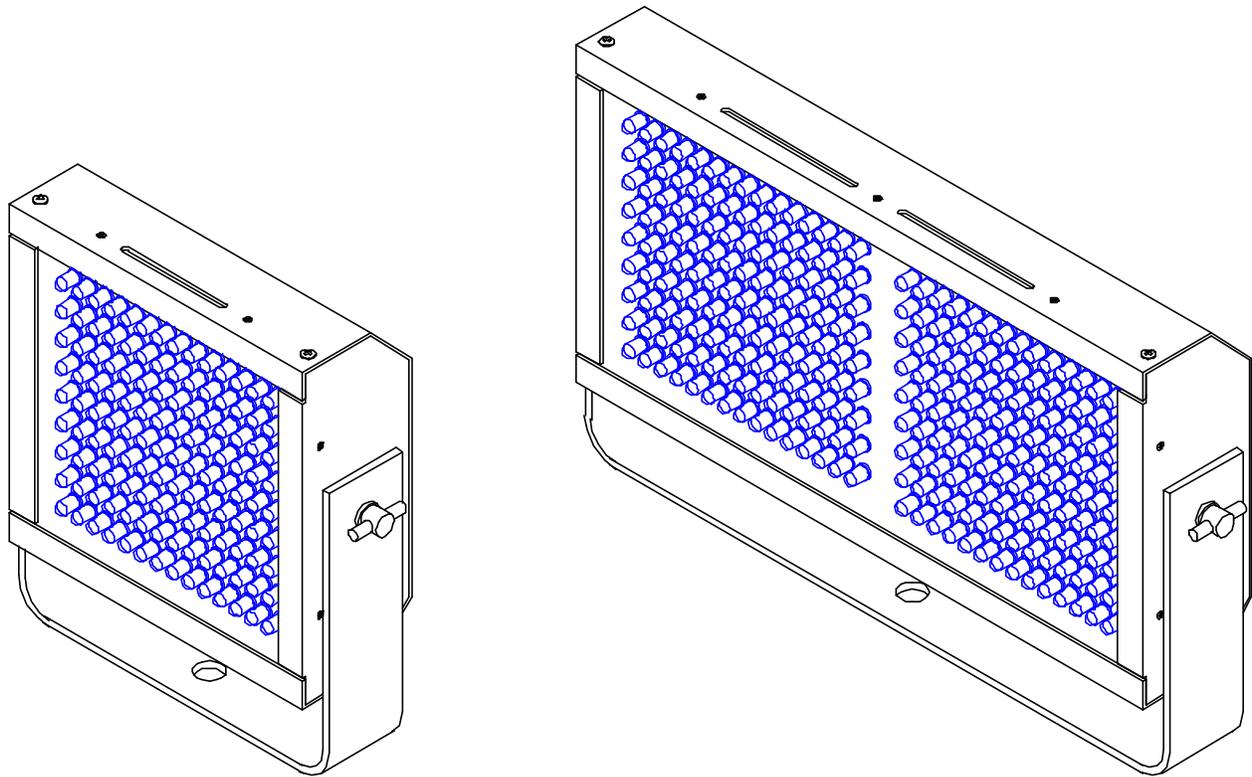




## BlackLED® BL-150 / 300 DMX Ultraviolet Illuminator

The BL-150 and BL-300 Ultraviolet Illuminators are “state of the art” lighting instruments based on an array of Ultraviolet LED's and a computer micro-controller. These units permit ultraviolet effects to be faded or strobed under DMX control. These effects cannot be easily created with any other type of UV illuminator without a mechanical shutter. The LED UV devices do not require replacement, produce little heat, and are available in a range of dispersion angles and UV or near-UV wavelengths. One channel of DMX-512 data controls UV intensity or strobe rate. The unit may also be operated in manual mode without DMX as a stand-alone fixture with preset intensity if desired. Illuminators may be controlled by any DMX lighting system for professional displays, or may be set up for independent operation at a preset intensity in stand-alone UV lighting applications.



The BL-150 model includes an array of 150 LED emitters, and the BL-300 fixture includes a double array of 300 emitters total. The standard version of either fixture is equipped with 365 nanometer LED devices, with output in the ideal range for illuminating both visible and invisible UV pigments. The output wavelength matches the 365 nanometer UV wavelength from mercury arc lamps or fluorescent tubes, with a minimal visible light signature. All LED emissions are long wavelength “UV-A” light, which are not considered a skin or an eye hazard under normal conditions.

