# BlueWave® 200 Version 2.0

## UV Light-Curing Spot Lamp System

### with Patented Intensity Control Adjustment


BlueWave® 200 Version 2.0 (PN 40080 - North American/PN 40075 - International) shown with 4-Pole Lightguide

# Operation Manual

DYMAX®

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# INTRODUCTION

The enclosed BlueWave® 200 UV Light-Curing Spot Lamp System was developed and manufactured by the DYMAX team, driven by a desire to best serve your needs. Before shipping, your *BlueWave 200* was thoroughly checked and tested for trouble-free performance.

The proper set up and operation of this Spot Lamp System will maximize safety and user-friendly performance, providing optimum yield of your technological process.

**THEREFORE, WE ENCOURAGE YOU TO READ, UNDERSTAND, AND FOLLOW ALL SAFETY AND OPERATING INSTRUCTIONS AND RECOMMENDATIONS COMPILED IN THIS AND OTHER RELATED MANUALS** prior to setting up and operating this new Spot Lamp System or its individual components.

**Par conséquent, nous vous encouragez a lire, comprend, et suivre tout sécurité et instructions d'opération et conseillations rédiger dans cette et autre manuels etablir** un lien avant de mettre en place et de faire marcher cette nouveau système de lampe de tache ou cettes composants individuel.

If you encounter a problem, have any questions, or would like to help us with your suggestions or recommendations, please contact our Applications Engineering or Customer Service Departments. Trained DYMAX professionals are standing by to serve you.

Si vous rencontrez un problème, avait n'importe de questions, ou si vous voudrez de nous aider avec tes suggestions ou conseillations, s'il vous plait contacte notre departements technique ou service client. DYMAX formé professionals attendre a vous servir.

# UNPACKING AND INSPECTION

Upon receipt of the unit, carefully remove the contents from the boxes and check for damage. **DYMAX is not responsible for damage from shipping – all claims for shipping damage should be made with the carrier.**

Check all boxes for contents and write down any serial numbers for further reference. You may wish to retain the original shipping cartons in case you need to repackage any item for return.

If you observe or experience any problem with your equipment, notify DYMAX Customer Service, your authorized distributor, or your DYMAX representative immediately.

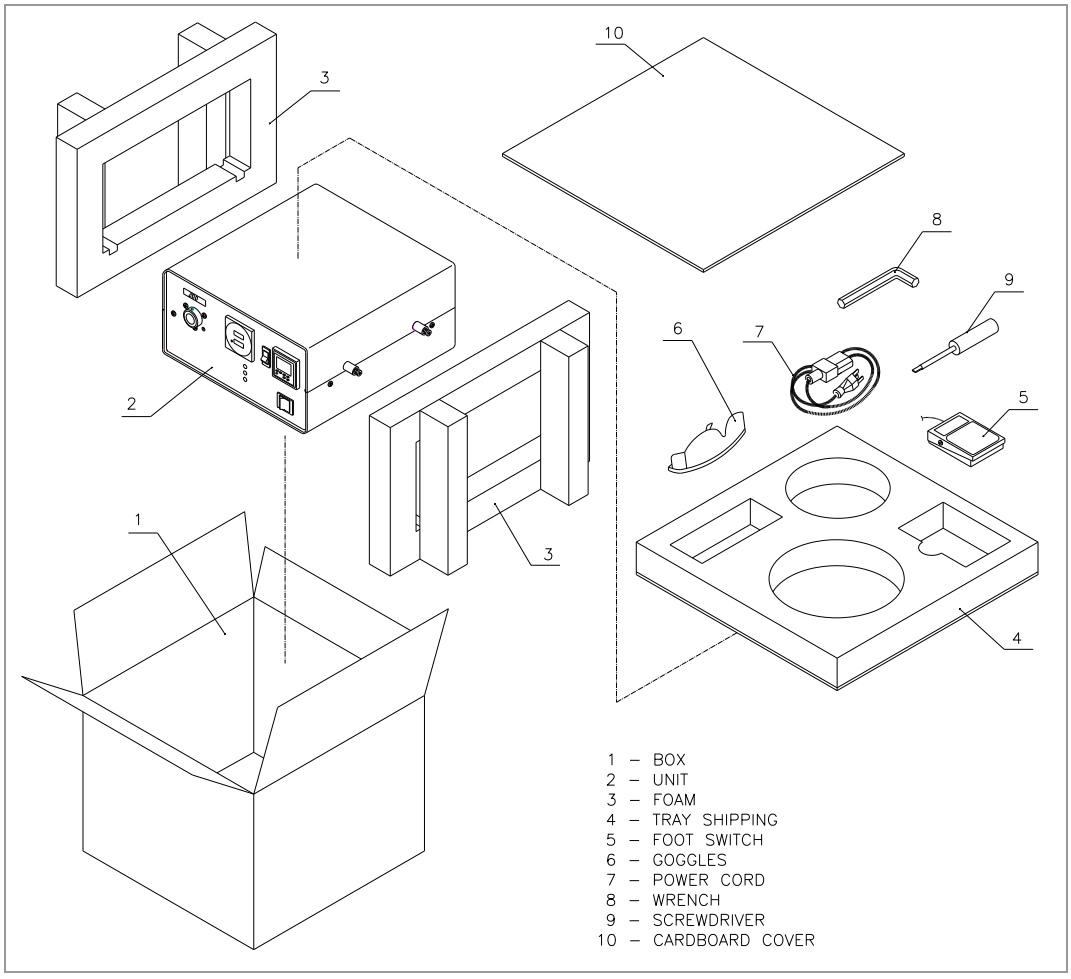


**Figure 1.** BlueWave® 200 (PN 40075 & PN 40080) Unpacking Diagram

**NOTE: Lamps are shipped with the Bulb/Reflector installed.**

**NOTE: Report any shortage to DYMAX Customer Service.**

Before continuing with unpacking and installation, please read the following chapters of this manual for safety recommendations, installation, operating, and troubleshooting instructions.

**CAUTION! Always wear protective goggles or face shield when working near the front of the unit, which emits UV light! The rear of the unit also emits stray UV light.**

**WARNING! Always observe safety requirements!**

**CAUTION! Risk of electrical shock if cover is removed!**

**CAUTION! Cover is warm to the touch when unit is in operation!**

**PRÉ-CAUTION! Toujours faisez de l'usage des lunettes de protection ou protéger de visage marche près du devant d'élément!**

**AVERTISSEMENT! Remmarquez toujours besoin de sécurité!**

**PRÉ-CAUTION! Risque de décharge électrique quand le couvert est enlever!**

**PRÉ-CAUTION! Le couvert est chaud a le touche quand l'élément est en opération!**

**ACHTUNG! Tragen Sie immer eine Sicherheitsbrille oder einen Gesichtsschutz, wenn Sie nahe an der UV Lichtquelle arbeiten. Die Rückseite des Gerätes emittiert gestreutes UV Licht!**

**WARNHINWEIS! Bitte beachten Sie immer die Sicherheitshinweise!**

**ACHTUNG! Gefahr eines Stromschlages bei geöffnetem Gehäuse!**

**ACHTUNG! Gehäuse erwärmt sich während des Betriebs: Vorsicht bei Berührung!**

## SAFETY

Equipment is designed to be used properly set up, with components correctly connected, and operated in accordance with relevant instructions. The system's design was developed to maximize operator safety and minimize exposure to UV.

