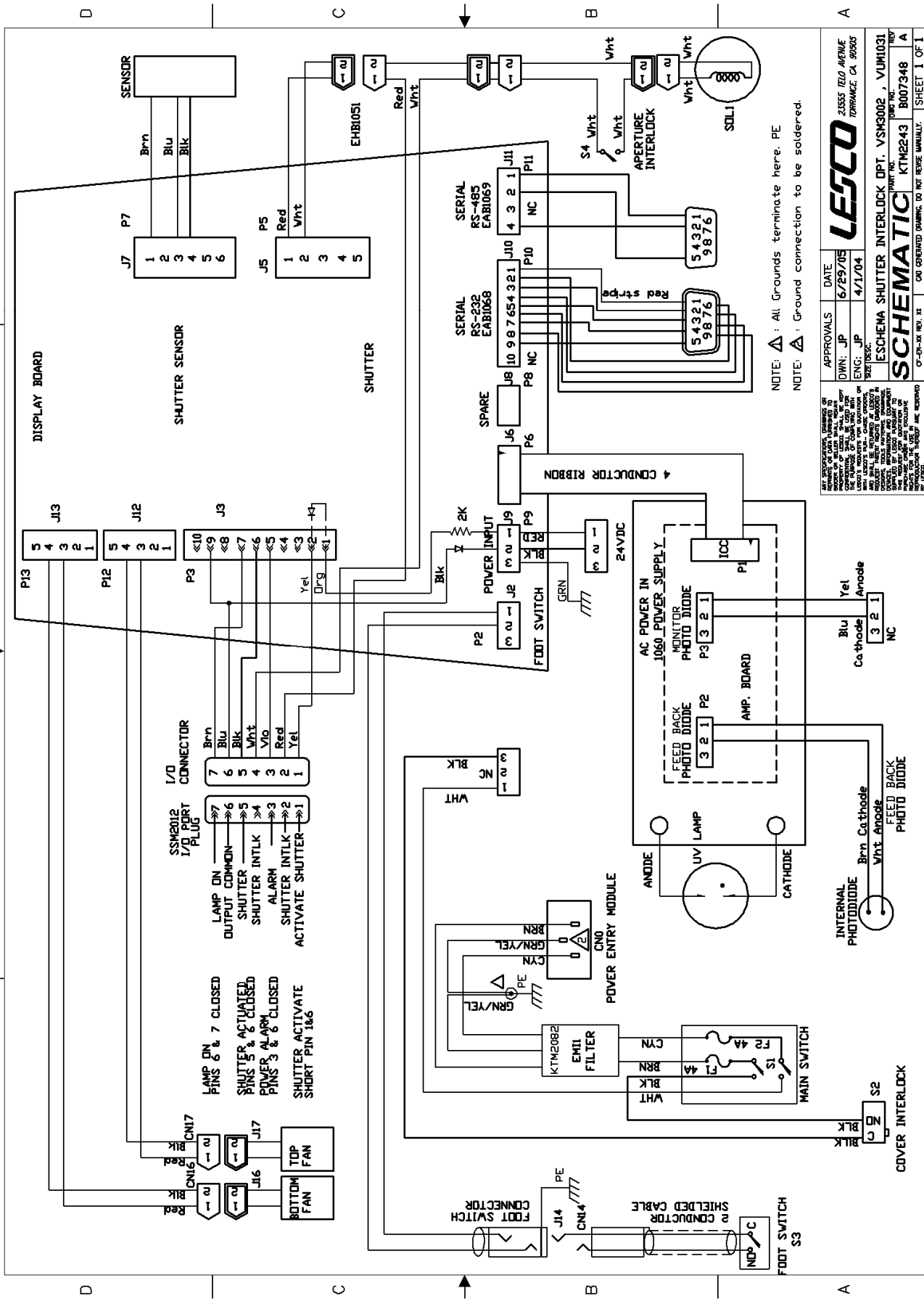
NOTE: Δ : All Grounds terminate here. PE
 NOTE: \triangle : Ground connection to be soldered.

APPROVALS	DATE
DWN: JP	9/15/05
ENG: JP	4/17/04

DESIGN: SCHEMATIC
 PART NO: SUPER SPOT MAX VSM3002 (VUM1030)
 DRAWING NO: KTM2224 B007127
 SHEET 1 OF 1

REVISIONS OF THIS DRAWING OR ANY PART THEREOF SHALL BE MADE NECESSARY BY THE USER, THE USER SHALL BE RESPONSIBLE FOR THE CORRECTION OF THE DRAWING. THE USER SHALL BE RESPONSIBLE FOR THE CORRECTION OF THE DRAWING. THE USER SHALL BE RESPONSIBLE FOR THE CORRECTION OF THE DRAWING. THE USER SHALL BE RESPONSIBLE FOR THE CORRECTION OF THE DRAWING.

1 2 3 4

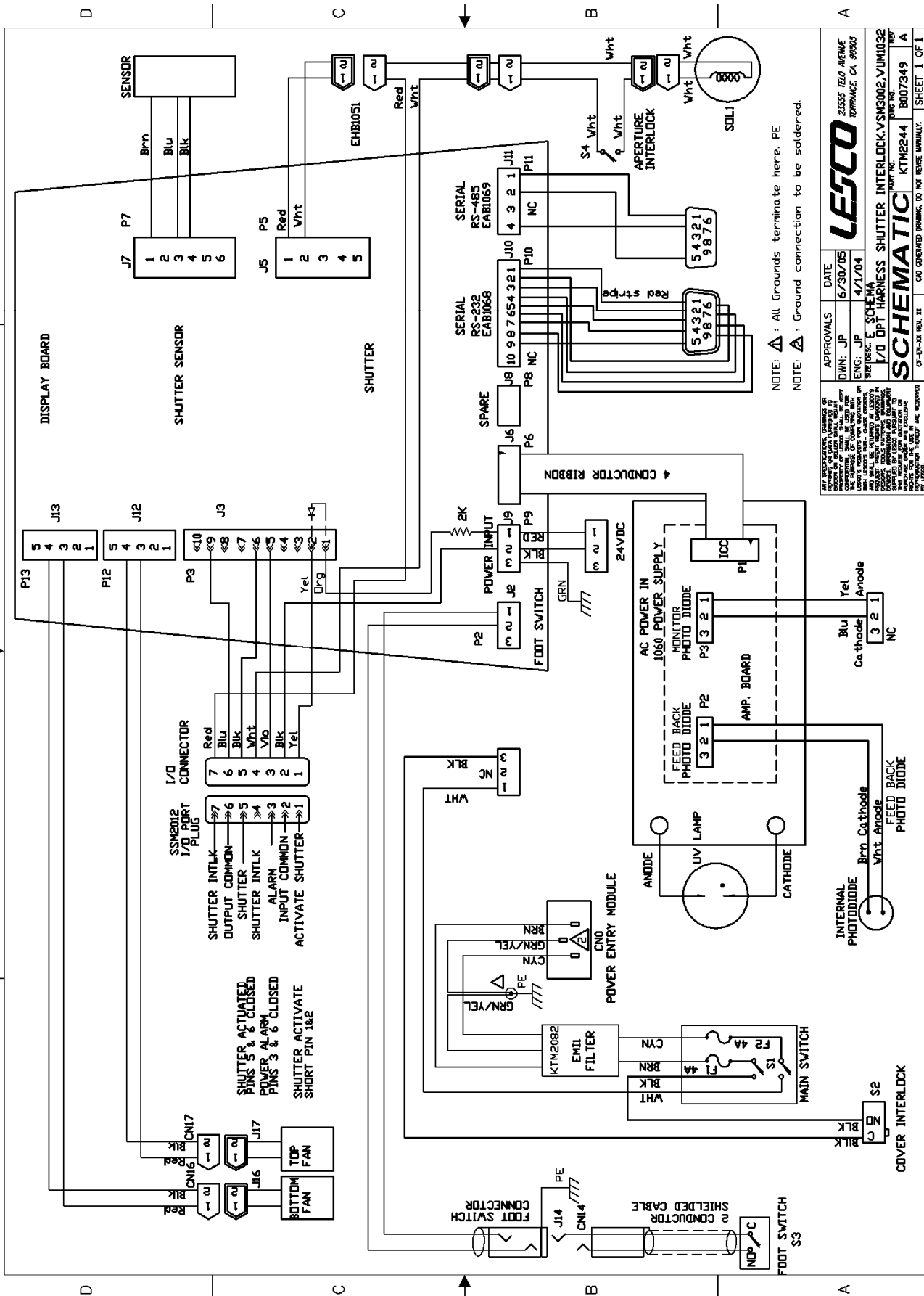


APPROVALS		DATE
DWN: JP	6/29/05	
ENG: JP	4/1/04	

DESIGN: ESCHEMA SHUTTER INTERLOCK OPT. VSM3002, VUM1031
 DRAWING NO: KTM2243 B007348
 SHEET 1 OF 1

NOTE: Δ : All Grounds terminate here. PE
 NOTE: \triangle : Ground connection to be soldered.

