



SUNRAY 400 SM

PN: UV0446

UV/Visible Flood
Curing Lamp

INFORMATION IN THIS MANUAL IS SUBJECT TO CHANGE WITHOUT NOTICE

Uvitron International, Inc. • 150 Front Street, Unit 4 • West Springfield, MA 01089
Phone (413) 731-7835 • Fax (413) 731-7767 • <http://www.uvitron.com>

CONTENTS

Section	Page
1.0 Introduction	3
1.1 Purpose of Manual	3
1.2 Purpose of Equipment	3
1.3 Unpacking	3
1.4 List of Included Parts	3
2.0 Installation	4
2.1 General	4
2.2 Mounting	5
2.3 Shielding	5
2.4 Dimensions	6
3.0 Safety Considerations	6
3.1 UV Safety Warning	6
3.2 Electrical Safety	6
3.3 High Temperatures	6
3.4 Ozone Safety	7
3.5 Lamp Recycling	7
4.0 Theory of Operation	8, 9
5.0 Controls and Indicators	10, 11
6.0 System Operation	12
6.1 Startup	12
6.2 Shutdown	12
7.0 External Interface	13
7.1-7.2 External Interface Wiring & Signals	13-15
8.0 Maintenance	16
8.1 Maintenance Considerations	16
8.2 Cleaning of Optics & Lamp Replacement	16
8.3 Fan Filter	17
8.4 Cleaning of Optional UV Shields	17
9.0 Troubleshooting	18
10.0 Replacement Parts & Accessories	19
11.0 Technical Specifications	20, 21
12.0 Block Diagram	22
13.0 Warranty Information	23

INTRODUCTION

1

1.1 Purpose Of Manual

The purpose of this manual is to provide installation, operation and troubleshooting instructions for the Uvitron International SunRay 400SM Light Cure System. It is important the manual be read carefully before any attempt is made to install and operate the equipment.

1.2 Purpose Of Equipment

The system is a bench-top or conveyor mounted light cure source, designed for the rapid curing of light cure adhesives. The unit is suitable for laboratory use or volume production applications.

1.3 Unpacking

Visually inspect the shipping carton for physical damage. Damaged shipping cartons should be reported to the carrier. Carefully open the carton and remove the equipment, being careful not to lose or damage any separately packed parts.

Check all parts against the parts list. Any damaged or missing parts should be reported to the carrier and to your UVITRON representative.

All packing material and the shipping carton should be saved in case the unit has to be returned at some future time.

1.4 List Of Included Parts

1. One (UV0446) SunRay 400SM Lamp Head with Standby power switch and Lamp Hour Meter.
2. One (UV0320) 400-Watt UVA enhanced metal halide lamp (installed).
3. One (UV2128) glass filter plate (installed).
4. One (UV0495) pair of UV/IR protective OTG glasses, 3.0 shade with case.
5. One (UV0341) Power Cord, 7'6" U.S. version (other types also available).
6. One (UV0503) SunRay 400SM owner's manual.

Optional Parts

1. One (UV0454) UV Flood Stand, consisting of post, base plate, & 2 screws with nuts.
2. One (UV0455) Wrap-around UV Flood Shield, Front.
3. One (UV1094) UV Flood Shield, Backside

INSTALLATION

2

2.1 General

The SunRay 400SM light cure system may be placed on any bench or shelf that has access to a 120/240V 50/60-cycle single-phase power source in a clean operation area. Since it is an air-cooled unit, dust or airborne particles can clog the internal cooling passages and cause overheating. Allow a 6 inch clearance on all sides for unrestricted airflow.

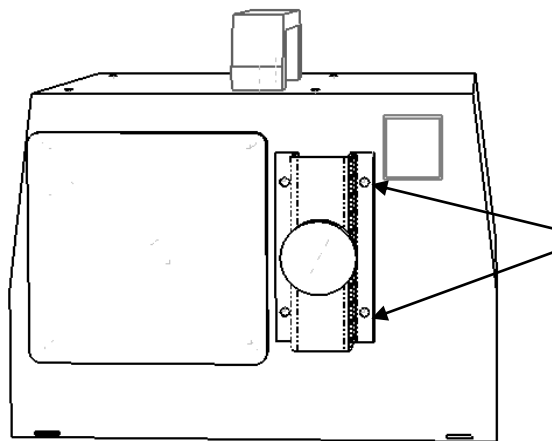
2.2 Mounting

The Lamp Housing Assembly should always be mounted on a stand, or held away from any flammable surfaces. Never place the Lamp Housing Assembly directly on the work surface. The SunRay is designed to be stand mounted using the optional UV0454 Flood Stand. The unit's rear mounted clamping bracket allows the lamp's height to be slide adjusted on the Flood Stand for optimum curing distance (see fig. 1).

For machine or conveyor mounting applications, the lamp housing assembly can be optionally mounted using the threaded holes for the clamping bracket assembly (see fig. 2). Simply remove the clamping bracket, and reuse its mounting holes and screws to attach to the desired mounting surface. If longer screws are required, care should be taken not to exceed the maximum mounting hole penetration depth of 1.25". (See fig. 3 for mounting hole pattern dimensions).



Fig. 1, SunRay with optional Stand & UV Shield



4 x 8-32 mounting screws at rear side of SunRay enclosure

Fig. 2, mounting hole locations

INSTALLATION (CONTINUED)**2**

The lamp housing assembly can also be placed on a shelf type structure, supporting the unit by its bottom outside edges. For this type of mounting, a windowed hole must be cut in the shelf, which would provide adequate clearance for the unit's bottom-side light exposure opening, and also for the cooling air exhaust holes.

2.3 Shielding

All installations should incorporate adequate shielding of radiated UV light, in order to prevent eye and skin burn of the operator or others passing through the work area (refer to UV Safety Warning in the following Safety Considerations section of the manual). The optional UV0455 Wrap-around Front Flood Shield and the UV1094 Backside Flood Shield can be used with the SunRay to minimize the amount of stray UV light scattering in the work area. Custom shielding may be constructed using sheet metal, UV blocking acrylic or polycarbonate to prevent operator exposure to UV radiation.

WARNING: To prevent risk of eye or skin burn, all personnel must be protected from direct or indirect exposure to the UV light produced by the SunRay curing system. Extreme care should be used when designing custom UV shielding to insure personnel will not be exposed to harmful UV radiation. Additionally, UV protective glasses and protective clothing should be used at all times while working in the vicinity of the UV curing system.