## Recommended Use

The BL-150 and BL-300 units are intended for use in applications where UV light must be controlled to conceal or reveal an ultraviolet scene when necessary. The fixtures are ideal replacements for arc lamp sources of moderate power, especially where external shutters are used to control the UV output. The BL-150 and BL-300 fixtures are also a good choice for replacement of arc lamp UV fixtures for improved energy efficiency, and are recommended for UV lighting applications or installations where space, ventilation, or maintenance access to the illuminator location is limited. Both the BL-150 and BL-300 units are also well suited to rough service applications where shock or high vibration levels are present, and also for vehicle or scenic applications where high efficiency operation directly from DC power sources is required.

## Mounting Provisions

The BL-150 and BL-300 fixtures may be mounted in any orientation, and are provided with a ½ inch hole in the mounting yoke, intended for a standard theatrical “C-Clamp” attachment to lighting pipes or other support structures. The swivel points provided by the mounting yoke hole, and the yoke pivot attachments at the sides of the fixtures may be used to aim the fixture output as necessary.

**The BL-150 and BL-300 fixtures are intended only for indoor use in dry locations. The units are not intended for outdoor use, or for indoor use in close proximity to water. The fixtures are not rated for, nor protected against water splash, droplets, or mist.**

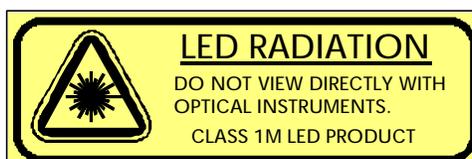
## Electrical Requirements

The BL-150 and BL-300 fixtures operate on 24 volt DC electrical power. The BL-150 unit requires less than .75 amperes of 24 volt DC power, or about 18 watts. The BL-300 unit requires less than 1.5 amperes of 24 volt DC power, or about 35 watts. Fixtures are shipped with a separate 24 volt DC power source, which can be operated from any AC voltage of from 100 to 240 volts, and at either 50 or 60 Hz. Power supplies are Class II UL listed components, and may also carry CE, TUV, or other electrical safety agency labeling.

## Optical Precautions

### CAUTION

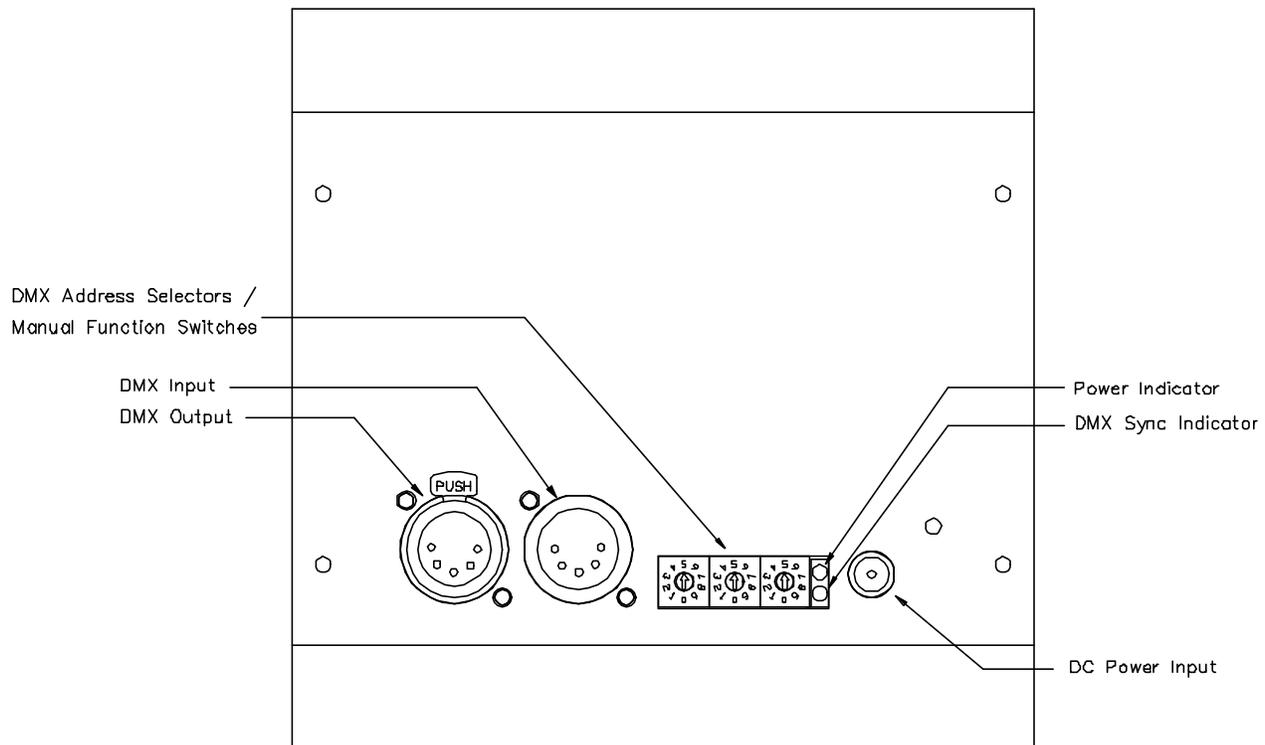
**This product contains Ultraviolet Light Emitting Diodes (LED’s). During operation, the LED array will emit intense ultraviolet light. Precautions should be taken to avoid looking directly into the UV output for prolonged periods with the unaided eye, viewing the UV output at close range, or viewing through optical systems which enhance or concentrate the UV light. The use of UV light protective glasses is recommended when the direct or reflected UV output must be viewed for extended periods, at close range, or through optics.**