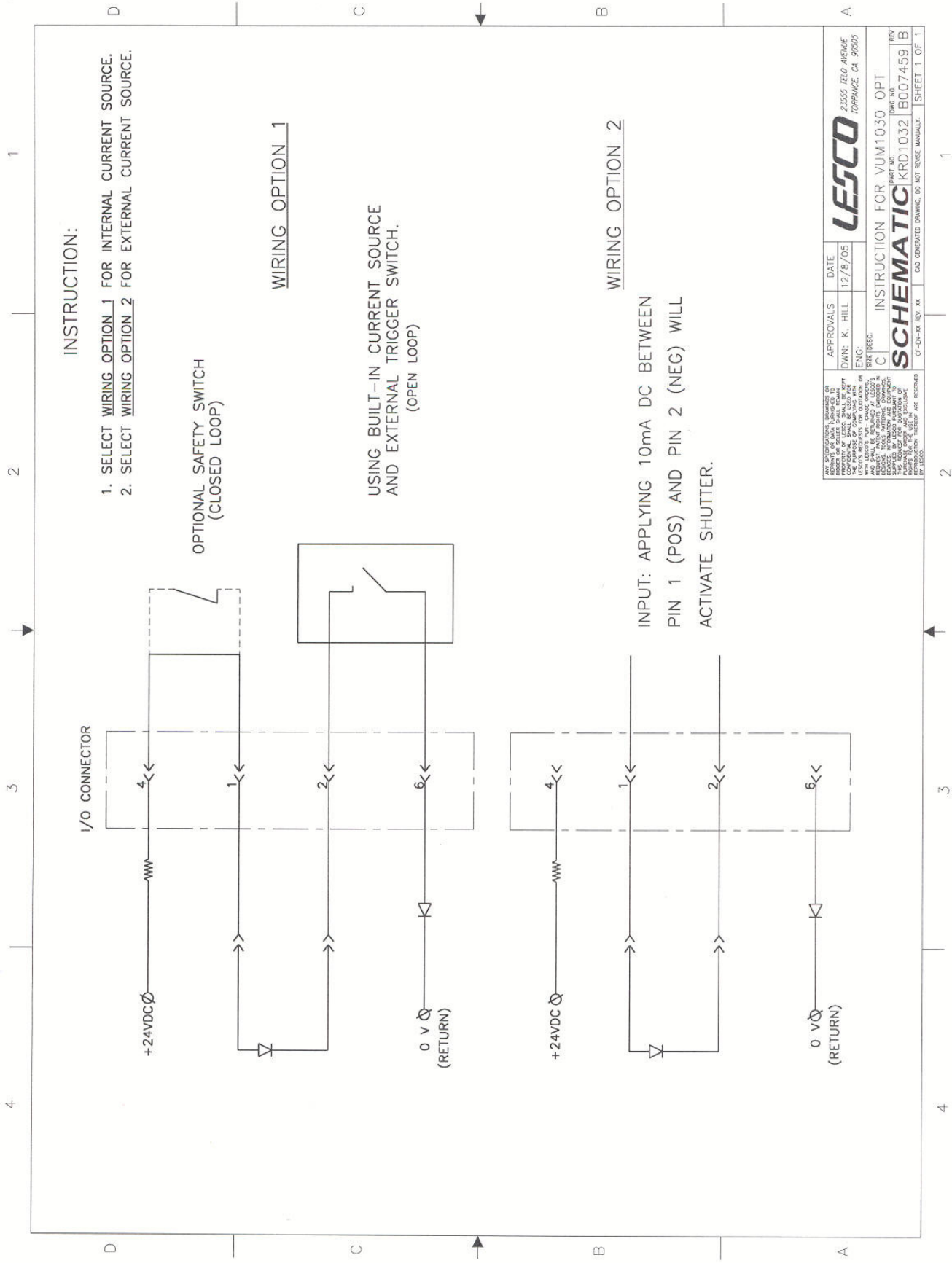
1 2 3 4



NOTE: Δ : All Grounds terminate here. PE
 NOTE: \triangle : Ground connection to be soldered.

APPROVALS	DATE
DWN: JP	6/30/05
ENG: JP	4/1/04

2555 TELL AVENUE
 TORRANCE, CA 90505
LESCO
 DRAWING NO: KTM2244
 PART NO: B007349
 REV: A
 TITLE: SCHEMATIC
 I/O PORT HARNESS SHUTTER INTERLOCK VSN3002 VUM1032
 SHEET 1 OF 1

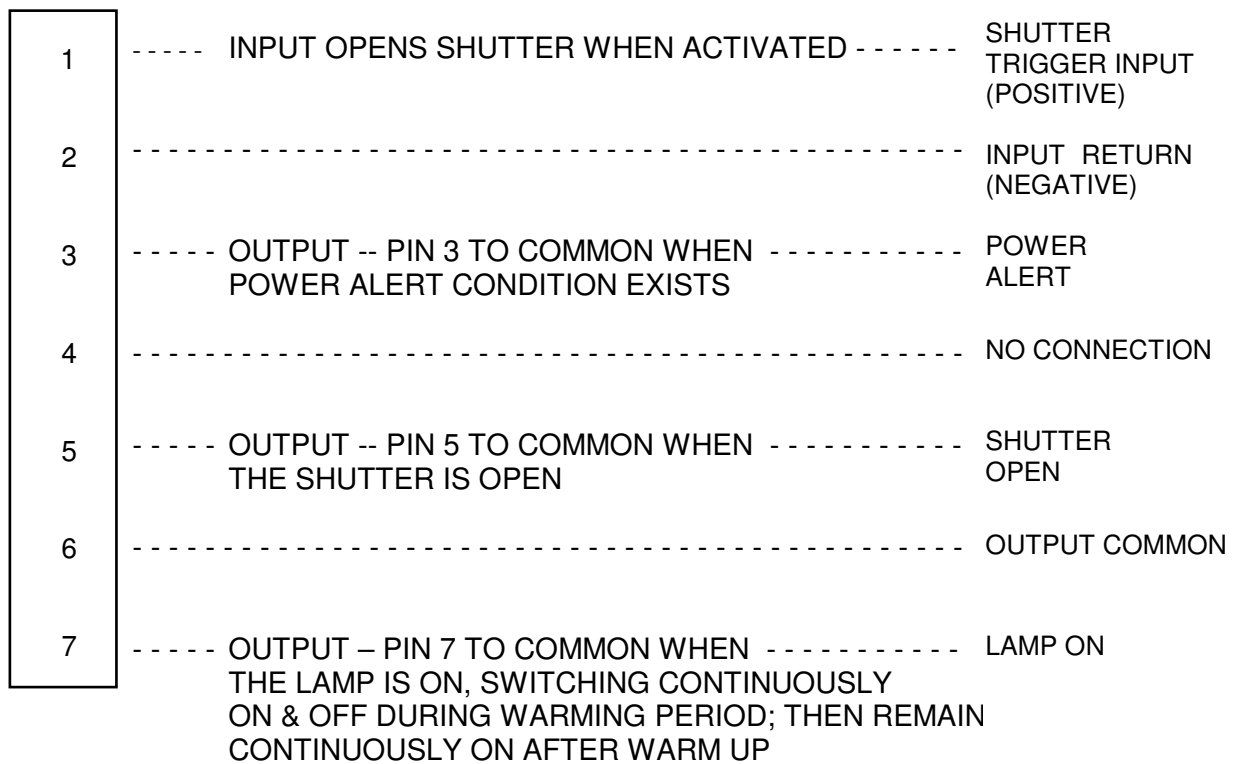


9.2 I/O Connector - Parallel Interface

The MAX unit incorporates an external parallel interface connector in its back panel. The MAX unit communicates with external equipment using inputs and outputs. There are several combinations available that include different shutter trigger signals and external safety interlock.

