BlueWave® MX-Series 1-Channel Curing System User Guide

BlueWave® MX-150 LED Spot-Curing System
BlueWave® MX-250 LED Flood-Curing System

- Instructions for Safe Use
- Setup and Operation
- Maintenance
- Ordering Spare Parts and Accessories
About Dymax

UV/Visible light-curable adhesives. Systems for light curing, fluid dispensing, and fluid packaging.

Dymax manufactures industrial adhesives, light-curable adhesives, epoxy resins, cyanoacrylates, and activator-cured adhesives. We also manufacture a complete line of manual fluid dispensing systems, automatic fluid dispensing systems, and light-curing systems. Light-curing systems include UV broad-spectrum and LED curing sources configured in, spot, flood, and conveyor systems designed for compatibility and high performance with Dymax adhesives.

Dymax adhesives and light-curing systems optimize the speed of automated assembly, allow for 100% in-line inspection, and increase throughput. System designs enable stand-alone configuration or integration into your existing assembly line.

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 the Dymax standard Conditions of Sale. Dymax recommends that any intended application be evaluated and tested by the user to ensure 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.
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Introduction

Introduction to the User Guide

This guide describes how to set up, use, and maintain BlueWave® MX-Series 1 Channel (CH) curing systems safely and efficiently.

Intended Audience

This user guide is meant for experienced process engineers, technicians, and manufacturing personnel. If you are new to high-intensity LED light sources and do not understand the instructions, contact Dymax Application Engineering for answers to your questions before using the equipment.

Where to Get Help

Dymax Customer Support and Application Engineering teams are available by phone in the United States, Monday through Friday, from 8:00 a.m. to 5:30 p.m. Eastern Standard Time. You can also email Dymax at info@dymax.com. Contact information for additional Dymax locations can be found on the back cover of this user guide.

Additional resources are available to ensure a trouble-free experience with our products:

- Detailed product information on www.dymax.com
- Dymax adhesive product data sheets on our website
- Safety data sheets (SDS) provided with shipments of Dymax materials
Safety

**WARNINGS!** If you use this LED light source without first reading and understanding the information in this user guide, injury can result from exposure to high-intensity light. To reduce the risk of injury, please read and ensure you understand the information in this user guide before assembling and operating the Dymax LED light source.

To use a BlueWave MX-Series 1CH system safely, it must be set up and operated in accordance with the instructions given by Dymax. Using the system in any other manner will impair the protection of the system. Dymax assumes no liability for any changes that may impair the protection of the BlueWave MX-Series 1CH system.

General Safety Considerations

All users of Dymax LED light sources should read and understand this user guide before assembling and using the system.

To learn about the safe handling and use of light-curable formulations, obtain and read the MSDS for each product. Dymax includes an MSDS with each adhesive sold. In addition, fluid product MSDS can be requested through our website.

Safety Symbol Index

The following symbols are displayed on BlueWave MX-Series 1CH systems. Please see below for their meanings.

- Refer to Equipment Manual Before Operating Equipment
- Warning! Use Caution When Operating Equipment
- Eye Protection Required
- Product Contains an Electrostatic Sensitive Device (EST) Internally
- Complies with All Listed European Directives
- Warning! UV Light Hazard (Do not look directly at light)
- WEEE Directive (Waste electrical and electronic
- Warning! Hot Surface
equipment must be disposed of or recycled at the nearest collection facility)

Specific Safety Considerations

The BlueWave MX-Series curing systems are designed to maximize operator safety and minimize exposure to light-curing energy. To use the unit safely, it must be set up and operated in accordance with the instructions in this user guide. Please also read and understand the safety considerations unique to LED-curing systems as described below.


**WARNING!** Looking directly at the high-intensity light emitted by the BlueWave MX-150 or MX-250 can result in eye injury. To prevent eye injury, never look directly at the energy-emitting end of the high-intensity emitter and always wear protective goggles.