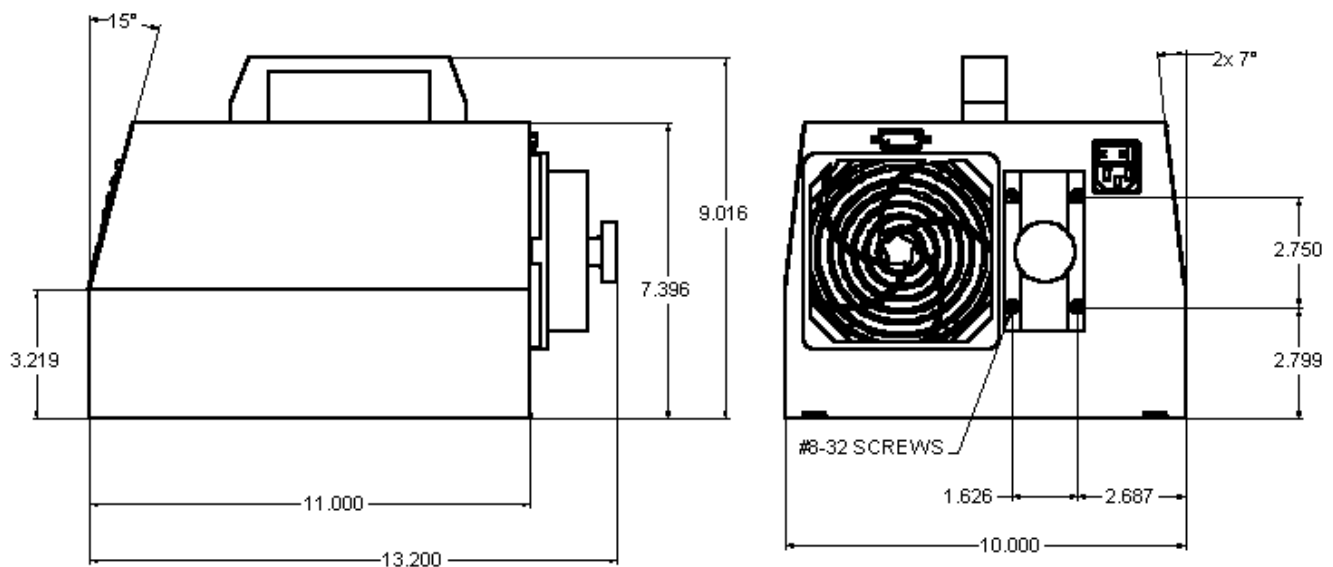
2.4 Dimensions

Fig. 3, SunRay overall dimensions

SAFETY CONSIDERATIONS

3

3.1 UV Safety Warning



Ultraviolet radiation can cause severe burns to eyes and skin. Do not look at the light without protective eye shielding (UVITRON UV/IR safety glasses Part No. UV0495, UV2231 or equivalent).

While thermal burns are felt immediately, UV burns are not felt for several hours. Short exposure to UV lamp radiation can cause severe burning of skin and eyes. UV burn of eyes affects the cornea and burning takes several days to heal. UV burn is identical to “Welders Burn” and will feel like sand in the eyes that cannot be washed out. The discomfort is temporary and has no lasting effects. Some effects of UV radiation can cause permanent damage to the eyes. *Never look directly at the operating arc lamp, with or without UV protective glasses.*

Exposure to UV radiation of only limited time will cause erythema (redness) on normal skin. Remember that a few seconds of exposure to direct radiation of the lamp can cause burns equal to a day in the sun. Such redness is temporary and will not produce blistering, or tanning, as only a small amount of radiation penetrates deeply. Extended exposure to UV radiation can lead to skin cancer. *When operating the unit in production, the use of protective clothing and cotton gloves is required.*

3.2 Electrical Safety

HIGH VOLTAGE



High voltage and current energize the UV Lamp. A high voltage power supply and Starter combination are designed to provide lamp-starting voltages, to limit current, and subsequently provide a uniform output of energy. *To avoid the risk of electrical shock, do not remove the Lamp Access Panel or attempt to replace the lamp before turning off the Power Input switch, and disconnecting the Input Power Cord.* The electrical system of this unit should be serviced by only UVITRON service personnel.

3.3 High Temperatures



Due to the high output power of this system, high temperatures may be present on the surfaces of the Lamp, Reflector, and Lamp Housing Assembly. *Extreme care should be taken to prevent touching any of these surfaces before allowing sufficient time for all temperatures to drop to safely back to room temperature after power has been removed.* Also, the Lamp Housing Assembly should never be placed on or near any flammable surface while the lamp is on, or before its temperature has cooled back to room temperature. Never place the lamp head or parts to be cured on a heat sensitive surface. Always cure parts on a metallic or non-flammable surface.

WARNING: Placing the Lamp Housing Assembly on or near flammable surfaces while the lamp is on, or still hot could result in fire.

SAFETY CONSIDERATIONS (CONTINUED)**3****3.4 Ozone Safety**

High concentrations of ozone (O₃) can cause discomfort, or at sufficiently high levels can be dangerous. Arc lamps that are used in light curing systems may generate ozone when oxygen in the air is exposed to short wavelengths of light produced by the lamp (<210 nm). This ozone generation can be avoided by using arc lamps that are constructed with ozone-free quartz glass, which absorbs the ozone producing wavelengths. This type of glass is used in Uvitron's UVA and visible type lamps. Unfortunately, this ozone-free glass also can reduce the effectiveness of some curing processes that may require the absorbed short wavelengths (e.g. those for some inks and coatings). For this reason, Uvitron's UVB type lamps are not constructed with ozone-free glass, and should be used only in well ventilated work areas. Another way to cope with the ozone is to exhaust the lamp air outdoors. Such exhausting involves no danger as the hot ozone containing gas is very unstable and breaks down to oxygen rapidly in ducting.

Although some SunRay system configurations generate ozone at a level that could barely be detected by odor and at a level well below the 0.1 parts per million allowable limit for continuous exposure (American Conference of Government Hygienists), it is recommended that all SunRay lamps systems be operated in well ventilated areas. For U.S. government recommended ozone exposure limits and additional ozone safety information, visit the following OSHA web page:

https://www.osha.gov/dts/chemicalsampling/data/CH_259300.html

3.5 Lamp Recycling

UV curing arc lamps (sometimes referred to as bulbs) all contain some level of mercury, and should be disposed of responsibly in accordance to local, state and federal laws. Excellent guidelines for mercury lamp recycling can be obtained at the following [National Electrical Manufacturers Association](http://www.lamprecycle.org) website:

www.lamprecycle.org



Or call Uvitron customer service at (413) 731-7835 for more information.

THEORY OF OPERATION

4

4.1 Light Curing

Ultraviolet Light (UV) exists around us as one of nature's phenomenon, an example of which is Ultraviolet (UV) rays produced by natural sunlight. Ultraviolet light can also be artificially produced by an electrical arc lamp enclosed in special glass to allow its passage (a UV arc lamp).

