

Discontinued System

# OPERATIONS MANUAL

## *PC-3D UV CURING LIGHT SOURCE*

**TABLE OF  
CONTENTS**

<b><u>Description</u></b>	<b><u>Page</u></b>
Safety .....	1
Description.....	4
Specifications.....	5
Unpacking and Inspection.....	6
Installation .....	8
Lamp Replacement/Installation.....	9
Maintenance .....	10
Troubleshooting Guide.....	11
Spare Parts.....	14
Options .....	15
Warranty.....	16
Diagrams .....	17

## **SAFETY**

Explanation of **WARNINGS, CAUTIONS, AND NOTES:**

### **WARNING**

A **WARNING** indicates when failing to follow the instructions could result in injury to personnel.

### **CAUTION**

A **CAUTION** indicates when failing to follow the instructions could result in damage to equipment.

### **NOTE**

A **NOTE** is used to highlight an important procedure, practice or condition.

### **WARNING**

**READ, UNDERSTAND AND FOLLOW ALL** the safety and operating instructions found in this manual.

# **SAFETY**

## **Safety Precautions Must Be Observed By All Personnel Working Near or Around Ultraviolet (UV) Light**

### **UV Terminology**

The portion of the Electromagnetic spectrum which falls between x-rays and visible light is called Ultraviolet or UV. Ultraviolet (UV) radiation can be classified into three categories: UVC, UVB, and UVA. UVC is for the wavelengths below 280 nm, UVB is for the wavelengths between 280-315 nm, and UVA is for the wavelengths between 315-380 nm.

### **Exposure Hazards**

Exposure to UV light, even for short periods of time, can be hazardous. The danger depends upon the exposure time, the intensity of the light, the wavelength, and the individual's sensitivity to UV. UV-B and UV-C can be considered the most hazardous to the skin, causing such effects as sunburn. Ultraviolet light is considered to be hazardous to the eyes, this is why eye protection is important when working around UV light.

Ozone is a form of oxygen. Interaction of ultraviolet light below 220 nm with oxygen in the surrounding air produces ozone, which is a powerful, toxic agent. It has a characteristic pungent odor to which most people are quite sensitive (people can typically detect concentrations of several parts per million). At high concentrations, it can cause discomfort, or at sufficiently high levels, be dangerous. The EC series of lamps do not produce ozone as they are made out of a special material for the lamp's envelope called ozone-free quartz. Ozone is suppressed in this case, even if it is generated by the arc.

### **Safety Guidelines**

The National Institute for Occupational Safety and Health (NIOSH) recommends that exposure to UV energy be controlled and limited in the work place. Recommended maximum exposures are available, but do not apply to photosensitive individuals.

The total intensity from 320 to 400 nm hitting unprotected skin or eyes should not exceed 1 mW/cm<sup>2</sup> for periods longer than 1000 seconds. For shorter exposure times, the total radiant energy shall not exceed 1000 mW•sec/cm<sup>2</sup>.

## **SAFETY**

### **WARNING**

#### **EYE PROTECTION**

Always wear eye protection when working with or near UV equipment. Use goggles, safety spectacles (glasses), or a face shield to protect your eyes.

- Goggles completely surround and protect your eyes. Many goggles will also fit over regular glasses. Be sure your goggles fit comfortably.
- Safety spectacles don't fog as easily as goggles and can be worn at all times.
- A face shield protects your entire face, not just your eyes.

It is important to verify that your selection of safety eyewear is approved for UV protection.

Individuals should wear protective UV glasses as a minimum precaution.

#### **SKIN PROTECTION**

Individuals exhibit different levels of photosensitivity. Therefore, even minimal periods of exposure of unprotected skin to direct UV light must be avoided.

- UV barrier creams protect all exposed skin including the face, neck, and arms. UV blocking creams also provide protection to hands with minimal loss of tactile sensitivity or feel. It is, however, necessary to repeat application regularly because the cream wears off.
- Gloves which are opaque to UV light can be worn to protect the hands. Proper glove selection should also include protection from UV curing resins. Consult the resin manufacturer or product data sheets.
- Long sleeved shirts, or a lab coat, will protect the arms.