**WARNING!** UV emitted from this product. Avoid eye and skin exposure to unshielded product.

**CAUTION!** Possibly hazardous optical radiation emitted from this product. Do not stare at the bright light energy emitting from the unit. May be harmful to the eye. To avoid accidental exposure, always point the emitter and/or lightguide away and at the curing substrate.

**WARNING!** Possibly hazardous optical radiation emitted from this product. Do not look directly at the light energy emitting from the unit. Eye injury may result. To avoid accidental exposure, always point the emitter and/or lightguide away and at the curing substrate.

**WARNING!** The controller is cooled by natural convection. If you block the air flow from the controller, equipment damage and malfunction can result. To prevent damage and malfunction, ensure adequate space around controller vents to allow the free flow of air. Typically, 1.5 in (38 mm) of space around all sides of the controller is sufficient.

**WARNING!** Surface of light emission optics is very hot after continuous use of MX-150 or MX-250 emitter. Do not touch the distal, light-emitting end of the MX-150 lightguide-simulator optic or the MX-250 glass window. Touching
these surfaces can result in burns. Please allow either optic to cool for 10 minutes before attempting to replace the optic.
Dymax UV Light-Curing System Safety Considerations

Operators must understand these three concepts to use the LED light source safely: UV exposure, high-temperature surfaces, and bright, visible light.

UV Exposure

Figure 1. UV Spectrum

Standard Dymax UV light-curing systems have been designed primarily to emit UVA and Visible energy (Figure 1). Depending on the model of LED head used, the energy emitted from a BlueWave MX-Series 1CH curing system can either be in the upper end of the UVA portion of the spectrum (PrimeCure® and RediCure®) or in the lower portion of the visible spectrum (VisiCure®). UVA energy is generally considered the safest of the three UV ranges: UVA, UVB, and UVC. Although OSHA does not currently regulate UV-light exposure in the workplace, the American Conference of Governmental Industrial Hygienists (ACGIH) does recommend Threshold Limit Values (TLVs) for ultraviolet light.

The strictest interpretation of the TLV (over the UVA range) for workers’ eyes and skin allows continuous exposure up to 1 mW/cm² (intensity). Unless you are placing bare hands into the curing area, it is unusual to exceed these limits. To put 1 mW/cm² limit into perspective, a cloudless summer day will typically exceed 3 mW/cm² of UVA light, and also include the more dangerous UVB light (primarily responsible for sun tans, sun burns, and skin cancer).

Checking the Workstation

The human eye cannot 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/cm² of UVA continuously should be redesigned.

Protecting Operators

Light-curing technology 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.

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** — Opaque, UV-blocking clothing, gloves, and full-face shields are recommended when skin may potentially be exposed to UV light.

Shield the Source of UV

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

**Rigid Plastic Film** — Transparent or translucent/UV-blocking plastics (typically polycarbonate or acrylic) are commonly used to create shielding where some level of transparency is also desired.

**Flexible Film** — Translucent UV-blocking, flexible urethane films can be used to quickly create workstation shielding. This UV-blocking, flexible urethane film is available from Dymax, call for assistance.

High-Temperature Surfaces

Surfaces exposed to high-intensity curing energy may rise in temperature. The intensity, distance, exposure time, cooling fans, and composition of the surface can all affect the rise in surface temperature. In some cases, exposed surfaces can reach temperatures capable of producing a burn or causing damage to a substrate. In these cases, operators should try to maintain a cooler surface temperature or they should have the appropriate protection/training to avoid injury from the heat. No infrared radiation is produced by these LED systems, so surface temperatures will be lower than with conventional lamp systems. Empirical testing should be used to verify the exact temperature rise in each application.
Bright Visible Light

The bright visible energy emitted by curing systems can cause eyestrain if proper eye protection or shielding is not used. The use of tinted eye protection and/or opaque/tinted shielding can be utilized to reduce eyestrain and address this concern.