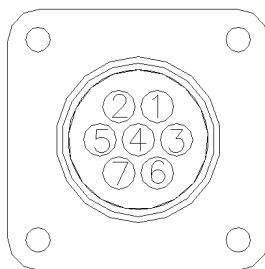
Please consult with the factory for all available options or to request a custom interface.

The following diagram illustrates the **standard** Super Spot MAX VSM3002 interface. The two available input options are indicated bellow.



INPUT POLARITY PROVIDED FOR SOLID STATE SWITCHING DEVICES OR EXTERNAL CURRENT SOURCE.

NOTE: LIMIT CURRENT THROUGH OUTPUTS 3, 5 & 7 TO 30mA MAX.



I/O Pin-Out viewed from rear of unit

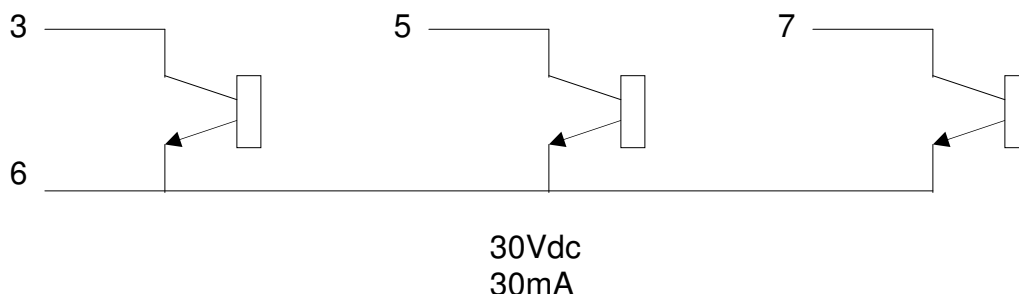
9.2.1 Standard Parallel Interface Input Option

9.2.1.1 VUM1029 A jumper between pin 1 and pin 2 will activate the shutter cycle. If a semiconductor switch is used, the sourcing input pin 1 must be drain to pin 2 with a device able to handle 15mA DC.

9.2.1.2 VUM1030 An external current source must provide 10mA between pin 1 and pin 2. Do not exceed 5Vdc between these pins to prevent damaging the input device. Use external bleeding resistor for higher voltages.

9.2.2 Standard Transistor Output (Optically Coupled)

NOTE: LIMIT CURRENT THROUGH OUTPUTS 3, 5 & 7 TO 30mA MAX.



9.3 Serial Communication

The MAX system includes a powerful serial communication protocol, allowing it to interconnect using the popular RS485 or RS232 interfaces to other devices such as computers, PLC and other embedded controller systems.

The RS485 serial interface is capable of supporting up to 100 MAX systems at a time, with each unit set at a unique address to communicate with the host device. The maximum cable length is 4,000 feet but longer distances are possible. Please consult the factory for more information.

Please use the following information to set up your device using either of the two available ports.

9.3.1 Specifications

The serial communication parameters must be set up as follows:

BAUD RATE = 9600
DATA BITS = 8
START BIT = 1
STOP BIT = 1
PARITY = NO
HANDSHAKING = NO

9.3.2 Transmission Format

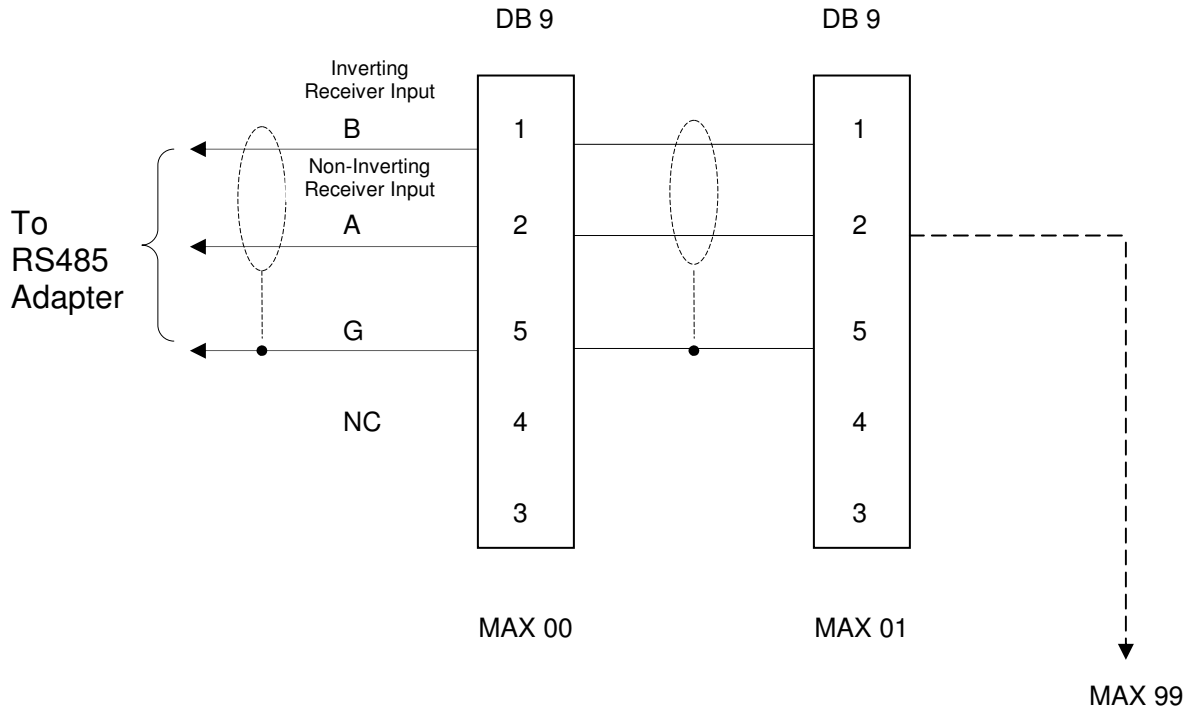
Format – Asynchronous
RS 485 Mode – 2-Wire Half Duplex
RS 232 Mode -- Full Duplex