## **PC-3D DESCRIPTION**

The Light-Welder® PC-3D is a combined, special purpose UV curing light source with an adhesive dispenser. UV light is generated by the lamp in the housing and transmitted through a flexible light guide. The light guide can be hand-held or machine mounted for automated applications. The adhesive dispenser is designed to dispense adhesive from a 10 mL or 30 mL syringe. A hand-held manifold is provided that couples the light guide and syringe together for wire tacking, SMDs and other spot curing applications

The light source consists of a housing containing the power supply, circuit protection, power-on light, lamp/reflector, cooling fan, light guide mount and an electric shutter. Electric shutters are supplied with timed opening and manual modes. The light guide is separate and plugs into the mount on the front of the unit. Light is not emitted from the unit when the light guide is removed. Lamps are rated at 500 hours of life.

The power supply operates on line voltages for either 100, 115, or 230 Vac, 50 or 60 Hz (factory set). AC voltage is stepped down and converted to DC through a full wave bridge rectifier. A separate high voltage winding on the transformer provides ignition voltage for the lamps. A blocking diode is located between the power regulator and the high voltage winding to prevent damage to the regulator circuit. When the lamp ignites, high voltage is dissipated across the lamp, although, the high voltage winding is always energized. If the lamp extinguishes due to a momentary power failure, it will re-ignite after it cools down, if the power switch is left on. The unit is rated for continuous operation.

A cooling fan keeps the lamp, lamp housing, and internal components of the power supply operating at optimum temperature. A 50 Watt, short arc, mercury vapor lamp is mounted in a reflector and pre-focused to provide optimum light output.

Adhesive dispensing is done by a time/pressure system. A vacuum suckback feature is included to prevent dripping of low viscosity adhesives. Operation is controlled by a foot switch which initiates the dispense cycle. Both timed and manual modes are provided. Initiating the dispense cycle causes the dispensing timer to energize a solenoid valve for a predetermined time. In the manual mode, the solenoid valve is energized directly. The timer operates on momentary or maintained switch closure, however, the switch has to be reset to initiate another cycle.

<b>PC-3D SPECIFICATIONS</b>
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Voltage: ..... 100 Vac  
 ..... 115 Vac  
 ..... 230 Vac  
 Current: ..... 3 A @ 100 Vac  
 ..... 2.5 A @ 120 Vac  
 ..... 1.5 A @ 220 Vac  
 Frequency: ..... 50/60 Hz  
 Lamp/Reflector: ..... 50 Watt DC (pre-focused)  
 Shutter Timer: ..... 1 to 50 sec. delay  
 Dispenser Timer: ..... .1 to 3.5 sec. delay  
 Air Pressure Requirements: ..... 100 psi max; clean, dry shop air  
 Footswitch: ..... DPDT, Rocker type  
 Hour-meter: ..... 99,999.9 hours, non-resettable

**Output Intensities (Typical W/cm<sup>2</sup>)\*\***

<u>WAVELENGTH</u>	<u>FILTERED</u>	<u>UNFILTERED</u>
320 - 390 nm	1.5	2.5+

\*\* Measured with an Accu-Cal<sup>®</sup> 20 Radiometer.



With the filter installed, the PC-3D lamp emits only UV-A light and low amounts of UV-B and UV-C ultraviolet light. Without the filter, UV-A, UV-B, UV-C, and visible light are emitted. **Never** look directly at the light source while the unit is in use.

## **PC-3D UNPACKING & INSPECTION**

Upon receipt of the unit, unpack and check for shipping damage. Report damage to freight carrier and make any claim for damage through them.