Product Overview

Description of BlueWave MX-Series 1CH Systems

BlueWave MX-Series curing systems feature all the benefits of LED-curing technology in smaller, more versatile units. These systems are uniquely designed to offer higher, more consistent curing intensity than traditional spot or flood curing systems. The systems are comprised of a power supply, a controller with an easy-to-use control interface, and an emitter. Emitters are available in two models, the MX-150 for spot curing and MX-250 for flood curing, as well as in three different curing wavelengths, 365, 385, and 405 nm.

- The BlueWave MX-150 functions as a high-intensity spot-curing system. The system has the ability to be set up in many configurations and can be used with a lightguide if needed.

- The BlueWave MX-250 functions as a flood-curing system with a 50 mm x 50 mm (2 in x 2 in) active curing area. It provides manufacturers with additional curing flexibility and expansion capabilities. BlueWave MX-Series emitters can be used as hand-held units or integrated into an automated manufacturing system allowing for maximum application flexibility. Their output intensity levels can also be adjusted from 10% to 100% to meet process and adhesive requirements. BlueWave MX-Series 1CH systems are rated for continuous operation. However, if the internal temperature of the system exceeds the maximum safe operating temperature limits, each emitter contains a thermal sensor that will shut the unit down to protect the components of the emitter.
Figure 2. Main Components of a BlueWave MX-150 System
Figure 3. Main Components of a *BlueWave* MX-250

- Emitter
- Cable
- LED Emitter
- Stand
- Controller
- Touch Screen
- Power Switch
- Controller
The *BlueWave* MX-Series 1CH system is engineered for precise performance and long service life. Key features include:

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible mounting options</td>
<td>Adaptable to a variety of process and fixture scenarios</td>
</tr>
<tr>
<td>Available with spot or flood-curing emitters</td>
<td>Supports a variety of curing processes</td>
</tr>
<tr>
<td>PLC interface</td>
<td>Easily incorporated into automated systems</td>
</tr>
<tr>
<td>100% duty cycle capability</td>
<td>Highest throughput (exposure cycles “at the speed of light”)</td>
</tr>
<tr>
<td>No mechanical shutter</td>
<td>Instant on/off/no warm up period</td>
</tr>
<tr>
<td>Intensity output adjustment (10% to 100%)</td>
<td>Superior accuracy over “closed-loop feedback” or auto-adjusting units</td>
</tr>
<tr>
<td></td>
<td>Optimum process control</td>
</tr>
<tr>
<td>LED emitters available in 365, 385, or 405 nm wavelengths</td>
<td>Compatible with a variety of UV and visible light-curable materials, including Dymax materials for fewer re-qualifications</td>
</tr>
<tr>
<td></td>
<td>Wavelength flexibility allows co-optimization of adhesive and curing system for optimal cure</td>
</tr>
<tr>
<td></td>
<td>Units can be custom configured to your curing requirements</td>
</tr>
<tr>
<td>Stable LED temperature</td>
<td>Comfortable hand-held operating temperature</td>
</tr>
<tr>
<td></td>
<td>Maximized continuous operation without overheating</td>
</tr>
<tr>
<td></td>
<td>Optimizes cure time efficiency</td>
</tr>
<tr>
<td></td>
<td>Temperature monitoring assures maximum LED life</td>
</tr>
</tbody>
</table>
Controller Front Panel

The front panel features the power button and a touchscreen display through which the unit can be operated.

**Power Button** — Press the power button to power up the controller. Press the button a second time to turn the unit off.

**Figure 3. Front Control Panel**
Controller Back Panel

**Power Cord Receptacle** — Connection point for the power cord.

**Foot Pedal Jack** — Connection point for the foot pedal.

**PLC Connector Terminals** — Connection points for an interface with a user-supplied PLC (for remote operation).

**Emitter Connector** — Connection point for the system’s emitter.

**Figure 4. Back Panel Controls & Connections**
Unpacking

Upon arrival, inspect all boxes for damage and notify the shipper of box damage immediately. Open each box and check for equipment damage. If parts are damaged, notify the shipper and submit a claim for the damaged parts. Contact Dymax so that new parts can be shipped to you immediately.