**SAFETY RECOMMENDATIONS:**

- Use the goggles provided or a face shield approved for UV protection to protect your eyes.
- Long-sleeved shirts or a lab coat are recommended to protect the arms and use of UV-opaque gloves will protect the hands.

**NOTE**: With the internal Filter installed, the BlueWave® 200 emits UVA and visible light. Never look directly at the light source while the unit is on.

**SÉCURITÉ**

L'équipment ètre concu pour ètre utilisé correctement constituer, avec composants brancher correctement, et marché en conformément avec instructions important. Le plan étais developer pour render au maxime opérateur sécurité et minimiser exposition à ultraviolette.

**RECOMMANDER DE SÉCURITÉ:**

- Emploi lunettes ou un protéger de visage pour protection de ultraviolet pour protéger vous oeux.
- Chemises à manche long ou manteau de labo sont recommander pour protéger les bras, et utilisation de ultraviolette gants opague vais protéger les mains.

**REMARQUER:** avec le filtre intérieur installé, l'Onde Bleu émettre UVA et lumière visible. Ne jamais regardez directement à la source de lumière pendant que l'élément est en opération.

**SICHERHEITSHINWEISE**

Dieses Gerät wurde so entwickelt, dass es nur vollständig, alle Komponenten korrekt miteinander verbunden, in Übereinstimmung mit relevanten Instruktionen betrieben wird. Bei der Entwicklung wurde weiterhin großen Wert auf die Benutzersicherheit und minimale UV Belastung gelegt.

**SICHERHEITSHINWEISE:**

- Tragen Sie immer die mitgelieferten Sicherheitsbrille oder speziellen Gesichtsschutz, der Ihre Augen vor UV Licht schützt.
- Wir empfehlen Langarm - Hemden oder einen Laborkittel zu tragen, um die Arme zu schützen. Für die Hände empfehlen wir UV- geblockte Handschuhe.

**BITTE BEACHTEN SIE:** Durch den installierten inneren Filter strahlt die *BlueWave 200* UVA und sichtbares Licht aus. Schauen Sie deshalb niemals direkt in die Lichtquelle, wenn das Gerät angeschaltet ist.

## DYMAX UV LIGHT-CURING SYSTEM SAFETY CONSIDERATIONS

DYMAX UV light-curing technology has been used successfully for over 30 years. The fast cure, one-component nature of our UV light-curing technology has made it the process of choice for many manufacturers requiring a cure on demand assembly process. There are four common questions/concerns related to UV light-curing systems: UV exposure, high-temperature surfaces, ozone, and bright, visible light.

**UV EXPOSURE**

Standard DYMAX UV light-curing systems and bulbs have been designed to primarily emit UVA light (as shown in Chart 1). UVA light is generally considered the safest of the three UV ranges: UVA, UVB, and UVC. Although OSHA does not currently regulate ultraviolet light exposure in the workplace, the American Conference of Governmental Industrial Hygienists (ACGIH) does recommend Threshold Limit Values (TLV′s) for ultraviolet light. The strictest interpretation of the TLV (over the UVA range) for workers' eyes and skin is 1 mW/cm$^2$ (intensity), continuous exposure. Unless workers are placing bare hands into the curing area, it is unusual to exceed these limits. To put 1 mW/cm$^2$ limit into perspective, cloudless summer days in Connecticut regularly exceed 3 mW/cm$^2$ of UVA light and also include the more dangerous UVB light (primarily responsible for sun tans, sun burns, and skin cancer) as well.

The human eye can not detect "pure" UV light, only visible light. A radiometer should be used to measure stray UV light to confirm the safety of a UV light-curing process. A workstation that exposes an operator to more than 1 mW/cm$^2$ of UVA continuously should be redesigned.

UV light-curing of adhesives can be a regulatory compliant, "worker-friendly" manufacturing process when the proper safety equipment and operator training is utilized. There are two ways to protect operators from UV exposure: shield the operator and/or shield the source.

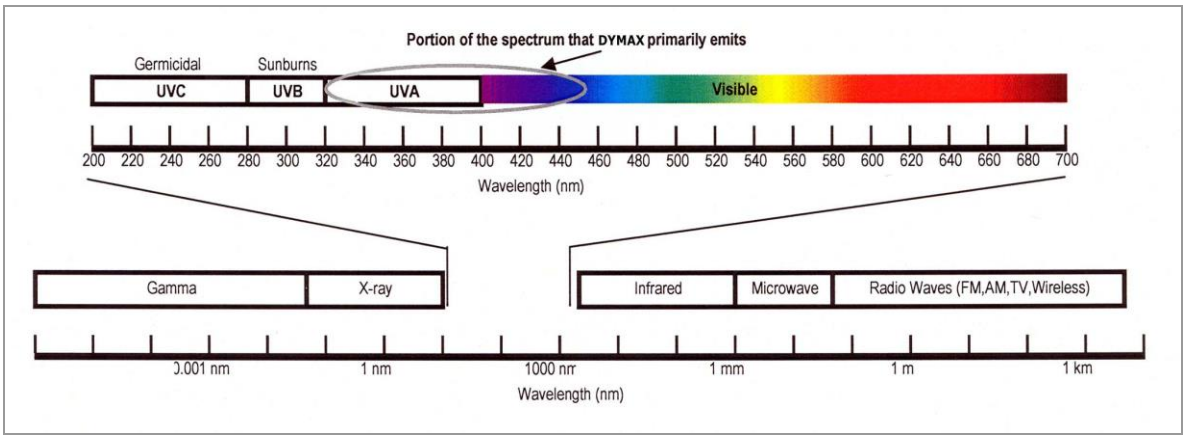


**Chart 1.** Light Spectrum

## SHIELD THE OPERATOR

- **UV-Blocking Eye Protection** – UV-blocking eye protection is recommended when operating UV light-curing systems. Both clear and tinted UV-blocking eye protection is available from DYMAX.

- **UV-Blocking Skin Protection** – Where the potential exists for UV exposure upon skin, opaque, UV-blocking clothing, gloves, and full-face shields are recommended.

## SHIELD THE SOURCE OF UV

Any substrate that blocks UV light can be used as a shield to protect workers from stray UV light. The following materials can be used to create simple shielding structures or blind corners:

- **Sheet Metal** – Aluminum, steel, stainless steel, etc. Sheet metal should be coated black or black anodized to minimize reflection of UV and visible light toward operators.

- **Rigid Plastic Film** – Transparent, UV-blocking plastics (typically polycarbonate or acrylic) are commonly used to create shielding where transparency is also desired. These rigid plastic films are available either water-clear or tinted.

- **Flexible Film** – UV-blocking, flexible urethane films can be used to quickly create workstation shielding. This UV-blocking, flexible urethane film is available from DYMAX.

## HIGH-TEMPERATURE SURFACES

Surfaces exposed to high-intensity curing lights will rise in temperature. The intensity, distance, exposure time, cooling fans, and the type/color of the surface can all affect the actual surface temperature. In some cases, exposed surfaces can reach temperatures capable of producing a burn or causing damage to a substrate. In these cases, care must be taken to ensure a more moderate surface temperature or appropriate protection and training for operators.