Check box for contents:

- 1 - Light-Welder PC-3D Light Source
- 1 - Lamp/Reflector Assembly
- 1 - Power Cord
- 1 - Liquid Light Guide
- 1 - Filter Assembly \*
- 1 - Pair UV Goggles
- 1 - Instruction Manual
- 1 - Warranty Card
- 1 - 1/8" Hex Wrench \*
- 1 - 1/16" Hex Wrench \*
- 1 - 5/64" Hex Wrench \*
- 1 - 10 mL Syringe Adapter Assembly
- 1 - Hand-held Manifold \*
- 1 - Assortment of Needles (Quantity of 10)\*
- 1 - Quick Disconnect 1/8" Female NTB Air Connector \*
- 1 - Quick Disconnect 1/8" Male NTB Air Connector \*
- 3 - 10 mL Syringe Adapter Seal \*

\* These parts make up the PC-3D Accessory Kit P/N 35950

### **NOTE**

#### **REPORT ANY SHORTAGE TO DYMAX CORPORATION CUSTOMER SERVICE:**

Phone: (860) 482-1010 or (877) 396-2988

Fax: (860) 496-0608 or (800) 482-1012

Light Sources are shipped with the lamp removed to prevent breakage. (Refer to Page 9, **LAMP REPLACEMENT/INSTALLATION**)



## PC-3D INSTALLATION

1. Install Lamp (follow directions in the **LAMP REPLACEMENT/INSTALLATION SECTION**, Page 9).
2. Connect power cord to rear of unit.
3. Connect light guide to bezel mount by pressing down on lock and inserting guide. Connect syringe adapter to connector on front panel.
4. Locate foot switch where desired.
5. Connect air supply to fitting on rear of unit.
6. Attach manifold bracket to right side of unit with screws provided.
7. Mounting unit on a short pedestal (5" - 6" high" takes strain off light guide when used for hand assembly and reduces operator fatigue.
8. Plug into a grounded wall outlet.
9. Press power switch. Switch will illuminate when power is on.
10. Allow lamp to warm up for 4-5 minutes to obtain maximum light output.

### CAUTION

THIS IS AN ARC, NOT A FILAMENT LAMP. ONCE IGNITED, IT MUST BE LEFT ON FOR A MINIMUM OF 5 MINUTES TO FULLY VAPORIZE ELEMENTS IN THE LAMP. IF NOT, THE LAMP MAY BE DIFFICULT TO RE-IGNITE.

### NOTE

The lamp must cool before it can be re-ignited. Leave power switch on should the lamp extinguish. This operates the cooling fan and allows the lamp to ignite when it has cooled sufficiently. If the lamp fails to ignite, refer to Pages 11-13, **TROUBLESHOOTING**. Lamp life is reduced approximately one hour each time the lamp is switched on and off. Avoid repeated cycles by leaving unit on through breaks.

DURING THE OPERATION OF THE UNIT, THE LAMP WILL REMAIN ON DURING ALL SHUTTER SEQUENCES. THE SHUTTER IS A MECHANICAL DEVICE WHICH BLOCKS THE TRANSMISSION OF LIGHT DURING "OFF" SHUTTER DURATION.

## PC-3D INSTALLATION

11. Operate shutter by pressing right side of foot switch. With the timer switch in the manual position, the shutter operates directly from the foot switch. In the timed position, the shutter opening is determined by the setting of the potentiometer; clockwise increases the opening time and the foot switch must be released after each cycle.
12. Set air pressure regulator to 10-15 psi on air gauge.
13. Place a syringe of adhesive with follower plug installed in manifold and install syringe adapter. Install desired needle. Snug set screw to retain syringe in manifold.
14. Install light guide in manifold and snug set screw to hold in place. DO NOT OVERTIGHTEN.
15. Select dispenser timer switch to desired position.
16. Depress foot switch to left to dispense adhesive. Adjust air pressure and time to dispense correct amount. Increase air pressure and time to dispense more adhesive and decrease to dispense less adhesive. Experimentation is the best way to determine correct settings and needle size to dispense correct amount of adhesive. Excessive dripping or oozing of adhesive from the needle indicates air is entrained in the adhesive or more vacuum suckback is needed.
17. Adjust vacuum suckback to prevent drips should they occur. Turning knob counterclockwise increases air flow to transducer which increases vacuum. A minimum vacuum setting is usually all that is required. Care should be taken not to use too high a vacuum, since this will suck adhesive up the air line into the solenoid valve.