## Controls and Connections

The rear panel of the unit includes a power input jack for a UL approved Class II 24 volt DC power source. A green LED power indicator and a green LED DMX sync indicator are located to the left of the power input connection. Three rotary selector switches are located to the left of the indicators to choose the base DMX address for the device. The DMX input and output connections are located on the far left side of the unit, and use the 5 pin XLR style DMX connection.

## Control Panel Connections



## Base DMX Address Settings

The three rotary address switches are set to select the base DMX address for the unit. The address switches should be preset to the desired base DMX address before the unit is powered up, as the address settings are read during the power up sequence. If it is necessary to change the DMX address for the unit, the address settings may be changed at any time, but the unit will not read or respond to the new channel assignment until power is removed, and restored once again.

## Default Settings

Unless otherwise specified, all units are shipped with factory default DMX address settings. The default factory setting is single channel mode, where one DMX channel will control the intensity of the UV emission from the unit. The default DMX address setting is to a base address of 001.

## Power Connections

The BL-150 and BL-300 fixtures are intended to operate from 24 volt DC power, or from a suitable AC adapter capable of providing 24 volts DC at a minimum current of .75 or 1.5 amperes respectively. The universal voltage AC adapter provided with the unit will convert any AC power source from 100 to 240 volts AC, 50 or 60 Hz to the 24 volts DC at 1.5 amperes maximum required by either unit.

The unit is provided with a 2.1mm coaxial DC power socket for connection to the DC power source. To connect the fixture to the power supply, first make sure that the power supply is turned off, and confirm the correct DC polarity, then insert the supply plug into the socket on the unit rear panel. Activate the power supply to operate the unit. When power is applied to the unit, the green “Power” indicator will light to confirm that the unit is active.

### CAUTION

**Application of AC voltage or DC voltages greater than 28 volts, or lower voltages with reversed polarity to the power input socket on any unit may cause serious damage to the fixture, and may cause increased risk of electrical shock or fire, potentially resulting in serious injury or death. Connection of the unit to AC power sources, or to alternative power supplies other than the universal input DC power pack provided with the unit may result in damage to the unit. Do not attempt to operate the unit if you are unsure of the rating of the AC power source, or of the voltage and polarity of any alternative DC power supply.**

## Basic Operation

The green LED power indicator on the rear panel will illuminate steadily when the unit is on. If the Power indicator is intermittent or flashes, then either the AC power supply, the DC power pack, or one of the power connections is unreliable. When power is first applied, the internal processor will read the address information selected on the three DMX address switches, and the unit will respond to the DMX setting for the selected channel, or to manual display settings as established by the DMX address selection switches.

Operation of the fixture is also indicated by a deep blue visible output from the UV LED array when activated by either DMX or manual commands. The intensity of the visible output is proportional to the UV output level, but the user should be aware that the primary output from the LED array is not visible, and is far more intense than the relatively dim blue output which is visible to the eye.

## DMX Channel Assignments

The BL-150 and BL-300 fixtures normally occupy a single DMX control channel, which is the channel selected as the base address on the DMX address selection switches. A unit set to a base DMX address of 100 would occupy and respond to information on DMX channel 100. The three rotary address selector switches are set to choose the base DMX address for the unit, and the selected address is read and stored when DC power is first applied to the unit. Changing to a new address settings will require that power be removed from the unit and restored before the new address setting will be functional. Units with custom control software may require a different number of DMX channels, but will operate in a similar manner.