Reactive materials called photoinitiators are added to resins for adhesive bonding, coating, sealing, and printing. Ultraviolet light will cure these adhesives by causing the liquid resin to polymerize, thus becoming a solid. This could be compared to two part epoxies, which when mixed in the proper proportions, turn from a liquid to a solid. Light curing resins, on the other hand, are single component products ready to use as received without measuring or mixing, and cure on-demand when exposed to UV light.

The photoinitiators added to the adhesive chemistry react to a specific range of light wavelengths, and the speed of the reaction is governed primarily by the intensity (or irradiance) of the light source for those wavelengths and by the chemistry of the adhesive. Approximate adhesive cure time can be calculated as follows:

$$\text{Curing Time [seconds]} = \text{Light Energy [Joules/cm}^2\text{]} / \text{Light Intensity [Watts/cm}^2\text{]}$$

Adhesive manufacturers typically specify the energy required for curing, or the required intensity and time duration. For some adhesive types, the relationship between the speed of curing and lamp intensity is not linear (doubling the intensity does not offer half the cure time). The fastest and most complete reaction may occur at high peak intensity for a relatively short period of time. This may be a more effective type of curing as compared to a similar (or even a higher) dose of UV light, which is spread over longer period of time.

NOTE: Various types of adhesives, inks and coatings from different manufacturers have different levels of reactivity which will require adjusting of exposure times for proper curing. Consult with the adhesive manufacturer for appropriate cure times for each type of material.

Light curable adhesives are typically cured using electromagnetic energy in the UV and visible ranges of 250 to 450 nanometers (nm). It should be noted that ultraviolet light is easily attenuated when attempting its transmission through any materials that are not extremely transparent or optically pure. Even window glass will have reduced transmission or block most UV wavelengths, and this attenuation is greater as wavelengths become shorter. For this reason, applications that call for deep curing through thick adhesive layers require the longer light wavelengths in the UV-A and visible ranges for maximum penetration. These longer wavelengths are also required for curing through more opaque or colored adhesives and substrate materials to reduce the effect of attenuation. Shorter wavelengths in the UV-B

THEORY OF OPERATION (CONTINUED)

4

and UV-C regions have more energy and are effective for curing and removal of surface tack for thin layers of coatings, inks and paints.

To allow the SunRay curing system to adapt to these different types of curing applications, multiple replacement lamp types are available which are optimized for each of the visible, UVA and UVB wavelength ranges. See the Accessories list in section 10.2 for ordering part numbers of the optional lamp types.

Refer to the chart below for the wavelength ranges of the ultraviolet and visible light curing bands of the electromagnetic spectrum.

ELECTROMAGNETIC SPECTRUM										
	Short Waves	Gamma Rays	X-Rays	Ultraviolet Light	Visible Light	Infrared	Micro Waves	Radio Waves	Long Waves	
Range	Vacuum UV	UV-C	UV-B	UV-A	Violet	Blue	Green	Yellow	Orange	Red
Wavelength [nm]	100-200	200-280	280-315	315-400	400-440	440-490	490-570	570-585	585-620	620-780

4.2 System Information

The SunRay 400SM has a very high power density light output, which will result in rapid, high bond strength cures. The light intensity can be controlled somewhat by adjusting the distance of the lamp head to the substrate being cured (larger distance results in lower light density and intensity). Intensity can also be adjusted by switching the system’s front panel lamp power switch between full and standby settings, which will reduce intensity by approximately one half. The lower power standby setting can be used for very reactive adhesives, or for temperature sensitive curing substrates.

The SunRay 400SM utilizes a metal halide type arc lamp, which is powered by a tightly regulated switch-mode power supply. This combination provides high intensity and consistent light output, resulting in very fast and repeatable product curing.

A system block diagram is shown in Figure 8.