## PC-3D LAMP REPLACEMENT/INSTALLATION

### WARNING

BEFORE REPLACING THE LAMP, THE UNIT MUST BE “OFF” FOR A MINIMUM OF 5 MINUTES. THIS WILL ALLOW DANGEROUS CHARGES, WHICH ARE PRESENT FOR PROPER LAMP OPERATION, TO BLEED OFF.

### LAMP REPLACEMENT PROCEDURE

1. Allow the unit to cool before removing the lamp/reflector assembly.
2. Unplug power cord.
3. Remove the cover screws and cover.
4. Disconnect the lamp electrode wire from positive electrode clip. Do not disconnect the wire from lamp.
5. Loosen the retaining nut (see Figure 1.1) and rotate the electrode to one side such that the lamp/reflector assembly can be removed from mount. Remove the lamp/reflector assembly.
6. Install the new lamp/reflector assembly into the mount and move the negative electrode (see Figure 1.1) into position. Tighten the screw. Do not bend the electrode to install the new lamp/reflector assembly.
7. Attach the electrode wire to the positive electrode clip (see Figure 1.1).
8. Replace the housing cover on the unit. If access to the unit is limited, use Allen head screws instead of thumbscrews.
9. Record the serial number of the unit and hour-meter reading on the Bulb History

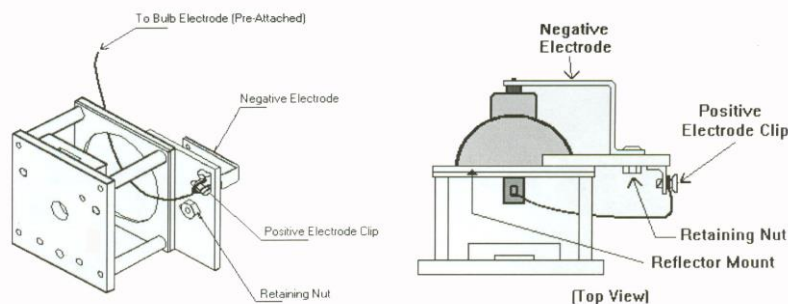


Figure 1.1

## **PC-3D MAINTENANCE**

### **LIGHT GUIDE**

Ends of the guide should be kept clean to transmit as much light as possible. Cured adhesive accidentally deposited on the output optical surface of the light guide can be removed with razor blade. Avoid sharp bends with the light guide since this reduces light output and damages the light guide.

## PC-3D TROUBLESHOOTING

### CAUTION

ONLY QUALIFIED MAINTENANCE PERSONNEL SHOULD ATTEMPT THE FOLLOWING PROCEDURES:

#### Problem: Lamp will not ignite

Possible Cause	Testing	Corrective Action
Improperly Fastened Connections	Visually inspect all input/output connections (i.e. power cord, lamp).	Secure all connections
Lamp Beyond Useful Life	Replace with known good lamp and re-test unit.	Replace lamp if defective (typical life = 1000 hours)
Corroded Negative Electrode (Brass Bracket)	Visually inspect the negative electrode for ANY signs of corrosion.	Replace, if corroded
Main Line Fuse Blown (Nothing in Unit Operates)	Remove fuse from power receptacle and check with an ohmmeter.	Replace fuse, if defective
No High Voltage Off Transformer Output	Verify ignition voltage off transformer (refer to Figure 1.2).	Replace transformer, if defective
Insufficient Ignition Voltage	Verify ignition voltage being supplied to the lamp (refer to Figure 1.2 for location and Figure 2.2 for waveform).	Replace defective component (typically blocking diode)
No Operating Voltage (Lamp Flickers)	Verify the operating voltage (refer to Figure 1.2).	Replace defective component