## OZONE

Standard DYMAX bulbs (UVA type) generate an insignificant amount of UVC and therefore essentially no ozone. Some UV light-curing systems, like those used to cure UV inks, emit primarily “shortwave” (UVB and UVC) energy. Upon exposure to UVC light (specifically <240 nm), oxygen molecules ($O_2$) split into oxygen atoms (O) and recombine with $O_2$ to create ozone $O_3$. The current, long-term ozone concentration limit recommended by ACGIH, NIOSH, and OSHA is 0.1 ppm (0.2mg/m$^3$).

**BRIGHT, VISIBLE LIGHT**

The bright, visible light emitted by some UV light-curing systems can be objectionable to some workers and can cause eyestrain. Tinted eye protection and/or opaque/tinted shielding can be utilized to address this concern.

**SUMMARY**

UV light sources can be more "worker friendly" than many commonly accepted industrial processes, provided the potential concerns are addressed. Contact your DYMAX representative for information regarding the proper use of DYMAX UV light-curing systems.

# DESCRIPTION

The BlueWave® 200 is a high-intensity UV light-curing Spot Lamp System used for small area curing of adhesives, coatings, and potting materials. It emits up to an 8-mm diameter spot of UV light from a liquid Lightguide (sold separately). The Lightguide is hand-held for complete mobility or can be clamped into position on assembly equipment or workstations for repetitive operations.

**WARNING**: Engage the Lightguide in the Bezel before the light is turned on, and remove the Lightguide from the Bezel only after the light is turned off to avoid the possibility of exposure to the light. Lightly tighten the setscrew for safety.

**AVERTISSEMENT:** Engager le guide de lumière dans le biseau avant la lumière est allumer, et enlève le guide de lumière de le biseau seulement après la lumière est fermer pour éviter la possiblité d'exposition à la lumière. Reserrer doucement la vis pour sécurité,

The system consists of an anodized aluminum housing containing an electronic Power Supply, Circuit Protection, Bulb/Reflector Assembly, Internal Light Filter for extended Lightguide life, thermostatically-controlled Cooling Fan, Lightguide Mount, Bulb and Unit Status Indicator Lights, combination resettable and non-resettable Hour-Meter, and Shutter. The Shutter is supplied with a timed and manual operation mode.

The Power Supply operates on line voltages between 100 and 240 VAC, and frequency between 50 and 60 Hz. The Power Supply is auto-ranging and is specially designed to provide proper rated voltage and current to the 200 Watt Lamp.

A Cooling Fan with a control loop is provided to keep the Lamp Housing and internal components of the Power Supply at the optimum operating temperature. The Cooling Fan must not be covered or otherwise blocked.

The UV source is a 200-Watt, medium-pressure arc metal halide Bulb mounted in a Reflector and focused to provide optimum light output. The unit is rated for continuous operation. The Bulbs used to power all high-intensity UV light-curing Spot Lamps degrade with use. Intensity, therefore, decreases as the Bulb ages. Using the *Blue Wave 200's* intensity control feature, users can eliminate this variation by manually increasing intensity to offset this degradation. During operation a user can adjust the output intensity using a tool or removable knob. The Blue Indicator Light, above the Bezel, lights when the Bulb is operating. If the Bulb extinguishes due to a momentary power failure, the unit must be turned off, allowed to cool, and then restarted to re-ignite the Bulb. A Change Bulb Indicating Light turns on when Bulb replacement is required.

A Thermal Shutdown Sensor is provided for internal temperature control of the unit. A Cover-Closed Switch and Lightguide Sensing Switch add to the safety of the unit. Fan Filters should be changed or cleaned frequently to prevent blockage and reduced ventilation airflow. Electric Shutters are supplied with timed and manual Shutter operating modes.

# SPECIFICATIONS

| | |
|---|---|
| **Part Number** | **PN 40080** – North American Version (with 115V standard plug)<br>**PN 40075** – International Version (with no plug) |
| **Intensities** | **Total** (280-450) 40+ W/cm$^2$<br>**Visible** (400-450 nm) 17+ W/cm$^2$<br>**UVA**[1] (320-395 nm) 17+ W/cm$^2$<br>**UVB** (280-320 nm) 7 W/cm$^2$ |
| **Power Requirements** | 100 to 240 VAC, 50 to 60 Hz, 2.5 Amps |
| **Power Supply** | Solid State, 200 Watt |
| **Bulb** | 200 Watt mercury Bulb included; replacement in less than a minute |
| **Reflector** | Elliptical; glass with diachronic coating to reflect UV and minimize IR |
| **Shutter Timer** | Digital LCD timer up to 99.99 seconds; manual or timed shutter |
| **Shutter Activation** | Footswitch or PLC |
| **I/O Port** | 15-Pin D – sub-miniature connector |
| **Signals** (PLC Integration) | **Inputs** Shutter activate, Shutter de-activate, Lamp turn on<br>**Outputs** Unit in warm-up, Lamp Lit, Unit Over Temperature, 1,950 hours, Bulb Replace 2,000 hours, Shutter Status |
| **Cooling** | Filtered, single fan arrangement; thermally controlled to maintain proper lamp temperature |
| **Operating Conditions** | Temperature range: 0 – 40°C humidity limit – non-condensing |
| **Hour Meter** | Digital LCD; Total unit operating hours (non re-settable)<br>Total Bulb hours (re-settable) |
| **Housing Dimensions** | 12.0" x 12.25" X 6.5" (30.5 cm X 31.1 cm X 16.5 cm) |
| **Weight** | 14 lbs. (6.0 kg) |
| **System Warranty** | 1 year from purchase |
| **Bulb Warranty** | 2,000 hours (no intensity warranty during 2,000 hours, only lighting) |
| **Replacement Bulb** | **PN 38465** |

[1] Measured with an EIT Spotcure Radiometer or an ACCU-CAL™ 50 Radiometer using a Lightguide Simulator and standard internal “Cool Blue” Filter.

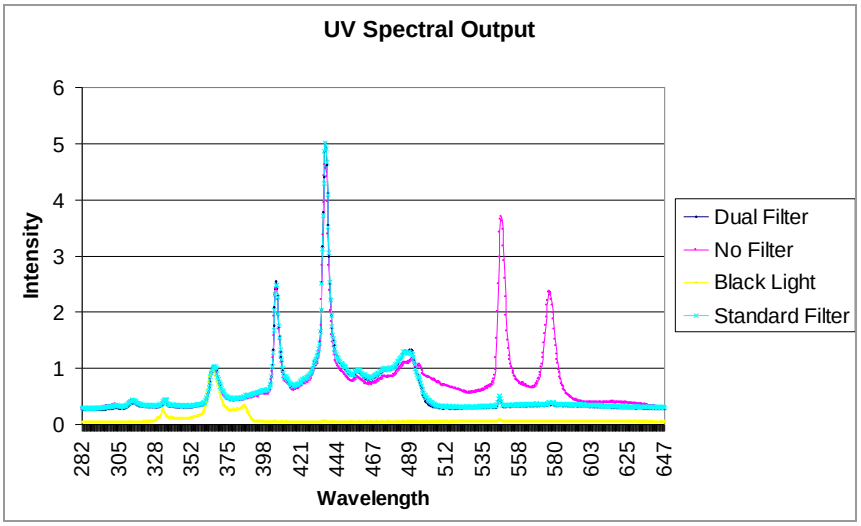


**Figure 2.** 200W Bulb Spectral Chart

# INSTALLATION AND SYSTEM INTERCONNECT

1. Connect the Power Cord to the Power Receptacle on the rear of the unit and plug the Power Cord into a grounded wall outlet.