CONTROLS AND INDICATORS

5

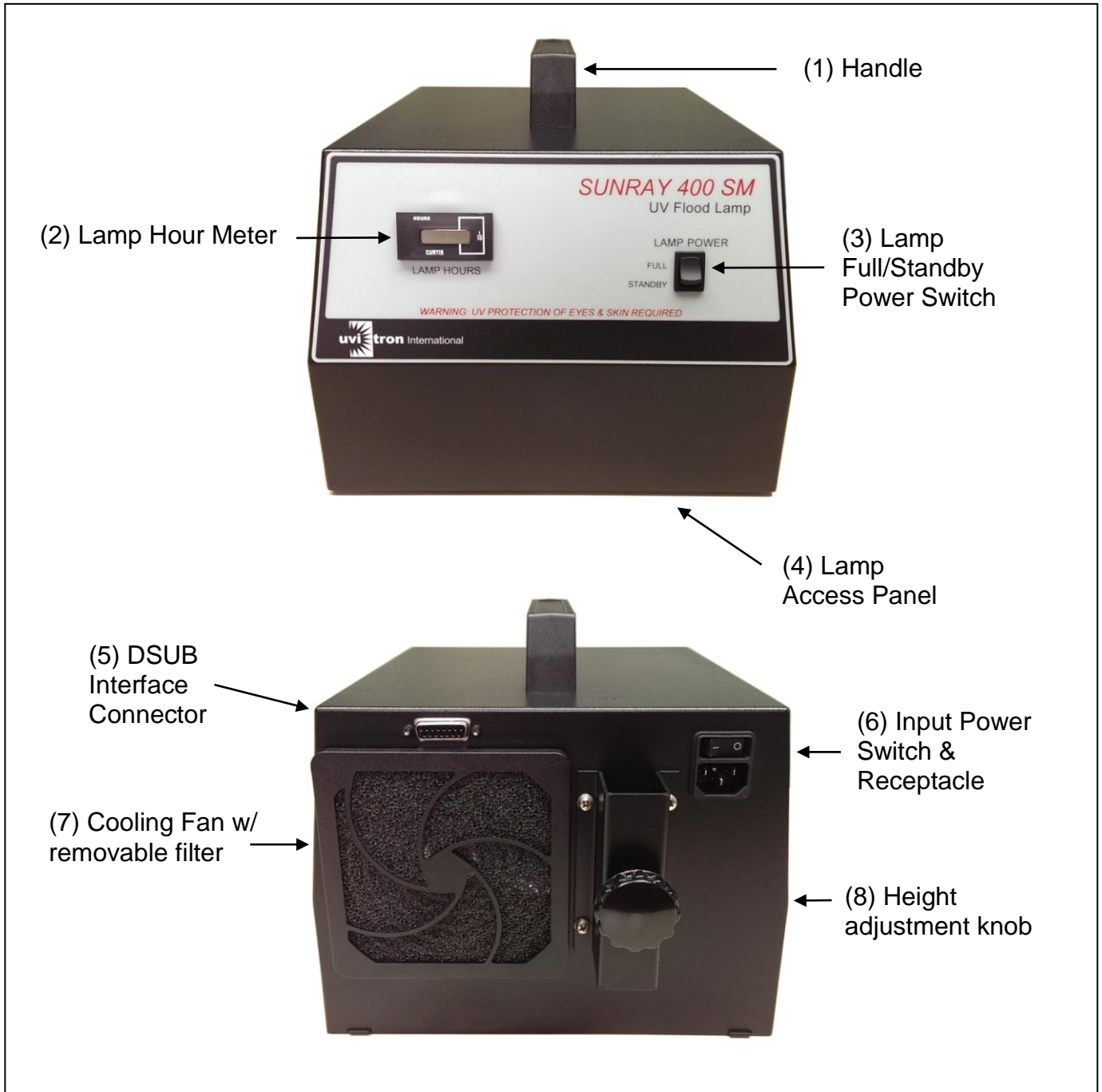


Fig. 4, Location of controls and indicators

CONTROLS AND INDICATORS (CONTINUED)**5**

Item	Description
1. Handle	<p>The SunRay handle can be used to carry the lamp housing assembly, or to raise or lower the unit height.</p> <p>WARNING: The handle should never be used to lift or carry the SunRay unit when it is mounted to a stand or other supporting device.</p>
2. Lamp Hour Meter	<p>The lamp hour meter is used to track the age of the arc lamp. The meter reading should be recorded when the lamp is replaced. Optionally, the reading can be zeroed via the hour reset signal on the rear panel DSUB connector when the lamp is replaced (see section 7 for signal interface info).</p>
3. Lamp Power Select Switch	<p>The Lamp Power rocker switch selects either the “full” or “standby” lamp power setting. When curing or warming-up the lamp, the switch should be set to full power. Between curing operations, the switch can be set to the standby setting, which reduces the amount of heat and stray UV light radiated by the unit. When switching back to full power, the lamp will be ready for curing again after a brief 10 second re-warming period.</p>
4. Lamp Access Panel	<p>The Lamp Access Panel can be removed for inspection or replacement of the arc lamp.</p> <p>WARNING: High voltages and high temperatures are accessible with this panel removed. Always switch the Input Power Switch off, disconnect the input power cord, and wait for the unit to cool before removing this panel.</p>
5. DSUB Interface Connector	<p>Signal interface for SunRay external control (see section 7).</p>
6. Input Power Switch & Receptacle	<p>The Input Power switch is used to apply or remove main power to the SunRay system. Co-located with the switch is the IEC type power cord socket where the input line cord is inserted.</p>
7. Cooling Fan w/ removable filter	<p>The system cooling fan has a foam filter element that can be removed for periodic cleaning (as required).</p>
8. Height Adjustment Knob	<p>When used with the optional Flood Stand, the rear mounted Height Adjustment Knob is used to set the optimum distance from the lamp to the substrate being cured.</p>

SYSTEM OPERATION

6

The SunRay is designed to be an extremely user-friendly system, which has a minimum of controls, and is easy to operate. Therefore, the following operating instructions are brief.

6.1 Start Up

A. To allow for adequate ventilation, place the SunRay system in a position, which allows for a minimum of 6 inches of clearance to the rear-mounted fan air inlet.

B. Plug the IEC type connector of the AC Power Cord, into the Power Input Receptacle at the rear of the Lamp Housing Assembly. Plug in the opposite end of the line cord into a nearby grounded single phase power outlet.

C. To start the system, turn on the Input Power Switch at the rear of the unit. The lamp should turn on.

D. A 2 minute warm-up time is required for the lamp to reach full intensity. During the warm-up period, the system should be set to full power mode.

WARNING: Bluish light is projected from the unit becoming brighter as the unit warms up. This ultra-violet light is harmful to the eyes and skin. UV Protective glasses and clothing are required to prevent burns of eyes and skin. Care should also be taken to protect other personnel in the area from unintentional exposure to the UV radiation (Refer to section 3.1 for critical UV safety information).

E. To test the standby power mode, switch the front panel Lamp Power Rocker Switch from Full to the Standby power setting. The lamp intensity will visibly dim.

NOTE: The SunRay system is designed for continuous operation. It is suggested that the lamp remain on during work breaks. Frequent stopping and starting of the lamp will reduce lamp life. In general, leave the unit in standby power mode for periods of non-use of less than thirty minutes. The unit will require only a brief 10 second re-warming period before the lamp returns to full intensity. Once the input power is switched off, the lamp will require a minimum of 5 minutes of cooling time before restarting.

F. The height of the Lamp can be adjusted up or down to control the intensity of light reaching the substrate being cured. Refer to the adhesive manufacturer's data sheet for appropriate exposure time and intensity levels. The optimum height and exposure time required to provide proper curing may need to be adjusted experimentally.

6.2 Shut Down

To shut down the light cure system, simply shut off the rear panel Input Power Switch.

EXTERNAL INTERFACE

7.1 External Interface Wiring

External control of the SunRay is possible by wiring to the unit's rear panel 15 pin DSUB type connector. See fig. 5 below for a wiring schematic of a typical configuration.