## **DMX Data Connection**

Once the base DMX address setting is complete, the unit may be connected to a DMX data source. The green “Sync” indicator will illuminate steadily if valid DMX data is being received by the unit. In normal operation, the unit will respond to changes in the DMX data for the selected channel as described in the Basic Operation section of this document. When normal DMX data is being received, the unit will retain the last valid data for about 5 seconds after the DMX data is removed. This data retention allows the unit to tolerate minor interruptions in the DMX data stream caused by poor connections or brief “dropouts”. After this interval, the unit will default to the normal “no DMX data” state, with the output inactive. Normal operation will resume immediately when the normal DMX data stream is restored.

### **CAUTION**

**Connections made to the DMX Input and Output terminals must conform to the US-ITT DMX-512 standard to insure proper operation of the unit. Any damage resulting from accidental application of incorrect power supply or DMX signal voltages will not be covered by the system warranty.**

## **DMX Troubleshooting**

After the start sequence is complete, the DMX Sync indicator will illuminate steadily in green when valid DMX data is being received, and will not illuminate, or will flash intermittently if DMX data is unstable. If the “Sync” indicator is not steadily illuminated when DMX data is connected, then there is either a problem with the DMX data or cables, or an internal problem with the unit.

If the unit does not operate, and the “Sync” indicator flashes at a regular interval, the DMX address is set to an invalid range, either to zero, or to a number higher than 512, which is the highest base address setting which will allow control of the fixture. If the “Sync” indicator is erratic, then the DMX data connection is either intermittent due to a poor electrical connection, or the DMX data is dropping out. This can be caused by poor connections, poor quality cables, long data runs, or poor signal quality in general. Test the unit with different cables, or in a different location closer to the DMX data source to determine what or where the problem is.

## **Manual Mode Operation**

Operation of the unit in Manual Mode is controlled by the settings of the DMX address switches. When the base address switches are set to a range of 900 to 999, the unit will produce UV output from 0 to 100 percent intensity, with no output at a setting of 900, and maximum output at a setting of 999. Output within this range is continuous, and is not affected by any other setting or by DMX data input. The unit will resume normal DMX operations when the address switches are set to a value of 512 or less, and power is cycled to read the selected DMX address as usual.

While in manual mode, the output of the unit may be adjusted using the address switch settings to obtain stable intensity at the desired level. The manual settings may be altered by adjusting the address settings at any time.

## **Fixture Installation**

The BL-150 and BL-300 fixtures may be installed in any mounting orientation which provides a clear projection path to the display area or scene, and access to the rear of the fixture for power and DMX data connections. A standard theatrical “C-Clamp” or other mounting attachment should be secured to the ½ inch hole provided in the mounting yoke for this purpose. The fixture can be aimed using the mount fastener and the pivots on the fixture ends to direct the UV output as necessary. Once aimed to the desired area, all fasteners should be tightened to lock the fixture onto the target area.

The user is responsible for mounting the instrument in a safe and secure manner. Please consult with local public or workplace safety authorities to determine if any additional safety restraints, such as safety wires or cables may be required.

## **UV Output and Dispersion Angle**

The primary output from the BL-150 and BL-300 fixtures is 365 nanometer ultraviolet light. Although the fixtures normally produce a dim visible output in a deep blue color, this visible emission is far less intense than the invisible ultraviolet emissions. The 365 nanometer emissions will produce excellent results with all visible and “invisible” UV paints and pigments. These fixtures will produce superior color reproduction, especially from red, orange, and yellow UV pigments in comparison to other UV LED fixtures using less expensive, longer wavelength LED emitters.

The dispersion or beam spread from the fixture is determined by the optical properties of the LED emitters installed. The standard LED emitters have a 10 degree circular beam dispersion, which means that the illuminated area will be generally be a round spot, with a diameter which is approximately 20 percent of the distance between the fixture and the display area. Some non-uniformity may be apparent in the UV output close to the fixture due to minor differences in the output or mounting angle of the individual LED emitters, but these will smooth out to a very uniform illumination with a soft edge as the distance from the fixture increases.

## **Fixture Masking and Diffusion**

The extended source area of the UV LED array makes the output from the fixture difficult to mask up close. A masking edge placed close to the fixture will generally display a “stepped” or “picket fence” shadow instead of a clean edge, due to the multiple emitters in the rows and columns of the LED array. For best results, masking edges should be placed as far from the fixture as possible.