2. Connect the Footswitch to the Footswitch Connection (Figure 3) in the rear of the unit. A ground stud is provided on the back of the unit if additional grounding is desired.

3. Remove the protective cover from the *BlueWave® 200's* Lightguide Mount (Figure 4).

   **NOTE:** Always have a Lightguide or the protective cap engaged in the Lightguide Mount. UV light can escape when the Shutter is activated.

4. Remove the protective end caps from the Lightguide. Visually inspect the two ends of the Lightguide to verify that no foreign material is present. The ends of a DYMAX liquid-filled Lightguide can be cleaned with isopropyl alcohol as required to remove foreign material and deposition from outgassing.

5. Insert the large end of the Lightguide into the Lightguide Mount until it snaps into place (Figure 5). A Blue Lightguide Seated Indicator Light illuminates when the Lightguide is properly installed and the unit is turned on.

6. If desired, the Lightguide may be fastened into place by lightly tightening the securing setscrew installed in the Lightguide Mount (Figure 6). A hex wrench is provided with the *BlueWave 200* for this purpose. The setscrew should be tightened gently to prevent damaging the Lightguide.

   **NOTE:** Multi-leg Lightguides should be balanced by rotating the Lightguide to obtain the desired UV intensity of each leg before tightening the setscrew.

4. Turn the *BlueWave 200's* Power Switch on.

5. Allow the Bulb to warm up. The unit is warmed-up when the blue Unit Ready Indicating Light is illuminated. Two beeps will sound. The Shutter is inoperable until the warm-up is complete and a Lightguide is installed.

   **CAUTION:** This is an arc, not a filament Bulb. Once ignited, it must be left on for a minimum of 10 minutes to fully vaporize elements in the Bulb. If not, the Bulb may be difficult to re-ignite. Each re-ignition increases the rate of Bulb degradation.

   **NOTE:** The Bulb must cool before it can be re-ignited. Turn the unit off and allow 5 to 10 minutes for it to cool down. If the Bulb fails to ignite, refer to the Troubleshooting Section of this manual. Bulb life is reduced each time the unit is switched on and off. Avoid repeated cycles that shorten Bulb life by leaving unit on through breaks.

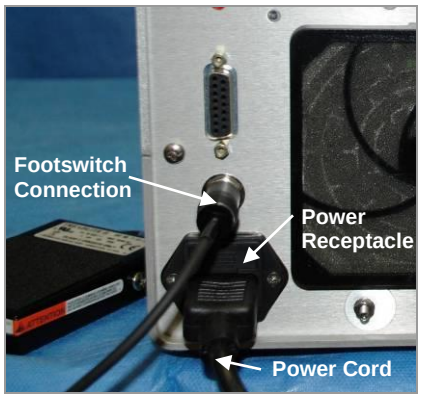


**Figure 3.** Cable Connection, *BlueWave 200* Rear Panel

**Figure 4.** Lightguide Mount Protective Cover Installed (left); Protective Cover Removed (right)

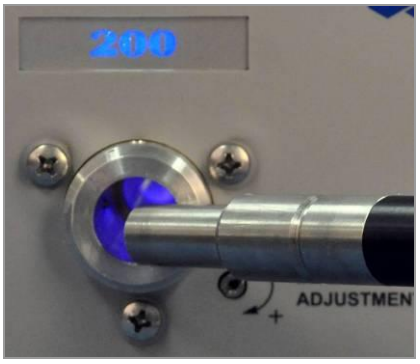


**Figure 5.** Insert Lightguide into Lightguide Mount


**Figure 6.** Tighten Setscrew on Lightguide Mount with Hex Wrench

6. Operate the Shutter by pressing the Footswitch. With the Shutter Selector Switch in the manual position, the Shutter operates directly from the Footswitch. In the timed position, the Shutter opening is determined by the setting on the electronic Timer. Simply push the Timer Setting Buttons to enter the desired number of seconds the Shutter is to remain open.

7. With the Shutter open, adjust the Intensity Adjustment Screw as required to achieve the desired output intensity (Figure 7).

# SETTINGS AND ADJUSTMENTS

### INTENSITY ADJUSTMENT

The Bulbs used to power all high-intensity UV light-curing spot lamps degrade with use. Intensity, therefore, decreases as the Bulb ages. Using the BlueWave® 200's patented Intensity Adjustment feature, users can eliminate this variation by manually increasing output intensity to offset this degradation.

The intensity can be adjusted with a tool (Figure 7) or a removable knob (Figure 8). This feature is useful for both validation and control.


**Figure 7.** Intensity Adjustment with Tool


**Figure 8.** Intensity Adjustment with Knob

### INTENSITY VALIDATION

Prior to production, DYMAX advises customers to conduct testing to determine the time and intensity required to fully cure their resin in their specific application. Typically, users validate by one of the following methods:

- **Set Exposure Time, Determine Intensity -** Users can specify a cure time and through empirical testing, determine the intensity required to achieve full cure. As with any manufacturing process, it is advisable to incorporate a safety factor.

- **Set Intensity, Determine Exposure Time -** Users can specify intensity and through empirical testing, determine the exposure time required to achieve full cure. As with any manufacturing process, it is advisable to incorporate a safety factor.

### INTENSITY CONTROL

Process validation confirms a minimum acceptable intensity. Users can then choose to operate at full intensity (using the excess intensity as an additional safety factor) or maintain a constant intensity through periodic manual adjustments. *BlueWave 200* Bulbs will typically vary less than 1% over eight hours of normal use and so daily or weekly adjustments are adequate to maintain a tightly controlled process. A Change Bulb Indicator Light (Figure 9) is provided to alert the operator to check Bulb operation or to change the Bulb if required.


**Figure 9.** Indicator Lights

## SETTING THE CYCLE DURATION

The Shutter Timer located on the front panel of the BlueWave® 200 is factory set to the most common operating mode and recommended operation of the Timer with the *BlueWave 200*. Some modes available on the Timer may not operate correctly with the *BlueWave 200* unit.

The Shutter Timer contains an LCD Display and Keypad. The LCD Display has a reset indicator, key protect indicator, output indicator, preset timing value, set value, and timing operation indicator. Below is a brief description of each display and location:


**Figure 10.** Shutter Timer

- **RST [Reset Indicator]** – Active when the Shutter Timer is reset by pressing the "RST" button on the lower left face of Shutter Timer.
- **K/P [Key Protect]** –Will always be lit as the function of the Shutter Timer is programmed at the factory and locked before shipment.
- **OUT [Output Indicator]** - Displayed when relay is switched on; is not displayed when relay is switched to off.
- **Timing Value** – Four-digit segmented display in center of the Shutter Timer. Shows current status of time.
- **Set Value** – Four-digit segmented display in lower right corner of the Shutter Timer. Shows set length of time.