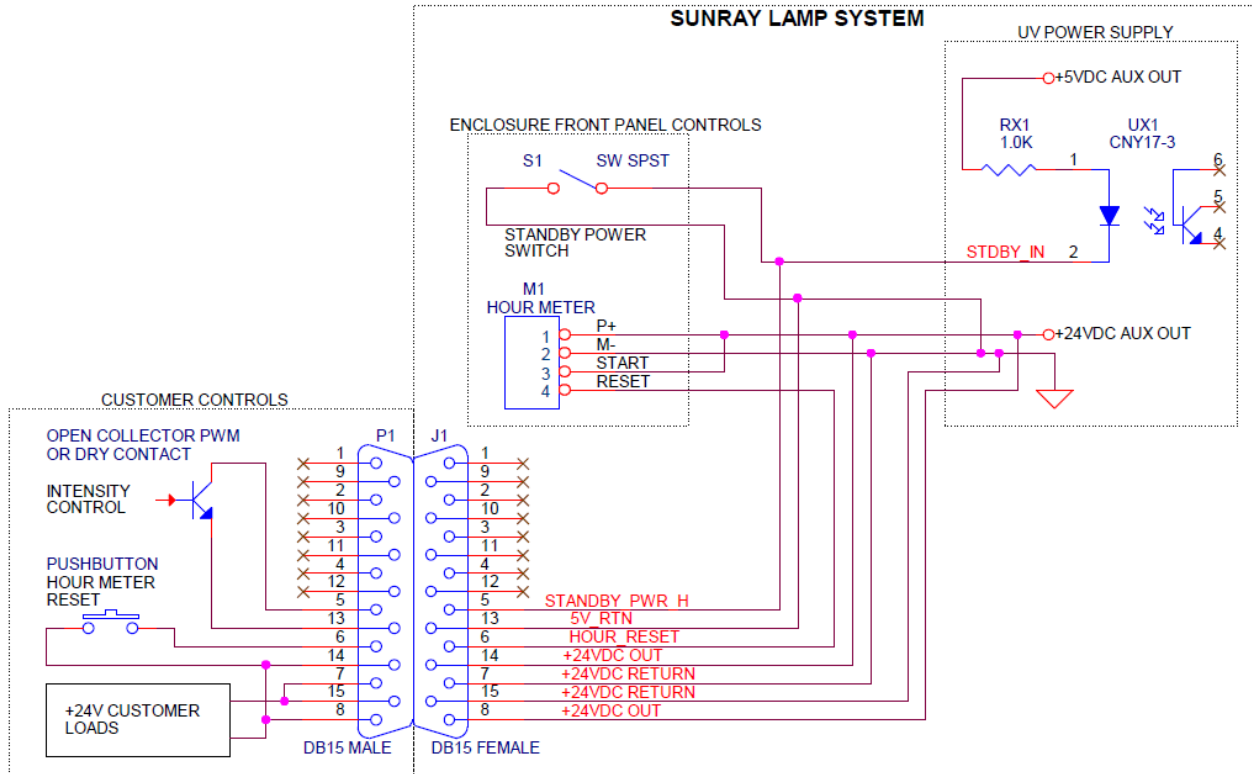


Fig. 5, SunRay 15 Pin DSUB Interface Schematic

The DSUB interface connector pin assignments and signal names are listed in the table below:

Pin Number	Signal Name
5	Standby Power H (Intensity Control)
13	Standby Power Return (5V_RTN)
6	Hour Reset
8,14	+24VDC Out
7,15	+24VDC Return

EXTERNAL INTERFACE (CONTINUED)

7.2 Interface Signal Descriptions

- The *Standby Power H* signal can be used to externally control the SunRay lamp intensity. This signal can be used to either simply switch between full power and half power as the unit's front panel switch does, or the signal can be pulse width modulated to linearly vary lamp intensity between full and half power (see Fig. 6 below). When the signal at pin 5 is open (high), the lamp intensity will be set to the minimum standby power level. When the signal is shorted to the Standby Power Return at pin 13, the lamp intensity will be set to the full power level.

NOTE: Because this signal is internally connected in parallel with unit's front panel lamp power switch, the front panel switch must be set to the standby position in order for the external signal state of pin 5 to take effect.

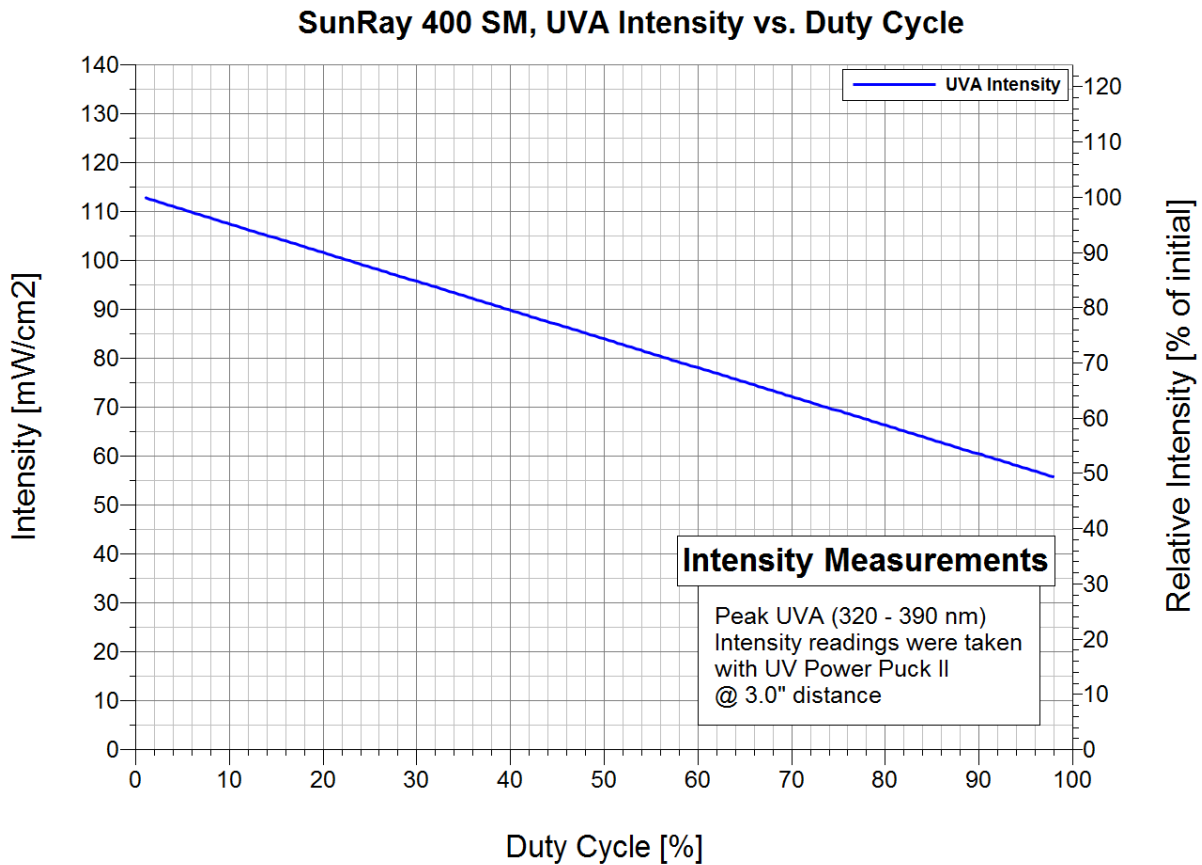


Fig. 6, Effect of PWM of Standby signal on lamp intensity

EXTERNAL INTERFACE (CONTINUED)

7

- The *Hour Reset Input* can be used to externally reset the number of hours displayed on the SunRay's front panel hour meter to zero. The hour meter should be reset when installing a replacement arc lamp so that the new lamp's age can be easily tracked over its lifetime. To reset the hour meter, the Hour Reset signal at pin 6 should be momentarily shorted to the +24VDC Out signal at either pin 8 or pin 14.
- The +24VDC *Out* and the +24VDC *Return* connections on the SunRay DSUB interface connector can be used to power external loads from the unit's internal 24VDC power supply. The 24VDC output can be used to supply up to 1 amp of current to external loads by connecting the load's positive terminal to connector pin 8 or 14, and the negative terminal to pin 7 or 15.