Diffusing the fixture output to cover a larger area is possible, provided that the diffusing material does not absorb the UV output. Clear or lightly frosted glass diffusers can generally be used to spread the fixture output without absorbing most of the UV emissions. Colored glass other than blue should be avoided. Most plastic filters will easily pass the deep blue visible emissions from the LED array, but may strongly absorb the UV output. Make sure to test the UV output level with a pigment test card or other UV sensitive material when using a plastic diffusing filter. Do not rely on the deep blue visible output as assurance that a plastic filter is not absorbing most of the UV output from the fixture..

## General Operation

In operation, the BL-150 and BL300 fixtures should provide hundreds of hours of maintenance-free operation, up to the lifetime limit of the UV emitters. The LED emitters are operated at 80 percent of their maximum continuous current, and should provide a fixture lifetime in excess of 20,000 hours, or approximately 5 years of operation running 10 hours per day.

To maximize fixture lifetime, the DMX control settings should reduce the fixture output to zero whenever the UV display is not required. Further improvements in lifetime can be obtained by keeping the fixture temperature to a minimum by avoiding hot locations, such as mounting the LED fixtures adjacent to conventional arc lamp UV fixtures, or high wattage incandescent sources.

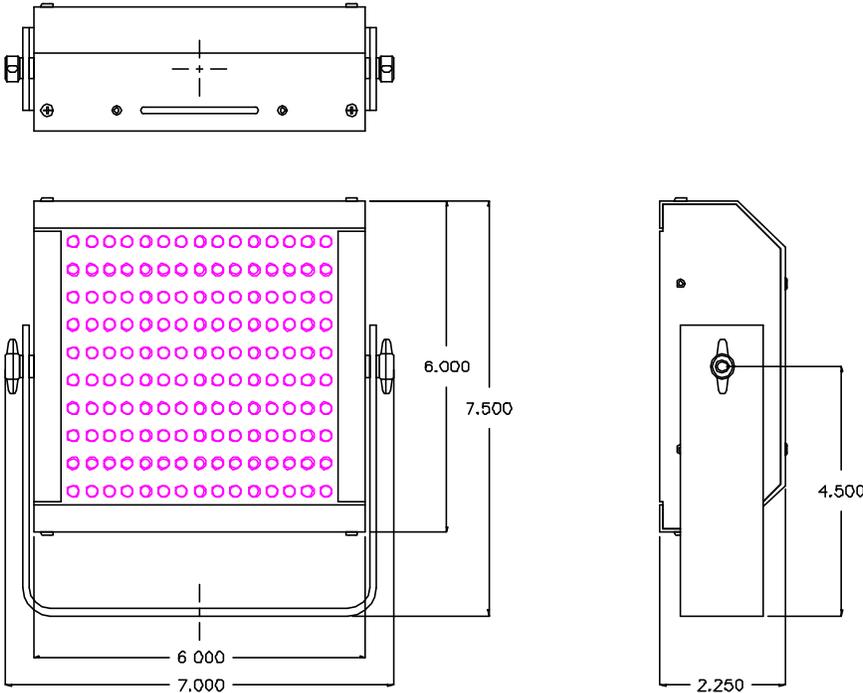
## Troubleshooting

<u>Problem</u>	<u>Probable Cause</u>
Fixture completely inoperative: No "Power" indicator	No AC line voltage to power supply Power supply input cord unseated at supply Power supply output cord unseated at fixture Power supply or cable defective
Good "Power" indicator, No DMX "Sync" indicator	No DMX data applied Bad DMX cable or connection
Good "Power" indicator, Good DMX "Sync" indicator	DMX address settings incorrect DMX control settings at minimum
Blinking DMX "Sync" indicator	DMX address out of normal range
Erratic DMX "Sync" indicator	Bad DMX cable or connection
Weak or uneven output pattern	Fixture DMX or manual output set too low Fixture too close to scene or display Plastic film or filter absorbing UV output Output window obscured or very dirty LED driver or LED array damaged
Fixture output varies or strobos	Bad DMX cable or connection Fixture is responding DMX data variations Fixture temperature too high Damaged or defective LED driver DC input voltage too low
Fixture is excessively hot	High ambient temperature at fixture location Ventilation blocked or obstructed by dust DC input voltage too low



**Fixture Dimensions**

BL-150 Fixture



BL-300 Fixture