9.3.3 Communication Distance

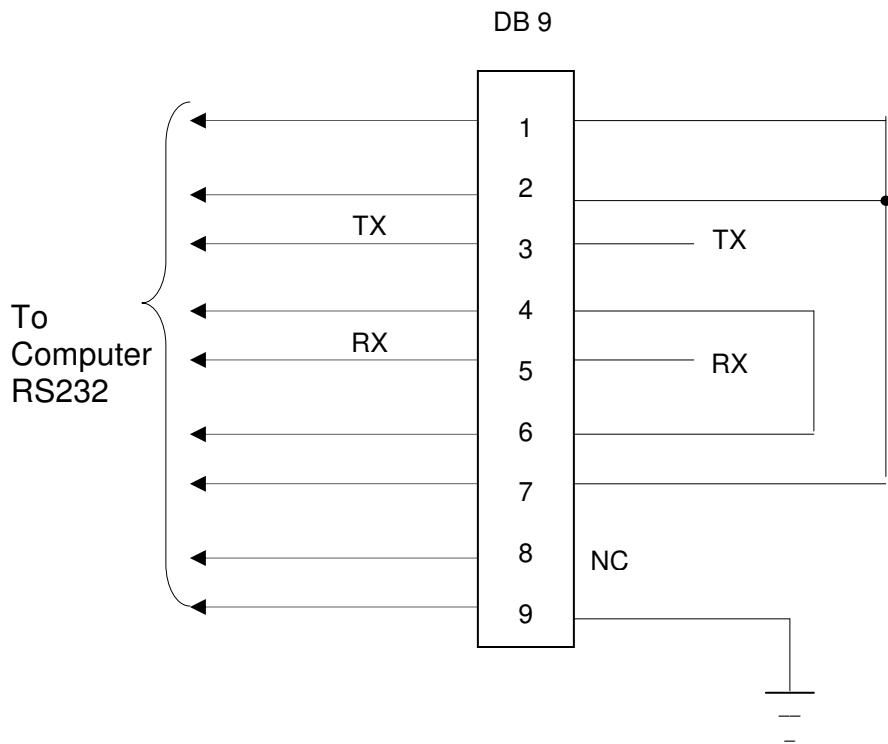
RS-485 Up to 4000 feet on Category 5 solid cable
RS-232 Up to 25 feet

AUVLESCO can provide RS485 adapters, cables and remote software to communicate serially with up to 100 MAX units from a single cable drop. *See Section 7.2.*

9.3.4 Connection Cable RS485



9.3.5 Connection Cable RS232



IMPORTANT NOTICE:

RS232 for point-to-point (1 unit) application, NOT intended for Multidrop Network.

9.3.6 Networking Adapter SSM3076 for VSM3002

Use Adapter SSM3076 for Super Spot MAX Model VSM3002 networking. SSM3076 adapts the RS-485 DB9 standard connector (VSM3002) to the RS-485 circular connector (VSM3001).

10.0 Accessories

10.1 Standard Replacement Parts

To order replacement parts please call the AUV\LESCO spare parts dept. in Torrance, CA. TOLL FREE (800) 615-3726 or (310) 784-2930.

Shutter	NZB1010
2 Amp, 120V AC input fuse	EFB1008
4 Amp, 240V AC input fuse	EFB1007
Foot Pedal	EVB2115
IR Filter	OFB1004
Photo diode	EHB1070
Replacement Reflector 100W	SSM3031
Replacement Reflector 200W	SSM3045
Replacement Bulb 100 watt	LPB1008
Replacement Bulb 200 watt	LPB2001
Replacement Fan Filters (pack of 5)	KFB1019
Solenoid	EHB1045
UV Safety Glasses	VXB1001
AUV\LESCO Spotcure Intensity Meter	AIB1001

10.2 Optional Liquid-Filled Lightguides

5mm x 1M	OLB1003
5mm x 1.5M	OLB1004
5mm x 3M	OLB1009
Dual 2 x 3mm x 1M	OLB1001
Dual 2 x 3mm x 1.5M	OLB1002
Trifurcated 3 x 3mm x 1.5M	OLB1012
8mm x 1M	OLB1008
8mm x 1.5M	OLB1010

NOTE:

Liquid-filled light guides should not be used with MAX HP Model.

10.3 Fiber Optic Lightguides

UV transmitting lightguides fabricated to specific applications are available upon request. AUV\LESCO fiber optic lightguides are designed with proprietary technology to withstand the extreme intensities generated by MKIII and MAX systems. Please call AUV\LESCO for pricing information.

10.4 Recommended Spare Parts Kit

RECOMMENDED SPARE PARTS KIT FOR VSM3002 SS MAX100W (Level I – qty 1-4 units)

Qty	.LESCO Part #	Description
4*	EFB1007	Fuse, 4 Amp, 250V
4**	EFB1008	Fuse, 2 Amp, 220V
4	EPB1054	Top & Bottom fan
2	ITB1096	Teflon stop
1	EXB1111	Board Amp
1	KFB1019	Filter (5 packs)
2	LPB1008	Bulb, 100W
1	OFB1004	IR Filter
2	EHB1070	Photo Diode Asy
2	EHB1045	Solenoid Asy
1	SSM3031	Reflector Asy

RECOMMENDED SPARE PARTS KIT FOR VSM3002 SS MAX 100W (Level II – qty 5-10 units)

Qty	.LESCO Part #	Description
1	E5B1010	Power Supply
10*	EFB1007	Fuse, 4 Amp, 250V
10**	EFB1008	Fuse, 2 Amp, 220V
8	EPB1054	Top & Bottom fan
4	ITB1096	Teflon stop
3	EXB1111	Board Amp
4	KFB1019	Filter (5 packs)
6	LPB1008	Bulb, 100W
3	OFB1004	IR Filter
4	EHB1070	Photo Diode Asy
2	EHB1045	Solenoid Asy
4	SSM3031	Reflector Asy

*For systems set @ 120VAC. ** For systems set @ 220VAC.

NOTES:

- Level I Spare Parts Kits are recommended for those sites that have 2-4 MAX spot cures, or have only one but that unit is in time-critical service and cannot be off-line for several days if a component failure occurs.
- Level II Spare Parts Kits are recommended for those sites that have 5 or more MAX units and some level of service training.

RECOMMENDED SPARE PARTS KIT FOR VSM3002 SS MAX 200W

(Level I – qty 1 – 5 units)

Qty	.LESCO Part #	Description
4*	EFB1007	Fuse, 4 Amp, 250V
4**	EFB1008	Fuse, 2 Amp, 220V
4	EPB1025	Top & Bottom fan
2	ECB2051	Lamp Connector
2	ITB1096	Teflon stop
1	EXB1111	Board Amp
1	KFB1019	Filter (5 packs)
2	LPB2001	Bulb, 200W
1	OFB1004	IR Filter
2	EHB1070	Photo Diode Asy
2	EHB1045	Solenoid Asy
1	SSM3045	Reflector Asy

RECOMMENDED SPARE PARTS KIT FOR VSM3002 SS MAX 200W

(Level II – qty 5- 10 units)

Qty	.LESCO Part #	Description
1	E5M1010-4	Power Supply 200W
10*	EFB1007	Fuse, 4 Amp, 250V
10**	EFB1008	Fuse, 2 Amp, 220V
8	EPB1025	Top & Bottom fan
4	ECB2051	Lamp Connector
4**	ITB1096	Teflon stop
3	EXB1111	Board Amp
4	KFB1019	Filter (5 pack)
6	LPB2001	Bulb, 200W
4	OFB1004	IR Filter
4	EHB1070	Photo Diode
4	EHB1045	Solenoid Asy
4	SSM3045	Reflector Asy

*For systems set @ 120VAC. **For systems set @ 220VAC.

NOTES:

- Level I Spare Parts Kits are recommended for those sites that have 2-4 MAX spot cures, or have only one but that unit is in time-critical service and cannot be off-line for several days if a component failure occurs.
- Level II Spare Parts Kits are recommended for those sites that have 5 or more MAX units and some level of service training.

11.0 Troubleshooting

***** CAUTION *****

*PARTS MAY BE HOT. If unit was running allow time for cool down.
Exercise care when touching internal optical parts.*

***** WARNING: HIGH VOLTAGE *****

*High voltage may be present in bulb terminal connections.
Allow 2 minutes to bleed down capacitor voltage.*

***** CAUTION *****

*Disconnect power from system or unplug system from wall or
VAC power source before connecting the footswitch adapter.*

<u>Fault</u>	<u>Action</u>
Unit Does Not Turn On	<p>Check power availability at the selected power outlet.</p> <p>Check that power cord is properly connected.</p> <p>Make certain voltage, phasing, and frequency are correct.</p> <p>Check the fuse.</p> <p>Check that the top cover is installed properly and is pressing down on the safety interlock switch (top of rear panel).</p>
Unit Blows Fuses	<p>Verify AC operating voltage configuration 120/220 VAC. If the unit is configured for 120VAC operation and 220VAC power is applied, the unit will blow fuses. Power supply may be damaged. Check AC voltage jumper and apply correct voltage. Retest power supply. Replace power supply if necessary.</p> <p>Perform visual examination of wiring harness. Any obvious electrical shorts (disconnected terminals, etc) touching the chassis will cause the fuse to blow. Insulate, repair and retest power supply. Replace power supply if necessary.</p> <p>Check for electrical short from photo diode sub-assembly to chassis. If photo diode is shorted to chassis, this will cause fuse to blow and possibly damage the power supply.</p> <p>Replace photo diode sub-assembly and check for electrical short to chassis before applying power. Retest power supply. Replace power supply if necessary.</p>

Open circuit voltage (no bulb). Open circuit voltage should rise to approx. +2340 Vdc for a few seconds, and then drop to approx. +330 Vdc. If power supply blows fuses without a load, then power supply components, wiring or shorts may be the problem. Perform visual inspection of power supply components and wiring. Retest power supply. Replace power supply if necessary.