MAINTENANCE

8

8.1 Maintenance Considerations

During the production process, various deposits of foreign matter may accumulate on the Lamp, Reflector, and Filter Glass surfaces. Product vapors can also condense on these surfaces over time, causing poor transmittance/reflectance of UV light, and reduced curing efficiency. To insure maximum light output of the curing system, these surfaces should be inspected and cleaned every two months (or as required).

The Lamp will also need to be replaced periodically as its UV output drops sufficiently enough to prevent complete product curing. A radiometer should be used to monitor system UV light output over time (e.g. Uvitron UV1450 UVICure Plus II, or UV1451 Power Puck II). If a radiometer is not available, the quality of the product's curing should be checked regularly as a less direct indicator of lamp performance. If a radiometer is not used to track lamp performance, then the lamp should be replaced approximately every 2000 to 3000 hours.

WARNING: To avoid coming in contact with dangerous high voltages or high temperatures, the following power down & cooling procedure must be completed before attempting any maintenance operations on the SunRay UV Lamp: *Turn off the Input Power Switch at the rear of the Lamp Housing, and unplug the power cord from the Input Power Receptacle. Wait a minimum of 15 minutes for the lamp and other hot components to cool back to room temperature and for internal power supply electrical storage capacitors to discharge before proceeding with any maintenance operations.*

8.2 Cleaning of Optics and Lamp Replacement

1. Remove the Lamp Housing Assembly from its stand or fixture, and place it upside-down on a soft clean surface.
2. Remove the two thumbscrews from the front edge of the Lamp Access Panel, and carefully slide the panel forward, out of the slots in the rear of the Lamp Housing. Place the Lamp Access Panel and glass on a soft clean surface.

CAUTION: It is extremely important to avoid touching (with your hand) the filter glass, aluminum reflector, and the glass portion of the lamp. Contaminants from your skin will cause oxidation of the reflector, and unwanted refraction of light through the contaminated portion of the filter glass and lamp. These contaminants may also cause localized hot spots on the quartz envelope of the lamp, which could result in premature lamp failure. Cotton gloves or a soft cloth should be used when handling or cleaning the Filter Glass, Reflector, and Lamp.

3. Using cotton gloves or a clean soft cloth, remove the lamp by holding it near one end, and pushing into the adjacent spring loaded socket. Once the other end of the lamp has cleared the walls of its socket, tilt the cleared end of the lamp up slightly, and remove the lamp from the other socket that is still engaged.

MAINTENANCE (CONTINUED)**8**

- Using a clean soft cloth dampened with isopropyl alcohol, clean the surfaces of the aluminum reflector, and both sides of the Lamp Access Panel Filter Glass.

CAUTION: Do not use abrasive cleaning compounds or steel wool for cleaning the reflector. These harsh products will remove the finish and reduce the reflector efficiency.

- Wipe the lamp lightly with a clean isopropyl dampened cloth. If the lamp shows signs of bulging or shape distortion, then replace it. Otherwise, dry and polish the lamp with a clean dry cloth.
- Re-insert the cleaned or new Lamp between the Lamp Sockets, with the filler nipple facing the reflector. Be sure to center each lamp electrode in its socket to insure proper electrical connection, and to avoid arcing (which could damage the lamp or socket). The lamp is non-polarized so it does not matter which electrode is placed in which socket.
- Re-install the Lamp Access Panel, and tighten both thumbscrews.
- Mount the Lamp Housing back on its stand or fixture, and reconnect the input power cord.
- Turn power on to the unit, and record the reading of the Lamp Hour Meter (for lamp age tracking). Optionally, the reading can be zeroed via the hour reset signal on the rear panel DSUB connector (see section 7 for signal interface information).
- Re-test the unit to insure satisfactory light intensity and cure time is achieved.

8.3 Fan Filter

The unit's rear mounted fan has a removable foam filter, which should be cleaned frequently to avoid restriction of adequate cooling airflow. The filter can be removed by unsnapping its plastic retainer from the fan guard. The filter element should be washed using a mild detergent solution.

8.4 Cleaning of Optional UV Shields

If the system was purchased with the optional front wrap-around or backside UV shields, they should be cleaned using a mild dish detergent solution, and a clean soft cloth.

CAUTION: The UV shields should never be cleaned using any ammonia-based cleaners. Such harsh cleaners will cause cracking or crazing of the acrylic, and will permanently damage the shields.

TROUBLESHOOTING**9**

The SunRay light cure system is designed for industrial use and if configured correctly, little or no problems should be encountered during normal use. If however problems do occur, the following problem checklist may help isolate the cause and suggest a solution.

Problem	Probable Cause	Solution
1. Lamp operates but has low output, or slow curing.	A. Lamp Power switch in standby position.	A. Place switch in the full power position.
	B. Lamp too far from substrate being cured.	B. Adjust lamp height to within 2 to 4 inches of surface being cured.
	C. Defective or excessively aged lamp.	C. Replace lamp (see lamp replacement procedure in maintenance section).
	D. Reflector or filter glass requires cleaning.	D. Clean reflector and glass as per maintenance procedure.
	E. Tackiness caused by filter glass blocking short light wavelengths.	E. Disconnect power, remove lamp access panel and remove filter glass to allow more UVB output (see fig. 7 for spectral charts).
	F. Adhesive not compatible with lamp type.	F. Compare the adhesive's light spectral requirements with the Lamp's spectral chart in the specs section. Visit Uvitron website for optional lamp type charts if required.
2. Lamp does not light, but fan and hour meter running	A. Arc lamp too hot.	A. Wait 5 minutes and retry.
	B. Lamp not properly installed.	B. Disconnect power, and verify both lamp electrodes are properly centered in sockets.
	C. Defective or excessively aged lamp.	C. Replace lamp (see lamp replacement procedure in maintenance section).
	D. Over-temperature protection activated	D. Allow unit to cool. Clean fan filter or operate unit in cooler environment.
3. Lamp does not light, fan and hour meter <u>not</u> running.	A. Power cord not properly connected or defective.	A. Verify both ends of the power cord are fully inserted into their sockets, or replace power cord.
	B. No power at outlet.	B. Test for power at wall outlet or check facility circuit breaker.