In addition to the indicators, the Shutter Timer contains six buttons with their functions described as follows:

- **MODE** –Disabled at the factory and locked before shipment.
- **Reset Indicator (RST)** – Used to cancel out of a timed cycle. If a cycle is initiated and counting down, pressing this button will close the Shutter and reset the counter to the current preset.
- **Digit Increment 1-4**: Pressing these buttons up or down will increment or decrement that digit by one. The timer digits are formatted MM:SS for a maximum Shutter time of 99 minutes and 0.99 seconds. Consult DYMAX for information on changing the format of this Timer.

To select the time, press the appropriate up key until the corresponding digit increments in the set value. By pressing the up key labeled (1, Figure 10), it will increment the left most digit on the set value. By pressing the up key (2, Figure 10), it will increment the second digit of the set value. The same will happen with the up key

(3, Figure 10) and the third digit of the set display, and up key (4, Figure 10) and the fourth digit of the set display. The Timer will increment from 9 back to 0. The Timer comes programmed for a range of 00.01 seconds to 99.99 seconds. Consult factory for other time ranges and functions.

To operate the Timer, select the "TIMER" option on the switch on the front panel (large rocker switch left of the Timer module). Program the time into the Timer as described above and depress the Footswitch. The Shutter will open and the preset value will begin to count backward. When the Timer reaches 00.00, it will reset the value to the set value and close the Shutter. The Timer can be stopped once started by pressing the Reset Button on the lower left face of the Timer. If power is removed from unit, the Timer will reset to the set value.

## LAMP DUAL-HOUR METER

The Lamp Dual-Hour Meter (Figure 11) provides elapsed time of unit operation (top display), as well as Lamp usage (bottom display). The top display of the Lamp Dual-Hour Meter continues to count hours of operation on the unit and cannot be reset. The lower display reflects the total number of hours on the Bulb; Bulb hours should only be reset when a new Bulb is installed. Instructions for Bulb replacement may be found in this manual as well as being located on the sticker under the unit cover next to where the Bulb is located.

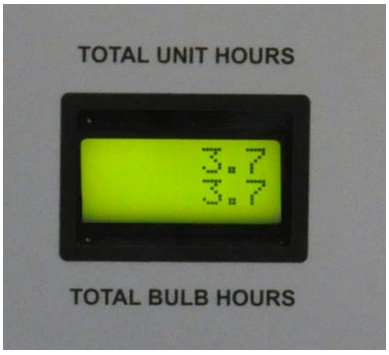


**Figure 11.** Lamp Dual-Hour Meter

When the lower display on the Dual-Hour Meter reaches 2,000 hours, the Bulb will turn off and Hour Meter will alternate between “CHANGE BULB” and "2000.0". The unit will not operate until a new Bulb is installed.

**WARNING:** Operating the Lamp beyond 2,000 hours may result in non-passive failure of the Lamp!

## BULB REPLACEMENT PROCEDURE

Bulb replacement is easily accomplished by following the steps below. Refer to the labeled diagrams under the light source cover.

1. Ensure that the Power Cord is unplugged from the rear of the unit.

2. Remove the top cover from the BlueWave® 200 by loosening the four cover fasteners.

3. Unplug the Bulb and Lift the Bulb Mounting Bracket (Figure 13) from it. Remove the Bulb from the Bulb Mount (Figure 14).

**Figure 12.** Bulb Installed in Bulb Mount

**Figure 13.** Lift Bulb Mounting Bracket

**Figure 14.** Remove Bulb from Bulb Mount

4. Unpack the new Bulb. Take care not to bend the flat Electrode in the center of the Bulb.


**Figure 15.** Bulb Package (Closed)


**Figure 16.** Bulb Package (Open)

**Figure 17.** Remove Bulb from Box

**Figure 18.** Bulb

5. Install the new Bulb into the unit (Figure 19), plug the Bulb in (Figure 20), and tighten the two Mounting Bracket Thumbscrews (Figure 21). Re-install the BlueWave® 200's cover. Make sure that the center Electrode is positioned as shown in Figure 21.

**Figure 19.** Install Bulb

**Figure 20.** Plug in Bulb

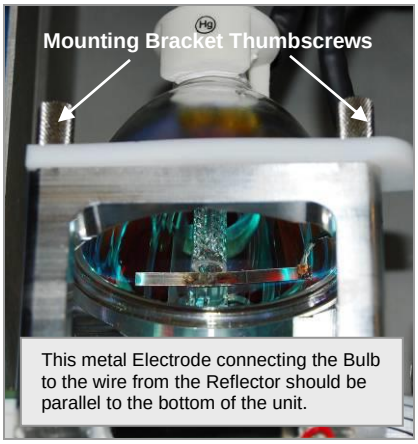


**Figure 21.** Bulb Electrode

**Figure 22.** Reset Button

6. Plug in and turn on the *BlueWave 200*. Press and release the red Reset Button on the back of the unit (Figure 22).This completes Bulb installation. When the unit is turned on, the Bulb will now ignite and is now reset to operate for 2,000 hours.

   **NOTE:** If the Bulb does not light, repeat instruction 5 to verify all steps were done correctly.

7. Allow the Bulb to warm up. The unit's warm-up is complete when the Unit Ready Indicator Light illuminates. The unit will also sound a double beep when the warm-up is complete.

   **NOTE:** The Shutter is inoperable until the warm-up is complete and a Lightguide is installed.

8. The unit is ready for use.

## OPERATION

The *BlueWave 200* will arrive almost fully assembled. Please refer to the Installation and Interconnection Section for instructions on installation of the Lightguide, Power Cord, and Footswitch. The system should be positioned in a dry location that does not obstruct airflow from the rear of the unit.

**IMPORTANT:** To ensure proper operation of the Shutter, be sure to completely insert the Lightguide into the Lightguide Mount prior to

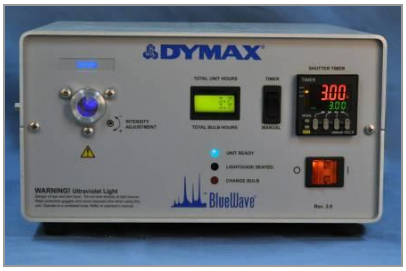


**Figure 23.** BlueWave Front Plate

tightening the setscrew. Be sure to lightly tighten the setscrew to ensure the Lightguide remains in place during use.

To energize the system turn the Power Switch from the “O” position to the “I” position; Fan, Hour Meter, Timer, and 200 Watt Lamp should begin to function. This can be confirmed by viewing the illuminated “200” nameplate above the Lightguide Mount (Figure 24). Before operating unit, allow the 200 Watt Lamp to complete the warm-up cycle.


**Figure 24.** 200 Nameplate (Not illuminated)

**CAUTION:** Always wear protective goggles or face shield when working near UV light. Never look directly at the light exiting the Lightguide.

**PRE-CAUTION:** Toujours porte lunettes de protection ou protéger de visage en travaillant près lumière ultraviolette. J’amais regarde directement à lumière sortie de le guide de lumière.