Unit Blows Fuses & Bulbs

If power supply blows fuses and bulbs but checks OK without a bulb installed, the power supply DC current regulator is not working. Replace power supply

Bulb Fails to Ignite

(Power is on, fans running and front panel illuminated.)

Verify the proper installation of the bulb/reflector assembly. Check both bulb connections and ensure the bulb connector is properly plugged in.

Turn the unit off for 20 seconds, and then restart. Repeat this procedure until the bulb lights, not to exceed five attempts.

If still no bulb ignition, replace the bulb. Replace the power supply.

Timer Not Running

(Power is on, fans are running and front panel is on.)

Verify that the footswitch is plugged in.

Unplug the footswitch. With the footswitch depressed, check the male plug contacts for continuity. If there is no continuity when the footswitch is depressed, replace the footswitch.

**** CAUTION ****

Disconnect power from system or unplug system from wall or VAC power source before connecting the footswitch adapter.

Shutter does not Open

Verify footswitch is plugged in (if applicable) and is in proper operation. Turn power OFF. Remove bottom cover. Disconnect solenoid connector from main harness.

Verify shutter is mechanically free & operable by lifting shutter from rest & allowing it to return. If broken, stuck or pinching at friction point, adjust fasteners to relieve friction or replace.

Verify that the lightguide is properly pushed into the lightguide socket and that the ball plunger is in the detent groove. MAX unit safety system disallows shutter operation if no lightguide is sensed by interlock switch within nosepiece.

Set the unit to "Manual" mode. Turn the power ON. With a DC voltmeter, verify 24 VDC are present on the harness side of the solenoid connector and the footswitch is depressed. If no power is present, replace the harness. If power is present, replace the solenoid.

Fans Do Not Work

Check for obstructions to the fan blades.

Disconnect the AC power. Remove the top or bottom cover, depending on which fan is not operating. **[Note: If the top fan does not work, disconnect the UV lamp before proceeding!]**

Disconnect the fan connector, plug system power in, turn the unit on, press top cover interlock switch when applicable, and check for 24 VDC in the harness side of the connector. If 24 VDC is present, then change the fan. If no voltage is present, replace the power supply.

Low UV Output

Confirm all elements of optical train (bulb, reflector, shutter, and IR filter) are intact and functioning correctly by taking radiometer reading with calibrated radiometer and AUV\LESCO Quartz Test Fixture.

Verify that the lightguide is properly pushed completely into the lightguide socket (and that the ball plunger is in the detent groove if applicable).

Verify that both ends of the lightguide are clean. (See Page **Error! Bookmark not defined.**, on Lightguides) Clean quartz surfaces with reagent grade isopropyl alcohol (IPA) solvent using a cotton swab or equivalent means. ON liquid-filled lightguides, acetone may also be safely used. Do not use acetone on fiber optic lightguides. If damage cannot be removed, please send the lightguide back to AUV\LESCO for re-polishing.

Set the UV intensity to minimum in the front panel. Measure the UV intensity with regular procedure. Radiometer measurement through lightguide should be approximately 10% to 20% less than through quartz if lightguide is standard 1M x 5mm LFLG type without radical bends.

If radiometer measurement through lightguide is substantially less, replace lightguide (see Lightguides section of this manual or AUV\LESCO website).

****WARNING****

Bulbs are extremely hot when first shut off and can cause severe burns!

Disconnect and remove the bulb; inspect the bulb visually. (**NOTE:** Do not touch quartz surfaces, particularly if hot. Fingerprints/body oils will shorten lamp life.) If the lamp is discolored or cloudy, or has excessive hours, replace the bulb. Insure correct seating of bulb in reflector housing.

Check the IR filter for scratches, cracks, fingerprints, solarization or other visual problems. Replace if noted.

Check reflector surface quality. Confirm highly reflective (shiny) surface and correct seating within cradle assembly. Check reflector for any discoloration (yellowing or blue-ish). Replace reflector if found.

If intensity is still low after all above checks have been done and unit has been dropped or jarred prior to low intensity readings, optical alignment problems may exist. Contact factory.

Serial Communication Problems

The MAX serial communication uses RS232 and RS485 configurations, allowing up to 100 units to be connected at one time to the source host computer. In case of communication problems, first verify that the address of the unit and the remote interface is the same. See Section 3.4.4 for the procedure. Change the address if required.

If the unit still does not communicate, separate the faulty unit from the common drop line (if applicable) and connect it directly to a computer RS232 or a RS485 adapter.

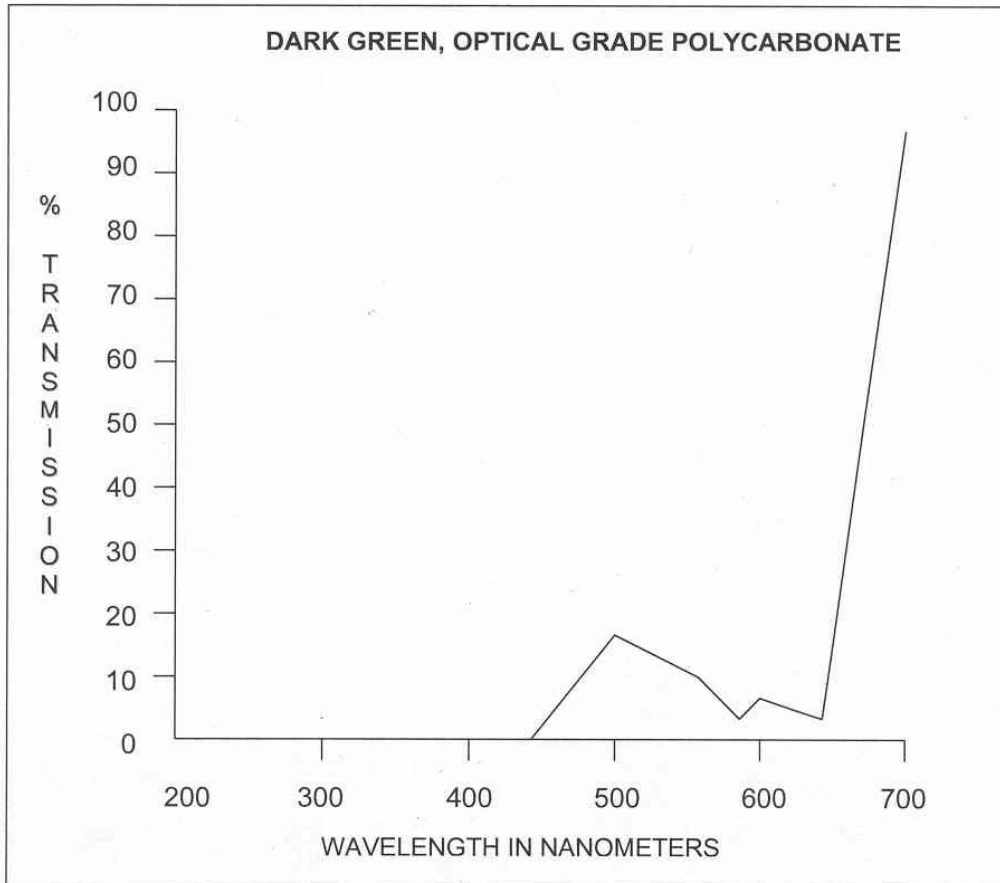
Make sure the communication cable works. Check the continuity between corresponding pins and the isolation between the conductors. Replace it if necessary.