The parts below are included in every package/order. If parts are missing from your order, contact your local Dymax representative or Dymax Customer Support to resolve the problem.

Parts Included

**Controller**
- Controller
- Power Supply
- Emitter Cable
- Power Cord
- Foot Pedal
- Safety Glasses
- BlueWave MX-Series 1CH User Guide

**LED Emitter**
- LED Emitter Assembly
- 5-mm Lightguide Adapter (MX-150 Emitter Only)

System Setup

System Connections

*NOTE: Although this product is designed with protection against ESD (Electrostatic Discharge) it is recommended to take precautions against static when handling the BlueWave MX-Series controller or LED emitter independently. Once these devices are attached together through the interconnect cable, then the threat of ESD damage is eliminated.*

1. Attach the Power Cord to the Power Cord Receptacle located on the unit’s back panel (Figure 4).

2. At the top of the Controller’s Rear Panel, there is a connector labeled “Emitter” (Figure 4). Connect one end of the Emitter Cable to this connector and the other end to the Emitter.
**WARNING!** Under no circumstance should the interconnect cable from the BlueWave MX-Series 1CH controller to the LED emitter be connected or disconnected while power to the unit is on. This procedure is usually called “hot-swapping” and should not be performed as it could cause damage to the controller or the LED emitter. Always power down the equipment before disconnecting any of these devices.

3. Plug the opposite end of the Power Cord into an appropriate AC outlet. The unit is now powered and ready to be turned on with the On/Off Switch located on the front of the unit (Figure 3).

**WARNING!** If the BlueWave MX-Series 1CH controller is powered on with no LED emitter connected, the controller screen will not show the banner containing the information of the emitter type or wavelength. An error will appear on the display and an audible alarm will sound. Power down the controller, connect the LED emitter, then power on again and the banner will appear.

4. If using the optional foot pedal, plug it into the foot pedal jack on the rear panel of the controller.

   If you are using a PLC - There are input and output PLC Connection Terminals that can be used to integrate the unit to an automated assembly line. The input connections consist of PLC Enable, Emitter Interlock, Light Shield Sensor, Program/Analog, and LED On. The unit normally has high logic levels (24V) and looks for a low signal (0V) input. The 24VDC is supplied internally allowing use of a simple contact closure such as a switch or relay to actuate the inputs.

   The output PLC connection terminals consist of System Status, LED status and Reserved. These output signals are 24VDC inactive and 0 Volts active.

   The Analog intensity input is a 0 – 10 Volt input that controls the LED intensity. This function is active when the Prog/Analog and PLC Enable inputs are activated.

   Refer to Table 1 for more complete description of PLC input and outputs.

5. Your unit is now ready for operation.
Modes of Operation

The system has three basic modes of operation: manual, timer, and PLC.

**Manual Mode**

In manual mode, the LED is energized when the foot pedal is pressed, passing curing energy through the delivery optics, and de-energized when the foot pedal is released. The LED may also be energized by momentarily pressing the run/stop button located in the center of the touchscreen user interface. The LED will be energized to the power level set through the touchscreen user interface. Pressing the run/stop button again during the curing cycle will de-energize the LED.

When manual mode is selected, the time indicator will be initialized to zero. The time display will count up during an exposure and display the total elapsed time at the end of the exposure to allow the user to save the time and power values if desired. Starting a new manual exposure will reset the time value to zero immediately and proceed to count up.

**Timer Mode**

In timer mode, the LED is energized for a specific time period each time the foot pedal or run button is pressed. The specific time is set by adjusting the timer’s value through the touchscreen user interface. Momentarily pressing the foot pedal or run button starts the timer and energizes the LED. When the timer counts down to zero, the LED is de-energized, and no curing energy is emitted. The timer is reset to the pre-set value, and the system is immediately ready to run another exposure cycle. The LED can be de-energized at any time during the curing cycle by simply pressing the run/stop button.
PLC (Programmable Logic Controller) Operation

When in PLC mode, an external PLC can control the unit. The PLC provides input signals to the BlueWave MX-Series 1CH system to control the on/off signals and intensity of the LED. The PLC monitors the status of the system by reading output signals provided by the unit.