REPLACEMENT PARTS AND ACCESSORIES**10****10.1 Ordering Information**

To order replacement parts or accessories, or to obtain further information, please contact Uvitron Customer Service:

Uvitron International, Inc.
150 Front Street, Unit 4
West Springfield, MA, USA 01089

Tel. (413) 731-7835
Fax (413) 731-7767
Web site: www.uvitron.com
Email: info@uvitron.com

10.2 Replacement Parts & Accessories

Item Description	Part Number
UVA Enhanced Metal Halide Lamp, 400W	UV0320
UVB Enhanced Metal Halide Lamp, 400W	UV0544
Visible Light Enhanced (420nm) Metal Halide Lamp, 400W	UV0489
Visible Light Enhanced (460nm) Metal Halide Lamp, 400W	UV0545
Filter Glass	UV2128
Lamp Access Panel Thumb Screws	UV0499
Lamp Height Adjustment Knob	UV0290
Power Cord, 7'6" U.S. version (other types also available)	UV0341
Replacement Fan Filter Elements	UV0498
Adjustable Height Flood Stand	UV0454
Wrap-around UV Flood Shield, Front	UV0455
UV Flood Shield, Backside	UV1094
UVICure Plus II Radiometer, UVA, B or C, 10mW-10W/cm ²	UV1450
UV Safety Glasses, Sport Contour, 3.0 Shade	UV2231
UV Safety Glasses, OTG (fit over prescription eyewear), 3.0 Shade	UV0495
UV Protective Face Shield, Lift up, 4.0 Shade	UV1889
Cotton Knit Work Glove Pair, Large, UV Protective	UV1422
SunRay 400SM Instruction Manual	UV0503

TECHNICAL SPECIFICATIONS**11**

Category	Parameter	Value	Conditions/Notes
General	Model	SUNRAY 400 SM	
	Part Number	UV0446	
Power Supply	Type	Electronic, Switch Mode	Constant power regulated
	Input Voltage	90–132/180-265VAC	<i>Auto-Ranging</i> AC line input
	Input Current, 120/240V	7A/3.5A maximum	
	Source Input Frequency	47 Hz to 63 Hz	
	Lamp Power Regulation	± 1%	Line & lamp
	Fan / Auxiliary Voltage	24V ± 10%	1 amp max from connector
	Protection	Inrush current limit, line voltage surge, short circuit, open circuit, hot re-strike, over temperature	
Lamp	Lamp Type, Standard	400 Watt Metal Halide	Quartz, ozone-free
	Lamp Voltage	135 ± 15V	
	Arc Length	32 mm	
	Burning Position	Horizontal	
	Radiation Flux	72 Watts	315 - 400 nm
	Warm-up Time	2 minutes	
	Cooling time before Restart	5 minutes typical	Lamp protection prevents restart of hot lamp
	Output Intensity (Initial)	115 mW/cm ² UVA Peak	Typical @3 inch distance
	Curing Area	8 x 6" minimum	Affected by lamp height
	Reflector type	Parabolic flood	Collimated light output
	Lamp Life	> 3000 hours typical	Affected by number of on/off cycles
Environmental	Operating Temperature	+10 °C to +40 °C (+50 °F to +104 °F)	
	Storage Temperature	0 °C to +60 °C (+32 °F to +140 °F)	
	Relative Humidity	30 to 75% operating, 10 to 100% storage	Non-condensing
	Cooling	Forced air	Quiet DC fan
	Over-temp Shutdown	60 °C (internal)	
Dimensions	L x W x H (inches)	11" x 10" x 9"	Including handle
	Weight (lbs.)	11 Pounds	

TECHNICAL SPECIFICATIONS (CONTINUED)

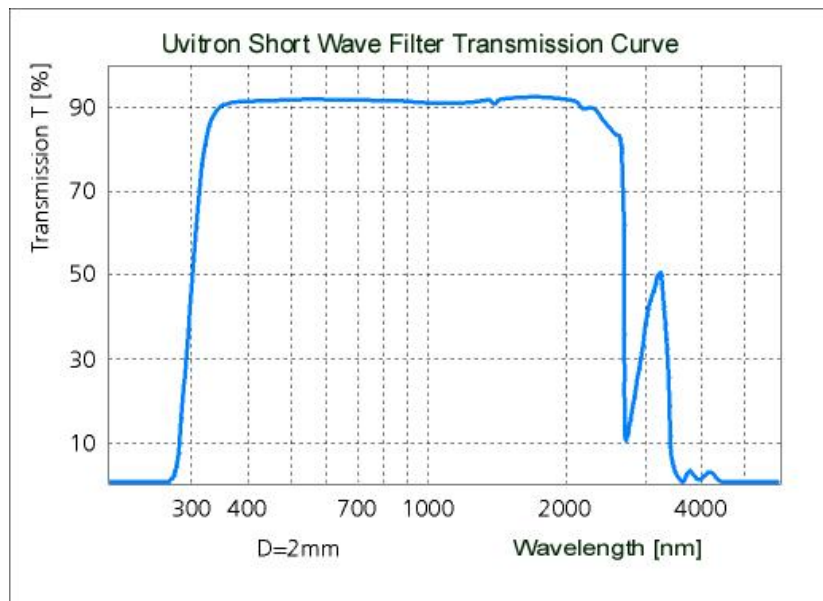
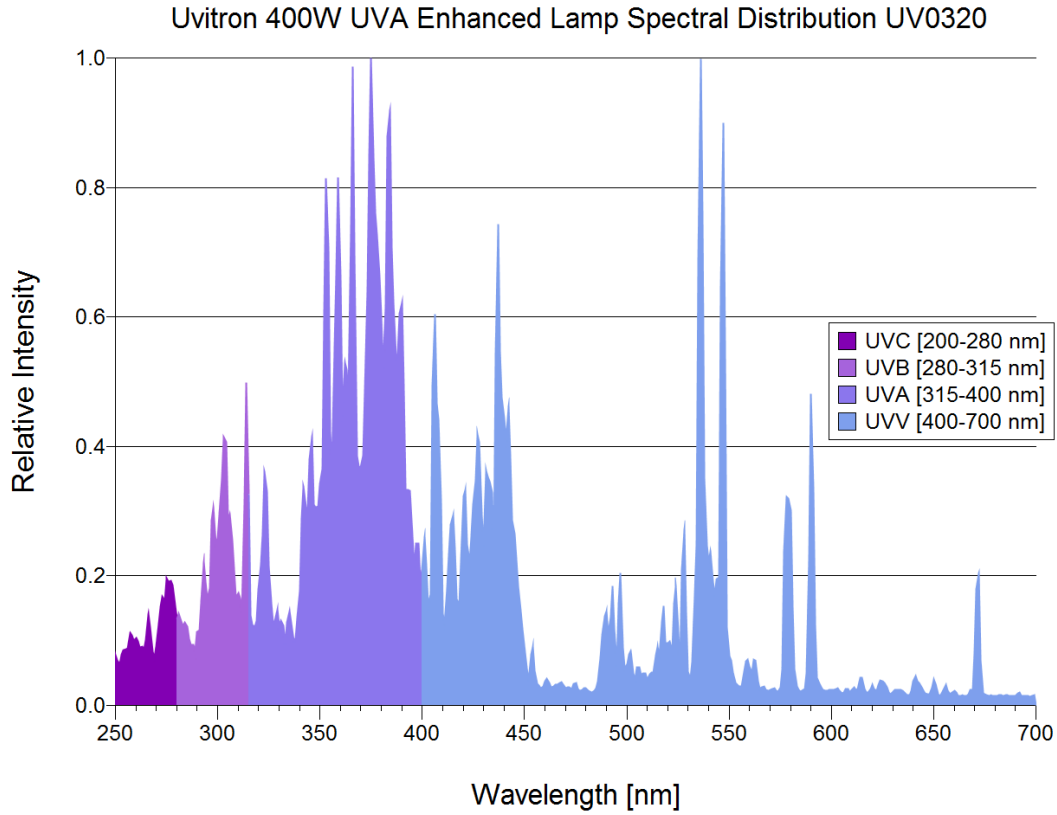