Appendix A – UV Protective Eye Glasses

UV PROTECTIVE EYE GLASSES

Eye protection glasses cannot completely eliminate the possibility of eye damage under all circumstances, but UV protective eyeglasses are designed to provide quality aids to eye protection against most commonly encountered hazards. These lenses are made of hi-impact polycarbonate with a scratch resistant coating and are impact resistant.

These tinted lenses meet ANSI Z87.1-1989 standards and absorb 100% of solar ultraviolet radiation as defined by ANSI Z87.1-1989. They have been accepted by OSHA as being in compliance with 29 CFR 1910 if used and maintained properly. Inspect glasses frequently and clean with a mild soap solution. Do not clean them with solvents. Scratched, pitted or damage lenses reduce visibility and protective ability. Replace immediately when damage is evident.



UV RADIATION	VISIBLE LIGHT	INFRARED RADIATION
200 300 380	500 600 700 780	

Appendix B – Agency Approvals

Certificate of Conformance

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Page 1 of 5

Product Names: 1) Super Spot MAX
2) Super Spot MAX HP

Model Numbers: 1) VSM3002
2) VSM3002-HP

Applicant: American Ultraviolet Company / LESCO Division
23555 Telo Avenue
Torrance, California 90505
Telephone: 310.784.2930
Facsimile: 310.784.2929
E-mail: sales@lescouv.com
Website: www.americanultraviolet.com

Pulver Laboratories Inc. (PLI) Control Number 5340X

Pulver Laboratories Inc. (PLI) Certification

PLI Equipment Categories

- 1) Industrial, Scientific and Medical Equipment
- 2) Measurement, Control and Laboratory Equipment

European Union Declaration of Conformity

Pulver Laboratories Inc. assessed a sample of this Equipment Under Test against the Essential Health and Safety Requirements of a Directive. Based on this assessment, the Equipment Under Test is deemed in compliance with the following Directives:

- | | | |
|--------------------------|------------------|--------------------|
| • EMC | Directive | 2004/108/EC |
| • General Product Safety | Directive | 2001/95/EC |
| • Low-Voltage | Directive | 2006/95/EC |
| • Machinery | Directive | 2006/42/EC |

The Pulver Laboratories Product Certification Label appearing on the above models indicates conformance to the Electromagnetic Emission, Electromagnetic Compatibility, and Product Safety Standards and criteria listed in this Certificate of Conformance.

PULVER LABORATORIES INC.

ELECTROMAGNETIC SHIELDS



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Tested and evaluated to the following standards with resulting Verifications:

Electromagnetic Emission Standards and Jurisdictional Organizations

FCC Verification

Federal Communications Commission (FCC, USA)

Category Classification: Class A - Commercial and Industrial

- American National Standards Institute standard number C63.4-2003 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- Federal Communications Commission Rules and Regulations located in the Code of Federal Regulations, 47 CFR, Part 1.1307(b); Part 2.1091; Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations; Part 15, Radio Frequency Devices, 10 July 2008 Edition.

ICAN Verification

Industry Canada (ICAN)

Category Classification: Class A - Commercial and Industrial

- Canadian Standards Association CAN3-C108.3.1-M84 (R2005): Limits and Measurement Methods Of Electromagnetic noise from AC Power Systems.
- Can/CSA-C108.6-M91 (R2003): Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.
- ICES-003, Issue 4, February 2004. Industry Canada. Interference-Causing Equipment Standard Digital Apparatus.

CE Certification mark

European Community

RF/EMC Category Classification: Group 1, Class A - Commercial and Industrial

Safety EU Classification

1. In end use: Class 1

Safety Standard Classification

1. In end use: Class 1

International Community

RF/EMC Category Classification: Class A - Commercial and Industrial

Safety Category Classification

1. In end use: Class 1

- EN 55011: 1991, Limits and methods of measurement of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.
- EN 55011: 15 Sept 1998, Limits and methods of measurement of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.
- EN 55011: 2004, Limits and methods of measurement of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment. Edition 4.1.

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- (BS) EN 55011: 2009+A1:2010, Limits and methods of measurement of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.

C-Tick mark.

Australian Communication Authority

Category Classification: Level 2

New Zealand Authority (Ministry of Commerce: Communications Division)

Category Classification: Level 1

- AUS/NZS CISPR 11:2009 (International Equivalent: CISPR 11 and EN 55011): Limits and methods of measurement of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.
- AUS/NZS 2064.1/2 (International Equivalent: CISPR 11 and EN 55011): Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific, and medical (ISM) equipment. 2004. Edition 2.0.

VCCI Certification mark

Category Classification: Class A - Commercial and Industrial

Electromagnetic Compatibility (EMC) Standards and Jurisdictional Organizations

Generic Immunity Standards

- EN 50082-1: 1998 Electromagnetic compatibility – generic immunity standard; Part 1. Residential, commercial, and light industry.

Electromagnetic Compatibility (EMC) Standards

- EN 61000-4-2: 2001 (IEC 1000-4-2), Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test. (BS EN 61000-4-2:2009)
- EN 61000-4-3: 2005 (IEC 1000-4-3), Part 4-3: Testing and measurement techniques - Radiated, radio-frequency electromagnetic field, immunity test.
- EN 61000-4-4: 2005 (IEC 1000-4-4), Part 4-3: Testing and measurement techniques - Electrical fast transient/burst immunity test.

Product Safety Standards and Jurisdictional Organizations

- American National Standards Institute / National Fire Protection Agency 70; 2008, National Electrical Code (NEC).
- American National Standards Institute / National Fire Protection Agency 70-NEC 2011 National Electrical Code [National Fire Protection Agency standard number 70], 2011 Edition.
- American National Standards Institute / National Fire Protection Agency 79: 2007, Electrical Standard for Industrial Machinery.
- American National Standards Institute/National Fire Protection Agency 79 - Standard for Industrial Machinery, 2012 Edition.
- American National Standards Institute / Underwriters Laboratories Inc. 508-1988 Industrial Control Equipment. 16th Edition, 23 February 1993 with revisions to 16 April 1996.
- American National Standards Institute / Underwriters Laboratories Inc. 508C- Power Conversion Equipment. First Edition, 22 December 1993 with revisions to 24 June 1996.

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- C22.1-02 Canadian Electrical Code, Part I (19th Edition), Safety Standard for Electrical Installations.
- Canadian Standards Association C22.2 Number 0-M1991, General Requirements – Canadian Electrical Code, Part II.
- EN 292-1: 1991 entitled Safety of Machinery - Basic Concepts, General Principles for Design. Part 1: Basic Terminology, Methodology published by the European Committee for Electrotechnical Standardization (CENELEC).
- EN 292-2: 1991 Safety of Machinery - Basic concepts, general principles for design: Part 2: Technical principles and specifications published by the European Committee for Electrotechnical Standardization (CENELEC).
- EN 60204-1: 2006+A1:2009 Safety of Machinery - Electrical Equipment of Machines: Part 1: General Requirements, published by the European Committee for Electrotechnical Standardization (CENELEC).

Referenced Only Standards

- CAN/CSA-C22.2 Number 61010-1-04 (R2009) 2004 entitled Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements (Adopted IEC 61010-1:2001)(Tri-National standard, with UL61010-1 and ISA 82.02.01).
- EN 61000-4-5: 2001 (IEC 1000-4-5), Part 4-5: Testing and measurement techniques - Surge immunity test.
- EN 61000-4-6: 2005 (IEC 1000-4-6), Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induces by radio-frequency fields.
- EN 61000-4-8: 2001 (IEC 1000-4-8), Part 4-8: Testing and measurement techniques - Power Frequency magnetic field immunity test.
- EN 61010-1: 2006. Safety requirements for electrical equipment for measurement, control, and laboratory use, published by the European Committee for Electrotechnical Standardization (CENELEC).