The PLC is typically programmed to start other machinery when the BlueWave MX-Series 1CH system becomes ready, or something starts the unit when other machinery is ready. The input and output signals are present on connector (J5) located on the back of the unit.

NOTE: A ferrite will be required on the PLC (0-10V) analog input cable to reduce noise. Ferrite bead (PN 0443164251) installed on the analog PLC cable (looped once) at the EUT end.

Figure 5. PLC Mode Screen

<table>
<thead>
<tr>
<th>PLC MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUTS</td>
</tr>
<tr>
<td>LED ENABLE</td>
</tr>
<tr>
<td>Emitter INTRLK</td>
</tr>
<tr>
<td>Light Shield Sense</td>
</tr>
<tr>
<td>Prog-EXT</td>
</tr>
<tr>
<td>LED On</td>
</tr>
<tr>
<td>LED Intensity</td>
</tr>
<tr>
<td>OUTPUTS</td>
</tr>
<tr>
<td>System Healthy</td>
</tr>
<tr>
<td>LED Intensity</td>
</tr>
</tbody>
</table>

Figure 6. PLC Inputs & Outputs

<table>
<thead>
<tr>
<th>PLC EN ABLE</th>
<th>Emitter In terlock</th>
<th>Light Shield Sense</th>
<th>Prog/A nalog</th>
<th>LED On</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC INPUTS (0/24VDC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Status</th>
<th>LED Status</th>
<th>Reserved</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC OUTPUTS (0/24VDC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analog Intensity</th>
<th>COM 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC ANALOG IN (0/10VDC)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 1. PLC Inputs

<table>
<thead>
<tr>
<th>Signal Name / Description</th>
<th>Isolated Inputs/outputs</th>
<th>Connector-Pin</th>
<th>Signal GND</th>
<th>Signal Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLC ENABLE</strong></td>
<td>IN</td>
<td>1</td>
<td>2</td>
<td>0 VDC 24 VDC</td>
</tr>
<tr>
<td>Active: Unit enters PLC mode and displays the PLC input status screen. The touch screen input is ignored.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive: All dedicated PLC inputs are ignored and the PLC outputs will remain active.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EMITTER INTERLOCK</strong></td>
<td>IN</td>
<td>3</td>
<td>4</td>
<td>0 VDC 24 VDC</td>
</tr>
<tr>
<td>Asserting this signal enables the emitter. Momentarily breaking the connection via customer supplied relays or switch contacts will deactivate the emitter. Switch contacts incorporated into access doors on light shield type enclosures will stop energy emissions if the door is opened during an exposure cycle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LIGHT SHIELD SENSOR</strong></td>
<td>IN</td>
<td>5</td>
<td>6</td>
<td>0 VDC 24 VDC</td>
</tr>
<tr>
<td>Active: The LED will be enabled (able to accept either LED ON IN or FOOT PEDAL IN). Inactive: The LED will be disabled.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PROG/ANALOG</strong></td>
<td>IN</td>
<td>7</td>
<td>8</td>
<td>0 VDC 24 VDC</td>
</tr>
<tr>
<td>Active: The external analog intensity input (LED_INTENSITY_IN) will be active. Inactive: The internal programmed time/power settings will be used.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LED ON</strong></td>
<td>IN</td>
<td>9</td>
<td>10</td>
<td>0 VDC 24 VDC</td>
</tr>
<tr>
<td>Manual operation: The LED turns on while the signal is active. Automatic operation: The LED turns on for the programmed time duration upon signal activation. The timed cycle must complete before another signal activation is recognized.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
**NOTE:** When you initiate PLC mode you have the option to toggle PROG/ANALOG. PROG will use the program that has been selected via the GUI. When you toggle back to ANALOG mode you can then set the intensity via the analog intensity inputs (1VDC = 10% intensity, 7VDC = 70%, etc) and then you can have your PLC outputs manage the exposure time by asserting the LED ON command. This would essentially give you controls to go to one preset program in PROG mode and then back to an analog control that can be set to whatever your PLC dictates at that time.