Position the Lightguide end no closer than ¼" from material being cured. Locating the Lightguide end too close can cause the Lightguide end to become cloudy from vapors coming off of curing material. This cloudiness can reduce UV output by as much as 50%.


**Figure 25.** Intensity Adjustment Knob

Bulb life is reduced each time it is started. To avoid premature Bulb deterioration, leave the unit on through breaks, short shutdowns, and lunch hours. These UV light sources are designed for continuous operation. If the power is momentarily lost, shut the unit “off” and let it cool down for 5 to 10 minutes then switch back “ON” and wait for warm-up.

As the Bulb degrades, some adjustment may be needed to the Lamp intensity. To use the patented Lamp Intensity Adjustment, the Intensity Adjustment Knob must be installed. This knob installs into the Intensity Adjustment Screw as shown in Figure 25.

## 15-PIN CONNECTOR I/O SIGNALS

**Figure 26.** 15-Pin I/O Signals

The BlueWave® 200 is equipped with a 15-Pin D-Subminiature Connector (Figure 26) that provides interface between the *BlueWave 200* and PLC and similar factory control equipment. The following discussion will describe inputs and outputs, their properties and how to use them.
**Input signals:**

**Pin 1 – User Supplied +24 VDC**

**Pin 2 – User Supplied 24 Volt Common**

**Pin 3 – Remote Shutter Activate (activate low):** This signal line may be used to remotely open the *BlueWave 200's* Shutter. When it is being used, the local Shutter Enable Jack on the rear of the *BlueWave 200* is still capable of opening the Shutter. The Shutter will stay open for the duration of the remote Shutter activate signal. The Shutter is opened when Pin 3 of the DSUB15 connector is low (0 VDC). When Pin 3 is high, the Shutter is closed. The position of the timed/manual mode has no effect on this input. The Timer will not be activated by this input.

**Pin 4 – Remote Shutter De-Activate (active low):** This signal line may be used to remotely prevent the Shutter of the *BlueWave 200* from being open under any circumstances. Bringing Pin 4 low (0 VDC) will deactivate the Shutter. The unit will not respond to the Footswitch.

**Pin 5 – Remote UV Lamp Turn On (active low):** With the main AC switched on and the PLC (Pin 6) enabled, this input is used to remotely power up the Bulb Supply. Until this input is grounded, the unit will be in "standby" mode – indicated by the Unit Ready Indicator Light.

**Pin 6 – Remote PLC Enable:** The user must supply 0 VDC to enable remote UV Lamp turn on.

**Output signals:**

The output signals are all opto-isolated signals; active low

**Pin 7 –** Unit Ready (active low) Indicates unit ready for operation.

**Pin 8 –** Indicates Lamp Lit (active low when lamp lit)

**Pin 9 –** Indicates Shutter Fault (low) during fault

**Pin 10 –** Indicates Temperature Fault (low during fault)

**Pin 11 –** Indicates 1,950 Hours (active low)

**Pin 12 –** Bulb Replace. Indicates 2,000 hours (active low).

**Pin 13 –** AC Power ON (active low)

**Pin 14 –** Lightguide Inserted (active low)

**Pin 15 – Shutter Status:** Shutter open is indicated by an active low signal.

Figure 27 shows the suggested relationship for both inputs and outputs between the BlueWave® 200 and a PLC system. The component values shown are appropriate for a 24 VDC PLC power supply to limit current flow to safe levels for the opto-coupler devices within the *BlueWave 200*.

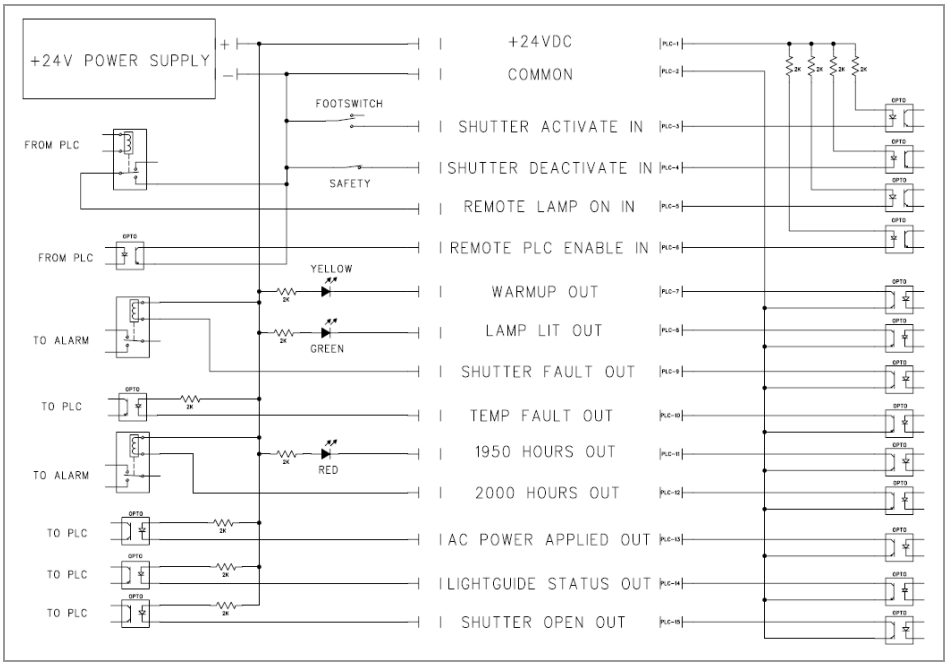


**Figure 27.** 15-Pin I/O Signals

# MAINTENANCE

The BlueWave® 200 was designed to operate with minimum maintenance. Follow the schedule below to assure top performance from the unit.

### LIGHTGUIDE

Clean the ends of the Lightguide monthly or as required. The ends of the Lightguide should be kept clean to transmit as much light as possible. Cured adhesive can be removed with a razor blade. Avoid sharp bends with the Lightguide since this reduces light output and damages guide.

### FAN FILTERS

The external Fan Filters should be inspected and cleaned periodically to prevent dust buildup from affecting airflow through the unit. Spare Fan Filters are provided with each unit and with replacement Bulbs. The Fan Filters are washable and may be reused. Remove the Fan Filter by removing the snap-on cover from the rear of each grill.

**Figure 28.** Exhaust Fans with Fan Filters Removed

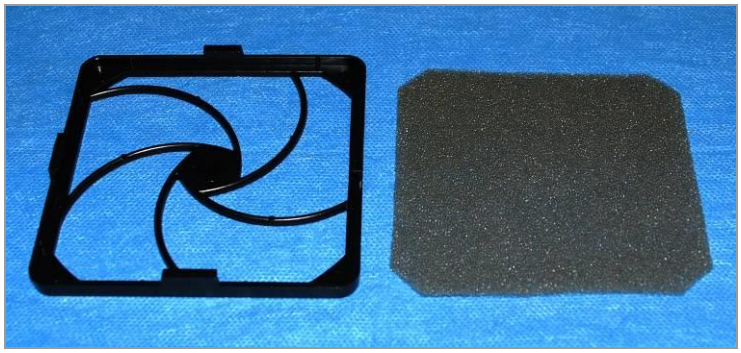

**Figure 29.** Disassembled Fan Filter

### FUSE REPLACEMENT

The unit has two Fuses that are installed in the Power Receptacle. To remove the Fuses, unplug the unit and remove the Fuse Holder with a small screwdriver. Remove the Fuses from the Fuse Holder and install new Fuses. Replace the Fuse Holder into the Power Receptacle. The correct Fuses are DYMAX PN 37869, 4.0 Amp fast-acting type.