#### Problem: Shutter fails to open

#### Other symptoms: Shutter remains open

Possible Cause	Testing	Corrective Action
Shutter Mechanism Sticking	Remove power from unit and manually move the shutter and solenoid up and down (should move freely).	Replace component causing problem
Solenoid Malfunctioned	Measure the voltage being delivered to the solenoid during operation (refer to	Replace solenoid, if defective

	Figure 1.2 - Auxiliary voltage). If good, check solenoid resistance ( $\approx 120$ ohms).	
Timer Malfunctioned	If shutter operates in manual mode but not in timed mode, timer is defective.	Replace defective timer

## PC-3D TROUBLESHOOTING

### Problem: Low output intensity

**Other symptoms: Fails to cure adhesive in allotted time**

Possible Cause	Testing	Corrective Action
Lamp Beyond Useful Life	Use a radiometer (model Dymax Accu-Cal 20) to measure actual output intensity. Consult manual for proper output.	Replace lamp if beyond useful life (typical = 1000 hours)
Transmission Loss in Light Guide Too Great	Compare light guide output against new light guide (or use the Dymax Light guide Simulator - P/N 36987) to determine transmission loss.	Replace light guide
Transmission Loss in Filter (Blue Filter at End of Light Guide) Too Great	Compare filter output against new filter to determine transmission loss.	Replace filter
Contaminants on Light Guide or Light Guide Filter	Visually examine ends of light guide and filter for contaminants.	Clean with isopropyl alcohol (or equivalent) or replace light guide/filter if it can not be cleaned.
Lamp Not Installed Properly	Visually check to make sure the lamp is seated flush in the lamp mount assembly (any error in installation could cause a low output).	Properly install lamp assembly. See Figure 1.1

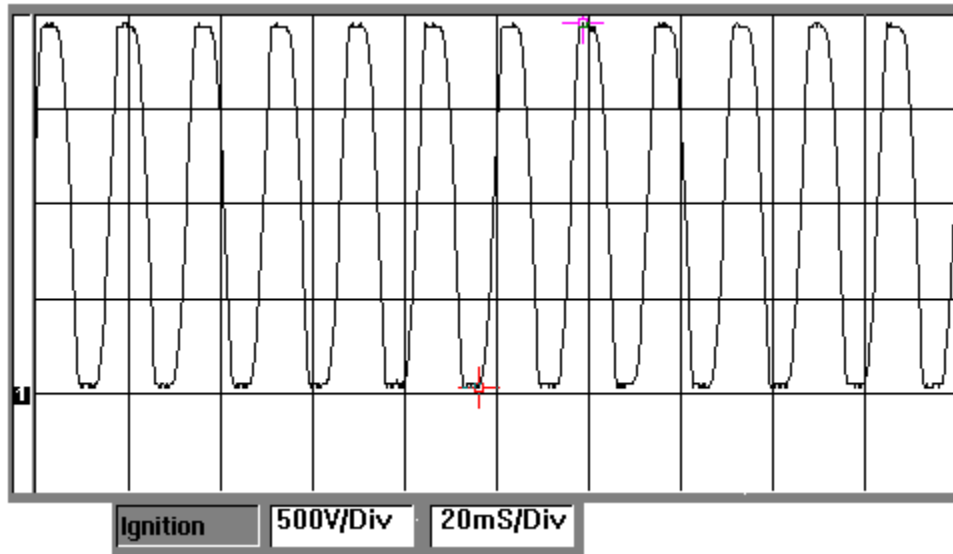
### Problem: Unit will not dispense adhesive

Possible Cause	Testing	Corrective Action
Air Line Not Connected	Check connections and source of incoming air.	Connect a 40-60 psi air source
Pressure Regulator Set on Zero (0)	Check pressure gauge for reading.	Turn the pressure regulator clockwise (CW) to increase output pressure
Plugged Air Line or Needle	Visually inspect all air-lines (internal tubing and external output tubing) for blockage.	Replace blocked tube
Dispenser Solenoid Malfunctioned	Measure the voltage being delivered to the solenoid	Replace solenoid, if defective

	during operation (refer to Figure 1.2 - Auxiliary voltage). If good, check solenoid resistance ( $\approx$ 850 ohms).	
Dispense Timer Malfunctioned	If adhesive dispenses in manual mode but not in the timed mode, timer is defective.	Replace defective timer