### Table 2. PLC Outputs & PLC Analog In

<table>
<thead>
<tr>
<th>Signal Name / Description</th>
<th>Isolated Inputs/outputs</th>
<th>Connector-Pin</th>
<th>Signal GND</th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLC OUTPUTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SYSTEM STATUS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active: Indicates the system is healthy.</td>
<td>OUT</td>
<td>1</td>
<td>2</td>
<td>0 VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Inactive: Indicates that the system has one or more operational problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LED STATUS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicates LED is commanded on. The LED &quot;On&quot; status will stay in OFF state when in error condition.</td>
<td>OUT</td>
<td>3</td>
<td>4</td>
<td>0 VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td><strong>RESERVED</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Connection</td>
<td></td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PLC ANALOG IN</strong></td>
<td></td>
<td>1</td>
<td>2</td>
<td>0 to 10 VDC</td>
<td></td>
</tr>
<tr>
<td><strong>ANALOG INTENSITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog signal applied to this input to control the LED intensity.</td>
<td>IN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Examples of PLC Wiring

Figure 7. PLC Interface Using Dry Contact Switches or Relays

Figure 8. PLC Analog Control Input

Figure 9. PLC Discrete Status Outputs
Figure 10. PLC Interface Using n-Channel Mosfets or Relays

Operation

To operate the system, first verify that all Connectors are correctly plugged into the rear panel of the unit (See System Connections, pg. 17 for more details). When all Connectors are properly plugged in, press the Power Button on the front panel of the unit. The system is now ready for use.
NOTE: The following lightguide instructions apply to the MX-150 emitter operation only. The MX-250 emitter emits a flood pattern, so lightguide references are not applicable to this unit.

The insertion of the 5-mm lightguide adapter, or an actual lightguide, into the end of the LED emitter needs to be fully seated. The device utilizes 3 spring plungers inside to hold the lightguide in place. Excessive vibration may cause the lightguide to shift position and cause an error condition. End users must provide means through the use of a fixture or other device to address this situation.

Upon startup of the unit, an intro screen will appear. After 4 seconds, the control screen should appear in the display. It will be in administrator mode the first time the unit is started.

**Control Screen**

The control screen is used to set up and run curing cycles. This screen allows users to switch back and forth between administrator and production modes as well as between timer and manual operating modes. It is also where the cycle’s time and power settings are set.

**Figure 11. Control Screen Components**

- **Information Button** — Loads the system information screen. Refer to “System Information” on page 31 for more information.
**Administration/Production Mode Toggle** — Switches between administration and production modes. A password will be required to enter administrator mode. Refer to User Settings/Boot Modes on page 30 for more information.

The production screen layout is identical to the administrator screen. The time, power and mode settings reflect the administrator settings and cannot be altered. User operational controls are limited to “Run/Stop”, “Volume” and “Brightness” (see Settings screen). Program(s) names will be displayed along with the Emitter type but the ability to save and load Program(s) will be disabled. The default password is 1234.

**Settings Button** — Loads the settings screen where the volume, language, screen brightness, and other user settings can be adjusted. Refer to “System Settings” on page 24 for more information.

**Irradiating Time** — The Irradiating time is displayed in this field.

When in timed mode, time is entered by touching the display field which in turn brings up a numerical keypad for entry. The entry range is 0.1 – 999 seconds. From 0.1 – 30 seconds the adjustment is made in 0.1 second increments and from 30 – 999 seconds the adjustment is made in 1 second increments.

When in manual mode, time is displayed and entry is not available.

**Power Button** — The Irradiating power level is displayed in this field. The power level is entered by touching the field which in turn brings up a numerical keypad for entry. The power range is 10 to 100% in increments of 1%.

**Run/Stop Cycle Button** — Initiates/terminates an exposure. The button also functions as an indicator which informs the user that the irradiator is emitting curing energy.