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When manufactured in accordance with the most recent version of PULVER LABORATORIES Evaluation Report Numbers Q534018W.DWG, Q534019W.DWG, Q534020W.DWG, and Q534021W.DWG the models conform to the Electromagnetic Emission, Electromagnetic Compatibility, and Product Safety Standards listed in this Certificate of Conformance for at least the following countries:

100 VAC nominal mains - Japan

110 / 115 / 120 / 127 VAC nominal mains - Bahamas, Belize, Brazil, Canada, Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, French Guiana, Guyana, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Philippines, Surinam, Taiwan, United States of America, Venezuela, Virgin Islands

200 / 208 / 220 / 230 / 240 / 250 VAC nominal mains - Argentina, Australia, Austria, Bahamas, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Denmark, Dominican Republic, Ecuador, Egypt, Finland, France, Germany, Greece, Guatemala, Haiti, Honduras, Hong Kong, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kuwait, Luxembourg, Malaysia, Netherlands, New Zealand, Norway, Pakistan, Panama, Paraguay, People's Republic of China, Peru, Philippines, Poland, Portugal, Republic of Korea, Russian Federation, Singapore, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Syria, Taiwan, Thailand, Turkey, United Kingdom, United States of America, Uruguay, Venezuela, Virgin Islands

To assure continued Product Safety conformance, PLI evaluates newly manufactured products at the facilities of American Ultraviolet Company/LESCO Division every three months. For continued Electromagnetic Emission and Electromagnetic Compatibility conformance, PLI evaluates products every six months. This Follow-Up Service exists whenever the PLI Product Certification Label appears on the product.

If the Pulver Laboratories Product Certification Label is not on the product, the PLI Follow-Up Service to evaluate manufactured products may not be in place; and, therefore, this Certificate of Conformance issued by PLI shows that the one product evaluated met the standards. It does not indicate all manufactured products meet the standards unless the Certification Label is on the products and Follow-Up Service exists for the manufacturing of the products.

Date: 28 February 2012

Re-Issued: ----

[Pulver Laboratories Inc.](#)

/Lee J. Pulver/

Lee J. Pulver, NCE
President

Certified Engineer : PS-000235-NCE



PLI224W.12.FRM Q534012WC.01.DoC

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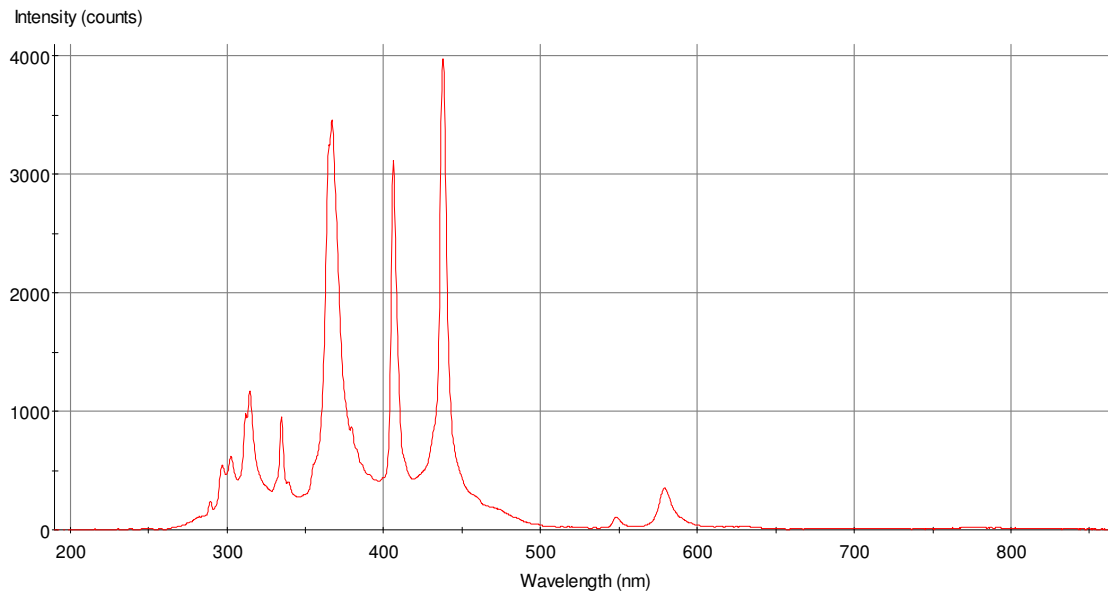
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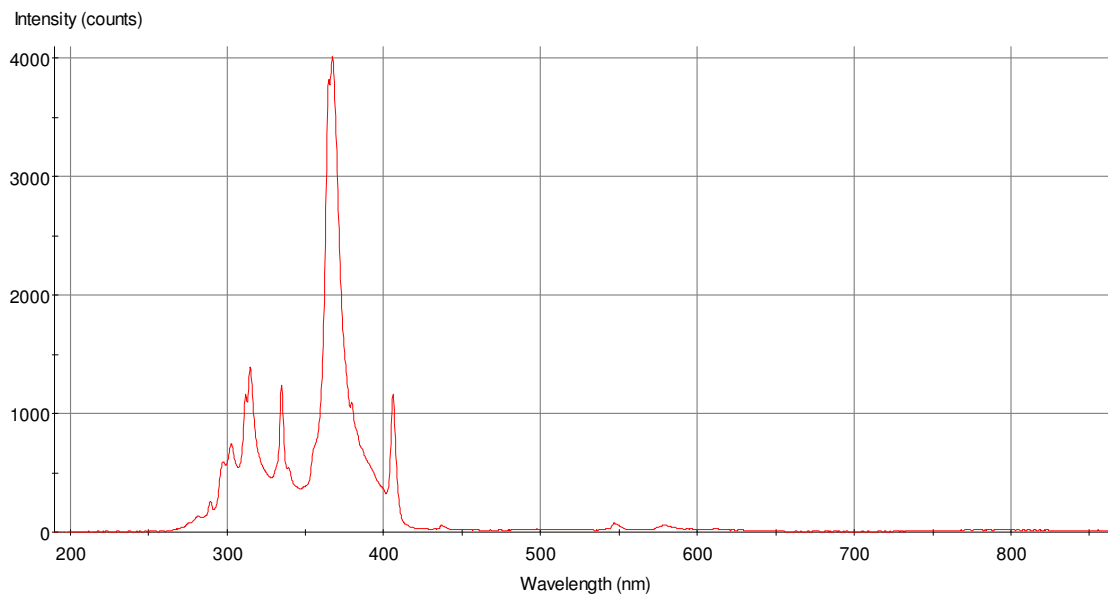
Appendix C – IR Filter Description

Presented here are the different spectral output graphs of our various filters on the UV SpotCure series.