**Figure 30.** Power Receptacle

**Figure 31.** Fuse Holder

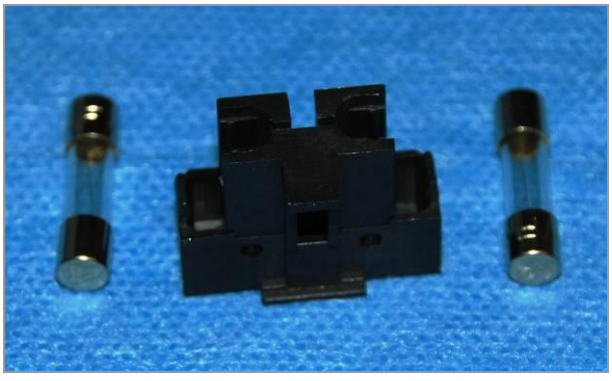

**Figure 32.** Fuses Removed from Holder

# TROUBLESHOOTING

**WARNING:** Only qualified maintenance personnel should attempt the following procedures:

**AVERTISSEMENT:** Seulement personnel d'entretien diplomé devrais essayer les procedures suivant.

| Problem | Possible Cause | Testing | Corrective Action |
|---|---|---|---|
| **Bulb Will Not Ignite** | Improper connections | Visually inspect all input/output connections (i.e. Power Cord, Bulb). | Secure all connections. |
| | Bulb beyond useful life of 2,000 hours | Replace with a new Bulb/ Reflector Assembly. Reset the Bulb Hour Meter and re-test unit. | Replace the Bulb/Reflector Assembly if required (typical life = 2,000 hours). |
| | Main line Fuse blown (nothing in unit operates) | Remove the Fuse from the Power Receptacle and check it with an Ohmmeter. | Replace the Fuse if defective. |
| **Low Output Intensity**<br><br>**or**<br><br>**Fails To Cure Adhesive In Allotted Time** | Bulb beyond useful life | Use a Radiometer (DYMAX ACCU-CAL™ 50 or equivalent) to measure output intensity. | Replace the Bulb/reflector assembly if beyond useful life (typical = 2,000 hours). |
| | Transmission loss in Lightguide too great | Compare Lightguide output against new Lightguide (or use the DYMAX Lightguide Simulator) to determine transmission loss. | Replace the Lightguide. |
| | Contaminants on Lightguide | Visually examine ends of Lightguide for contaminants. | Clean with isopropyl alcohol (or equivalent). Heavy deposits on liquid Lightguides may be removed with a razor blade. Replace Lightguide if it can not be cleaned. |
| | Bulb/Reflector Assembly not installed properly | Visually check to make sure the Bulb/Reflector Assembly is seated flush in the Bulb Mount Assembly (any error in installation could cause a low output). | Properly install Bulb/Reflector Assembly. |

# FREQENTLY ASKED QUESTIONS

**Q.) My BlueWave® 200 will not turn on.**

A.) Check the Power Cord connection.

B.) Check the Fuses located where the Power Cord plugs into the unit.

**Q.) The blue lens on the front panel does not light.**

A.) This signifies the Bulb has not ignited. Check that the Power Cord and Bulb connections are secure.

**Q.) The Bulb will not ignite; it only "flickers".**

A.) Replace the Bulb. Excessive power cycling will shorten the life expectancy of the Bulb. This is an arc, not a filament Bulb. Once ignited, it must be left on for a minimum of 10 minutes to fully vaporize elements in the Bulb. If not, the Bulb may be difficult to re-ignite. Each re-ignition increases the rate of Bulb degradation.

**Q.) I installed a new Bulb, and it still will not ignite.**

A.) The *BlueWave 200* has a safety shutdown feature at 2,000 hours. If the equipment has reached the safety shutdown point, the Hour Meter will alternate between "CHANGE BULB" and "2000.0" and the Bulb will not light. When this happens, the *BlueWave 200* will no longer supply an ignition voltage until a new Bulb is installed and the Reset Switch is pressed on the back of the unit. The power must be on for this reset to be performed. The Reset Switch should always be pressed whenever a new Bulb is installed and a Bulb should never be operated after it reaches the 2,000 hour life expectancy.

B.) Check and make sure the Bulb Connector is fully seated into the Igniter.

**Q.) Why do I have low intensity, even with a new Bulb?**

A.) Standard *BlueWave 200* units have a Filter Lens installed, which filters the light before it reaches the Lightguide. The light intensity will be decreased as the light that passes through the filter is restricted by dust and debris.

B.) The intensity is being checked too early. The 200 Watt Bulb will not reach full intensity until five minutes after initial power up.

C.) The Lightguide may not be fully seated into the Lightguide Mount.

D.) The end of the Lightguide may have a build-up of adhesive. Carefully remove with isopropyl alcohol or use a razor blade for heavier deposits.

E.) The condition of the Lightguide will also affect the intensity. All Lightguides degrade with time, but intensity will also drop if the Lightguide is bent or compressed. The intensity reading from the Lightguide should be compared to the intensity reading from a Lightguide Simulator to determine the efficiency.

F.) Incorrect installation of the Bulb. Bulb orientation is vital during the installation of the Bulb. Refer to the Bulb installation instructions supplied with all new 200 Watt Bulbs for the proper installation procedure.

**Q.) My Footswitch is not operating.**

A.) Check the connection of the Footswitch into the unit.

B.) Check that the Lightguide is fully installed and that the Lightguide Seated Indicating Light is on.

**Q.) What causes my Shutter to hesitate to open when I activate my Footswitch?**

A.) Maintaining clean equipment and a clean working environment will help prevent the build up of dust and other debris from collecting on the mechanical parts of the BlueWave® 200. Debris that settles in the piston well (adjustment screw) can hinder the movement of the Shutter Solenoid Piston.

B.) Shutter alignment to Reflector Mount incorrect.

C.) The Shutter is a mechanical part which may wear after extended use.

D.) Incorrect alignment of the Shutter to the Bulb Mount Assembly.

**Q.) Why does my shutter sometimes hesitate to close?**

A.) This problem may also relate to the cleanliness of the working environment. Dust and debris can collect and cause the Shutter to work improperly.

B.) Shutter alignment to Reflector Mount incorrect.

C.) The Shutter is a mechanical part which may wear after extended use.

D.) Incorrect alignment of the Shutter to the Bulb Mount Assembly.

**Q.) Why does my *BlueWave 200* seem to run very hot?**

A.) Replace the Fan Filter Media on the Exhaust Fan and vent located in the back of the equipment. This is your first line of defense against airborne dust and debris. The Fan Filter Media is supplied with new Bulbs and should be changed regularly.

B.) Idea operation of this equipment suggests at least 12" of clearance behind the unit for proper ventilation. Confirm that the Intake Fan is not feeding from the exhaust of other equipment.

C.) Confirm both Intake and Exhausts Fans are operating.

D.) Equipment may already be full of dust and debris; over heating the internal electronics.