**Operation Mode** — Select from timer or manual mode. For more information on operating modes, refer to “Modes of Operation” on page 19.

**Alarms Icon** — Alerts the user that there is an error. Refer to page 32 for more information.

**Emitter Type** — Identifies the emitter model connected to the controller and the wavelength that it provides. Emitters are available in two models, the MX-150 spot and the MX-250 flood. Each model is also available in three wavelengths: RediCure® (365 nm), PrimeCure® (385 nm), and VisiCure® (405 nm).

**Program Button** — Loads a list of saved curing programs to choose from.
Irradiation

To run a curing cycle in manual mode:

1. Input the power value by pressing the respective field. The time field will be disabled.

2. Press the Run Button or Foot Pedal to start the irradiation. The timer field will begin counting. The irradiation will terminate when the Stop Button is pressed or Foot Pedal is released.

The time delay for PLC or Foot pedal activation and the LED turning on is 260 ms.

When in PLC Program mode only: Add 225 ms to the LED ON in signal (J5) on the PLC connector. For example – if the user desires to turn the LED on for 1 second then the LED ON in signal (through J5) should be 1.225 sec.

To run a curing cycle in timer mode:

1. Input the time and power values by pressing on each respective field or by loading a previously saved program. To load a curing program, press the Program Button on the bottom of the screen. A list of available programs will appear. Select the appropriate one and press “LOAD”. The program will load and you will be brought back to the Control Screen.

2. Press the Run Button or Foot Pedal to start the timed irradiation. The irradiation will terminate when the count reaches zero. The timed exposure may be aborted at any time by pressing the Stop Button. Foot Pedal reactivation will not terminate the cycle.

At the conclusion of the timed exposure, the time value will be automatically reloaded in preparation for the next activation. Although the user is allowed to enter a time of 0.0 seconds, note that the LED will not activate since there is essentially no time set for it to run. The BlueWave MX-Series 1CH system will however support accurate LED activation as short as 0.1 seconds.

It is possible for users to type in a time setting greater than 4 digits during time entry. However, the BlueWave MX-Series 1CH system will only support up to 999 seconds and will default to this value if anything higher than that is entered.
Saving Programs

The current power and time settings (program) may be saved to internal memory by highlighting “New Name” and pressing “SAVE”, which will bring up a QWERTY keyboard for program name entry. The user may also save the current settings by selecting an existing program name and pressing “SAVE” to overwrite the previously saved program. Previously saved programs may be recalled by highlighting the desired program name and pressing “LOAD”. The Back button will return the user to the previous screen.

When entering program names for different time and power settings, utilize a dash or dot to separate words as the use of a space is not supported by this system.

System Settings

System settings allow the user to change the language, volume, brightness, and user functions. To enter this menu press the Settings Button located in the upper right hand corner of the Production or Admin Screens.
Language Settings

*BlueWave* MX-Series 1CH systems are currently available in English. The Back Button will return the user to the previous screen.

Volume Settings

The volume of the Alarm Annunciator can be adjusted using the Slider Control on the Volume Screen. Moving the Slider upward towards “MAX” increases the volume, while moving the Slider downward towards “MIN” decreases it. The volume can also be muted by pressing the Mute Box. A check mark will appear in the Mute Box if the unit is muted.

When finished, press “DONE” to save the current settings and return to the previous screen. If you do not want to save the changes, press the Back Button and you will return to the previous screen without saving any changes.
Brightness Settings

The brightness of the LCD screen can be adjusted using the Slider Control on the Brightness Screen. Moving the Slider upwards towards “MAX” increases the brightness, while moving the Slider downward towards “MIN” decreases it.

When finished, press “DONE” to save the current settings and return to the previous screen. If you do not want to save the changes, press the Back Button and you will return to the previous screen without saving any changes.