Fig. 7, Standard Lamp Intensity & Filter Glass Transmission vs. Wavelength

SUNRAY 400SM BLOCK DIAGRAM

12

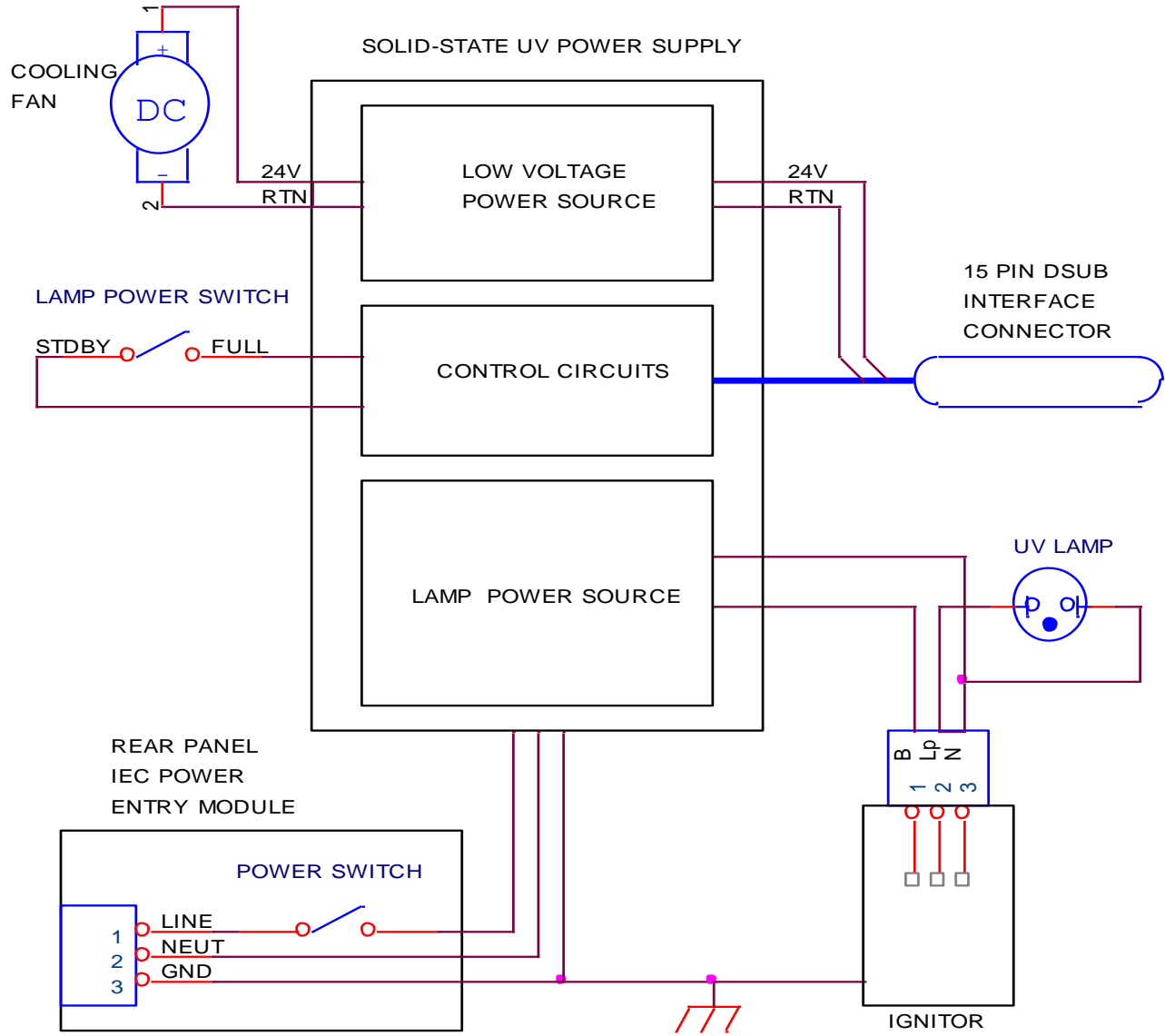


Fig. 8, SunRay System Block Diagram

WARRANTY INFORMATION

13

UVITRON INTERNATIONAL WARRANTY

UVITRON International, Inc. warrants its products against defective material and workmanship under normal use for a period of 1 (one) year from the date of shipment to our customer. This warranty does not apply to any product that has been subjected to misuse, accident, improper installation, improper application or improper operation, nor does it apply to any product that has been repaired or altered by other than a factory authorized representative. Any tamper-proof seals that are broken will void the warranty. There are no warranties that extend beyond those herein specifically stated.

SERVICING POLICY

WARRANTY REPAIR

All products will be repaired at the factory or replaced at no charge throughout the warranty period. If a unit is returned for an approved repair, the warranty will be extended for the length of time required to complete the repair or to replace the unit.

OUT OF WARRANTY REPAIR

Products requiring repair that are beyond the warranty period, will be subject to a fee depending on the degree of repairs. Please consult the factory for details.

SERVICE WARRANTY

UVITRON International, Inc. warrants all repair work for a period of 1 (one) year from date of repair. This warranty applies only to the repair for which the unit was returned.

RETURN MATERIALS AUTHORIZATION

A Return Material Authorization (RMA) number must be obtained so that we may process your returned equipment. Please call the factory service department to obtain a RMA Number.

SHIPPING INSTRUCTIONS

Products that are shipped to the factory for repair will be shipped at the customer's expense, and will be returned to the customer at no charge by UVITRON International, Inc., via normal shipping method for said product. Products that are shipped to the factory on a freight collect basis will not be accepted.