## PC-3D TROUBLESHOOTING



### Open circuit voltage from lamp output

**Test Configuration:** Remove Power  
Remove Lamp from Unit  
Measurement Taken Across Lamp Output from Unit

**Oscilloscope Setting:** DC Coupling  
20 ms / Div  
500V / Div  
Probe Connected Across Lamp Output (\* Use High Voltage Probe \*)

**Open Circuit Voltage:**  $\approx$  1900V peak

**PC-3D  
SPARE PARTS**

<u>Item</u>	<u>Part Number</u>
Lamp/Reflector.....	35003
Fuse: 3 Amp 250 Vac.....	35254
2 Amp 250 Vac.....	35636
5 Amp 250 Vac.....	35574
Filter (Light Guide) .....	35354
Light Guide, 1 Meter.....	35102
Solenoid Assembly.....	35928
Blocking Diode .....	35660
Adapter, 10 mL with Light Guide.....	35952

<b>PC-3D OPTIONS</b>
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<u>Item</u>	<u>Part Number</u>
Light Guide, 1/2 meter* .....	35101
Light Guide, 3 mm x 1 meter.....	36619
UV Goggles: Yellow.....	35284
Amber .....	35285
Smoke.....	35286
Face Shield .....	35186
PC-3D Accessory Kit .....	35950
10 mL Syringe Adapter Seal .....	36213
10 mL Empty Syringes.....	35329
10 mL Syringe Adapter Assembly .....	35654
30 mL Empty Syringes.....	35330
30 mL Syringe Adapter Assembly .....	35953
30 cc Syringe Adapter Seal .....	36214
Needles:15 ga. x 1/2" .....	35399
18 ga. x 1/2" .....	35400
23 ga. x 1/2" .....	35402
18 ga. x 1" .....	35287
15 ga. x 1" .....	35221
Accu-Cal 10 Radiometer.....	35191
Light Guide Simulator .....	36987

\* Longer Light Guides Also Available

## PC-3D WARRANTY

### CAUTION

DYMAX CORPORATION RESERVES THE RIGHT TO INVALIDATE ANY WARRANTIES, EXPRESSED OR IMPLIED, DUE TO ANY REPAIRS PERFORMED OR ATTEMPTED ON EC-SERIES LIGHT SOURCES WITHOUT WRITTEN AUTHORIZATION FROM DYMAX. THOSE CORRECTIVE ACTIONS LISTED BELOW ARE LIMITED TO THIS AUTHORIZATION.