## SPARE PARTS

| ITEM | PART# |
|---|---|
| Bulb/Reflector Assembly | 38465 |
| Clip, Reflector Upper (PTFE) | 38548 |
| Clip, Spring, Lower | 39609 |
| DC Power Supply +/- 12 VDC | 39426 |
| Fan 24 VDC | 39758 |
| Fan Filter Media | 38659 |
| Fan Filter and Holder | 38587 |
| Feet (Rubber Bumper) | 38572 |
| Filter, Bandpass | 35986 |
| Filter, Dual Fuse IEC Inlet | 37178 |
| Footswitch | 40402 |
| Fuses: F4.0 Amp | 37869 |
| Harness to Hour Meter | 40728 |
| Hour Meter (unit serial #s **5121800** and higher) | 40730 |
| Lightguide and Lamp Mount Assembly | 40054 |
| Power Supply, 200 Watt Assembly | 40088 |
| Shutter Guide | 40159 |
| Shutter, Tear-Drop, SS | 40049 |
| Switch, Manual Timer | 35384 |
| Switch, Reset Assembly | 38807 |
| Switch, Power | 36288 |
| Timer, Digital | 36287 |

**OPTIONS/ACCESSORIES:**

| ITEM | PART# |
|---|---|
| BlueWave® Case with Foam | 38679 |
| Liquid-D Lightguide, 5 mm x 1 Meter | 5720 |
| Liquid-D Lightguide, 5 mm x 1.5 Meter | 5721 |
| Liquid-D Lightguide, 8 mm x 1 Meter | 5722 |
| Liquid-D 2-Pole Lightguide, 3 mm x 1 Meter | 38476 |
| Liquid-D 3-Pole Lightguide, 3 mm x 1 Meter | 38477 |
| Liquid-D 4-Pole Lightguide, 3 mm x 1 Meter | 38478 |
| Fiber Optic 2-pole Lightguide, 3 mm x 1 Meter | 39783 |
| Fiber Optic 3-Pole Lightguide, 3 mm x 1 Meter | 39787 |
| Fiber Optic 4-Pole Lightguide, 3 mm x 1 Meter | 39791 |
| DYMAX ACCU-CAL™ 50 Radiometer (Spot Model) | 39560 |
| Lightguide Simulator | 38408 |

# DEFINITION OF TERMS

**Bulb** - Light source generating ultraviolet, visible, and infrared radiant energy from burning matter stimulated by electrical power conditioned by a proper power supply which is an integral part of a Lamp. A light source is usually placed into a Reflector (of various geometry) to increase light source efficiency by collecting and directing radiant energy of selected spectra (for a given curing process).

**Intensity** - A measure of light energy over the unit of surface area (usually surface at the specified working distance from the bottom of Reflector Housing) in $W/cm^2$ or $mW/cm^2$. For the UV portion of light, this measure is often called in literature “irradiance”, i.e. radiant energy arriving at a point on a surface per unit area.

**Brightness**, also known as **Luminance** - Description of energy in the visible region of the spectrum (approximately from 400 to 700 nm) and recorded in photometric units. “**Intensity**” (see below) of visible light energy is called Luminance.

**Luminance** - Luminous flux (energy of visible light) incident per unit area, and measured in **Lx** (lux) or **Lumen/cm²**.

**Ultraviolet (UV)** - The invisible region of the spectrum just beyond the violet end of the visible region. Wavelength ranges in general from 1.0 to 400 nm. DYMAX bulbs (burners) do not radiate energy in deep ultraviolet; there are very minute amounts below 220 nm and practically nothing can be sensed below 200 nm. This is due to the use of ozone-blocking quartz Bulb Envelope (See Ozone).

1. **Ultraviolet A (UV-A) -** UV of long wavelength from within approximately 400 to 320 nm of the spectral band (4000 to 3200⊕) - predominately produced by DYMAX Flood Lamps.

2. **Ultraviolet B (UV-B) -** UV of medium wavelength from within approximately 320 to 280 nm - DYMAX Flood Lamps produce some amount of their energy within this bandwidth.

3. **Ultraviolet C (UV-C) -** UV of short wavelength below 280 nm (we say from 280 to 200 nm) – a large amount of this energy is present in the sunlight.

4. **Visible -** Light that can be seen 400 to 700 nm.

**Dose** - Irradiance integrated over time, or Irradiance ($W/cm^2$) x Time (s) = Dose ($Joules/cm^2$). Note: Watt is the power that gives rise to the production of energy at the rate of 1-joule (J) per second (s).

**Ozone** - oxidizing agent ($O_3$) produced by the action of Ultraviolet radiant energy (below 185 nm) or electrical corona discharge of oxygen on air.

**OSHA** 1910.145: “Regulation of Accident prevention Signs and Tags” defines the following headers as:

**WARNING -** Used when there is a hazardous situation that has some probability of severe injury.

**CAUTION -** Used to indicate a hazardous situation that may result in minor or moderate injury.

**NOTICE -** Used to convey a message related directly or indirectly to the safety of personnel, or protection of property.

**OSHA** 1910.145: “Regulation de la prevention d’accident Signes et Étiquettes” défin les têtes comme:

**AVERTISSEMENT** - est utilisser quand il ya un situation hasardeux qu’il avais de probalilité de se blesser sévère.

**PRE-CAUTION** - est user pour indiquer un situation hasardeux qu’il peut être en consequence en minueur ou modére blessure.

**ATTENTION** - est user pour communiquer un message lié directement ou indirectement à la sécurité de personnel, ou protection de proprieté.

# WARRANTY

**CAUTION!**

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

DYMAX offers a one-year warranty against defects in material and workmanship on all system components, except the Bulb, *with proof of purchase date*. Unauthorized repair, modification, or improper use of equipment may void warranty. The use of aftermarket replacement parts not supplied or approved by DYMAX Corporation, will void any effective warranties and may result in damage to the equipment.

**REPLACEMENT BULB WARRANTY**

If the Bulb fails to ignite during the warranty period of 2,000 hours and all Bulb history cards for a specific BlueWave® 200 have been returned to DYMAX, the Bulb will be replaced under warranty.

**Please note that most 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 evaluations. Data sheets are available for valve controllers or pressure pots upon request.

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**Dymax Corporation**
+1.860.482.1010 | info@dymax.com | www.dymax.com

**Dymax Europe GmbH**
+49 611.962.7900 | info_de@dymax.com | www.dymax.de

**Dymax Engineering Adhesives Ireland Ltd.**
+353 21.237.3016 | info_ie@dymax.com | www.dymax.ie

**Dymax Oligomers & Coatings**
+1.860.626.7006 | info_oc@dymax.com | www.dymax-oc.com

**Dymax Korea LLC**
+82.31.608.3434 | info_kr@dymax.com | www.dymax.com/kr

**Dymax UV Adhesives & Equipment (China) Co. Ltd.**
+86.755.83485759 | dymaxasia@dymax.com | www.dymax.com.cn

**Dymax Asia (H.K.) Limited**
+852.2460.7038 | dymaxasia@dymax.com | www.dymax.com.cn

**Dymax Asia Pacific Pte. Ltd.**
+65.6752.2887 | info_ap@dymax.com | www.dymax-ap.com