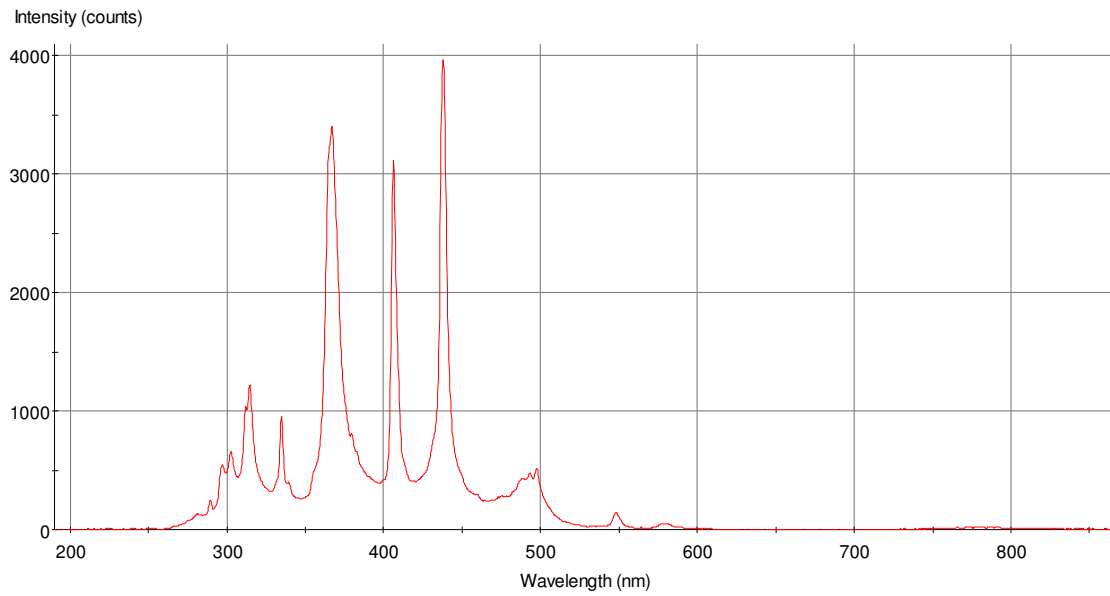
Filter OFB1004 280nm-480nm



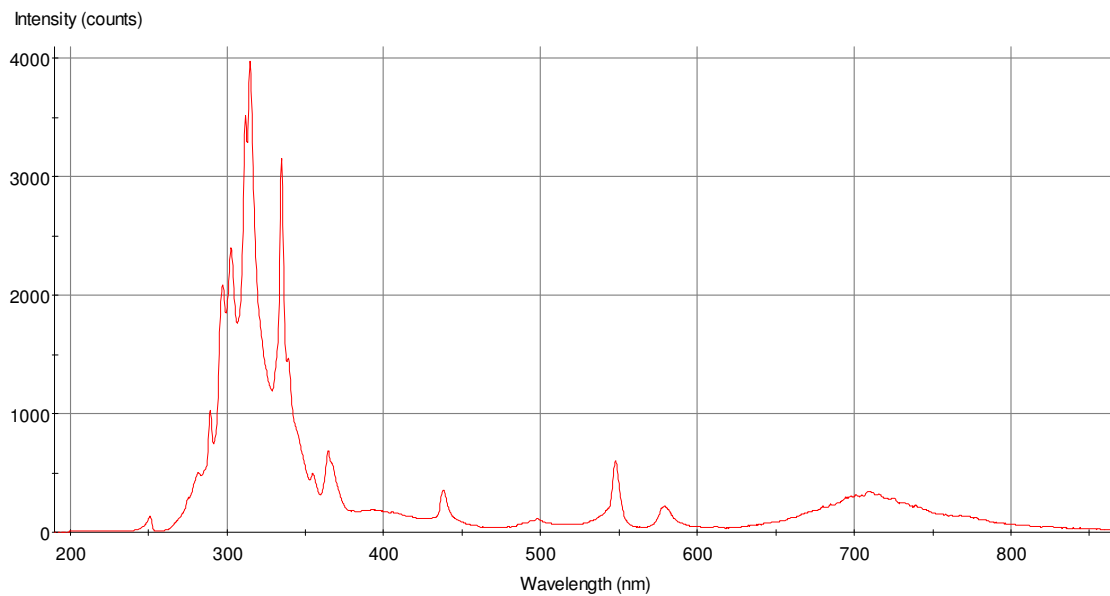
Filter OFB1008 280nm-400nm



Filter OFB1013 275nm-500nm

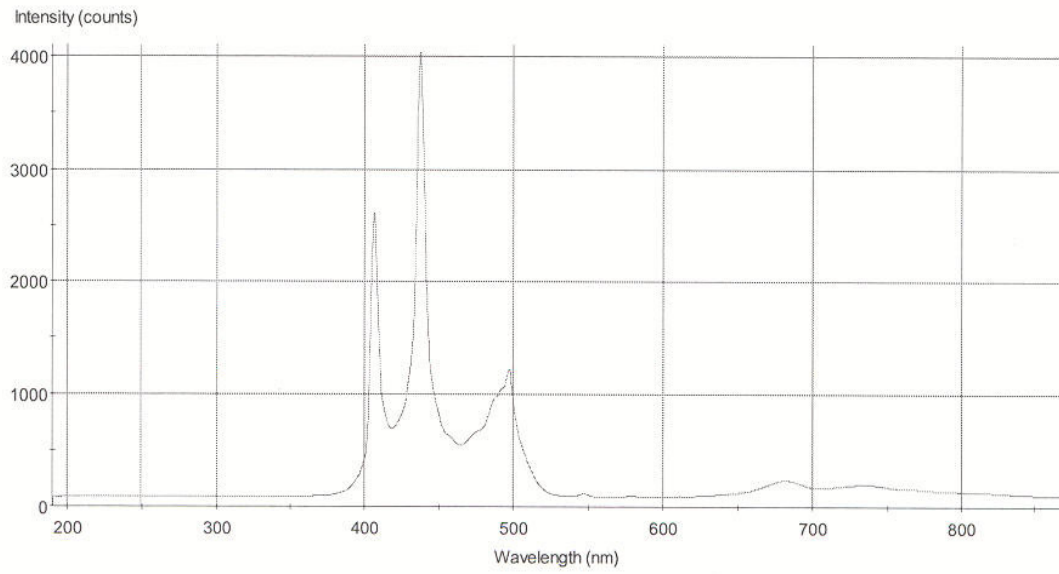


Filter OFB1014 280nm-320nm

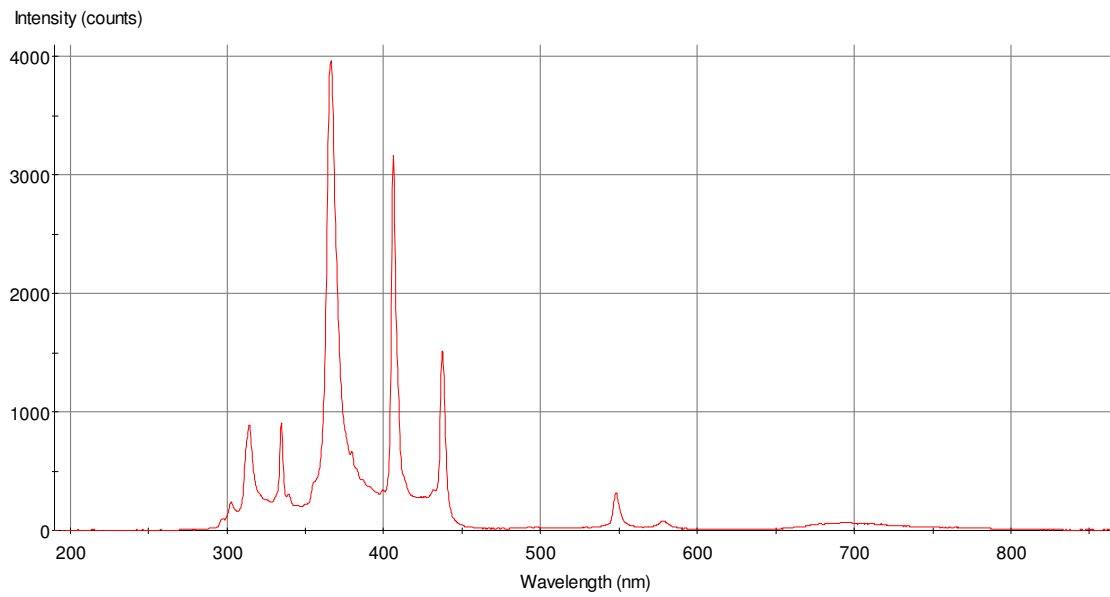


Filter OFB1019 400nm-500nm

KMD1042H



Filter OFB1021 320nm-420nm



FOR:

*SPARE PARTS,
SALES, OR
SERVICE*

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AUV/LESCOTM

A DIVISION OF AMERICAN ULTRAVIOLET COMPANY

*23555 TELO AVENUE
TORRANCE, CA 90505
USA*

PHONE: (310) 784-2930 / (800) 615-3726

FAX: (310) 784-2929 / (800) 905-3726

E-mail: Sales@lescouv.com