#### **Light Sources:**

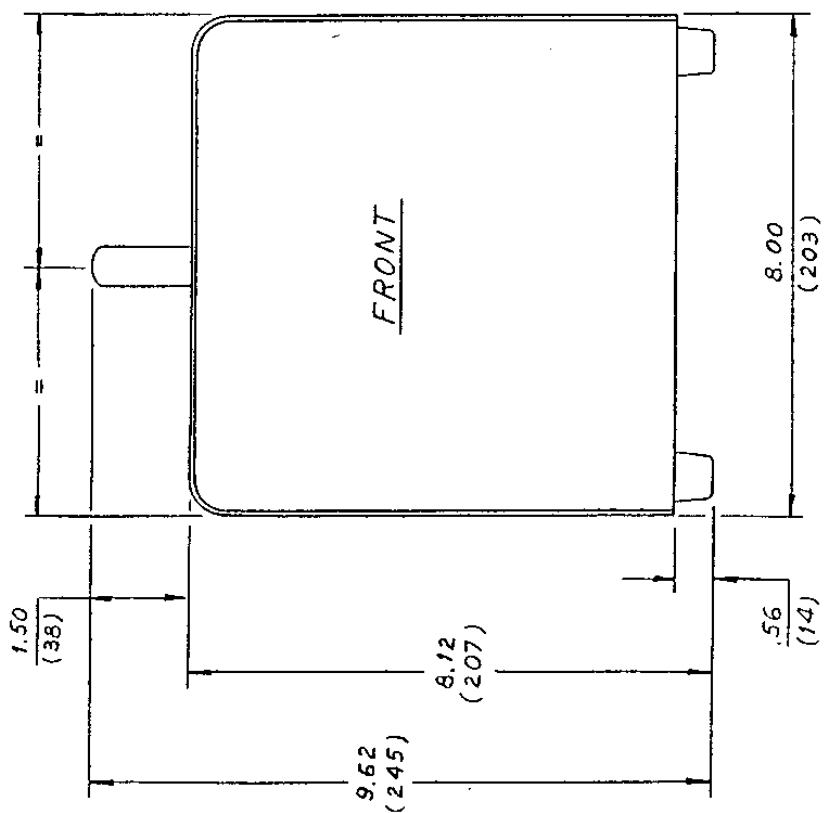
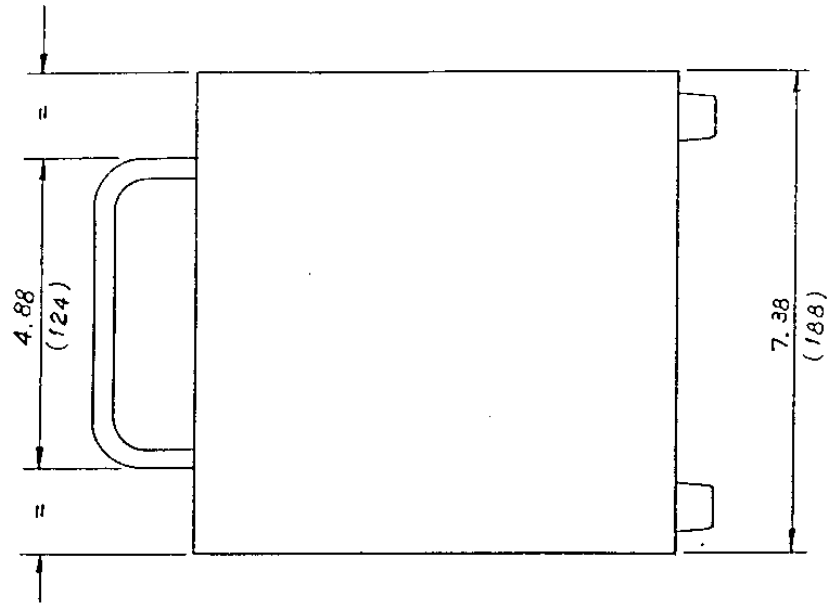
Warranty is granted for one year from the date of the equipment shipment from Dymax to the distributor or customer. The warranty start date can be extended to the date of shipment from the distributor stock to the end-user.

#### **Lamps and Lamp Assemblies:**

Warranty will be honored only if the defective lamp/reflector assembly is returned with a filled out Bulb History Record. The form will be provided with each lamp/reflector assembly.

The 50 Watt lamps/Reflector Assemblies are warranted for 500 hours of useful life. Lamps are not warranted against breakage from handling and shipping.

Many dispensing and curing system applications are unique. Dymax does not warrant the fitness of the product for the intended application. Any warranty applicable to the product, its application and use is strictly limited to that contained in Dymax's standard Conditions of Sale. Dymax recommends that any intended application be evaluated and tested by the user to insure that desired performance criteria are satisfied. Dymax is willing to assist users in their performance testing and evaluation by offering equipment trial rental and leasing programs to assist in such testing and evaluation. Data sheets are available for valve controllers or pressure pots upon request.



NOTE:  
 - DIMENSIONS ARE IN INCHES.  
 - DIMENSIONS IN PARANTHESIS ARE IN MILLIMETERS