User Settings/Boot Modes

The User Button is only available while in Admin Mode and is grayed out/inactive while in Production Mode. Pressing the User Button will load the User Screen where boot mode can be selected and the admin password may be accessed.
Administrator Boot Mode

Setting the boot mode to “Administrator” will cause the Controller to enter the Admin Mode immediately following power-up. The administrator password may be accessed by pressing the Settings Button followed by the User Button. The password is entered and confirmed in the password screen via the on-screen QWERTY keyboard. The password field accepts alfa-numeric characters up to a 12-character maximum. Pressing the Return Button will save the current settings and return to the previous screen; the Back Button will return the user to the previous screen without saving any change.

When in Production Mode, to return to Administrator Mode select “PRODUCTION” and enter password.

Production Boot Mode

Setting Boot Mode to “Production” will cause the Controller to enter Production Mode immediately after power-up; no password will be required.

System Information

The System Information Screen can be accessed by pressing the Information Button in the top left corner of the Production or Admin Screens. Information such as the controller model number and the serial number, firmware revision, and run hours for the Emitter can be found here. You can also access the Alarm Screen.
Troubleshooting & Maintenance

Measuring/Checking Intensity

ACCU-CAL™ 50-LED radiometers are designed to measure intensity levels up to 40,000 mW/cm², so they can easily handle BlueWave MX-Series 1CH systems. It is also capable of exposure to temperatures up to 100°C. As with any energy source, extended exposures will cause a thermal rise of the sensor assembly, so exposure times at higher intensities (>20 W/cm²) should be limited to less than 10 seconds.

Product Cleaning

Product cleaning is limited to wiping the product with a damp cloth. Do not soak. Isopropanol Alcohol or household cleaners may be used for cleaning the product.

Alarms

When the system malfunctions, a red alarm icon will appear, along with an audible beep, on the Production or Admin Screen signaling that there is a problem. To check the
alarm codes press the red Alarm Button on the bottom of the screen. Errors codes will populate the Alarm Screen. Alarms can be reset by pressing “RESET ALARMS”.

![Figure 22. Alarm Icon](image)

![Figure 23. Alarms Screen](image)

**Alarm Codes**

Alarms are generated and displayed on the Alarm screen. The alarms include:

- Lightguide Not Installed
- Emitter Error
- Controller-Interconnect Cable
- 100, LED Over Temperature
- 103, LED Over Current
- 104, Emitter Fan Speed Low

**BlueWave® MX-250 Glass Window Replacement Instructions**

1. Before starting, disconnect power to the unit.
2. Lay the emitter on its side with the cover facing upwards. Using a 5/64” hex key, loosen and fully remove the two screws (Figure 24).

3. Remove the side cover by lifting from the bottom as shown in Figure 25.

![Figure 24. Remove Screws](image1.png) ![Figure 25. Remove Side Cover](image2.png)

4. Slide the damaged glass cover out (Figure 26), taking care not to touch the metallic reflector surfaces.

   *NOTE*: If the old window has shattered, be sure to remove all debris before attempting to install the new glass window.

5. Unwrap the new window and carefully clean with the enclosed alcohol swab. Holding the window by its sides, slide into the groove (Figure 27). Take care not to touch the glass with bare hands, as any residue left on the window can adversely affect the performance of the unit.

![Figure 26. Slide Glass Cover Out](image3.png) ![Figure 27. Insert New Glass Cover](image4.png)

6. Reinstall the side cover removed in Step 3.

7. Insert the two screws removed in Step 2 and tighten.
## Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Protection Equipment</strong></td>
<td></td>
</tr>
<tr>
<td>Protective Goggles — Green</td>
<td>35286</td>
</tr>
<tr>
<td>Protective Goggles — Gray (standard model included with unit)</td>
<td>35285</td>
</tr>
<tr>
<td>Face Shield</td>
<td>35186</td>
</tr>
<tr>
<td><strong>Radiometer</strong></td>
<td></td>
</tr>
<tr>
<td>Dymax ACCU-CAL™ 50-LED Radiometer</td>
<td>40505</td>
</tr>
<tr>
<td><strong>Stands</strong></td>
<td></td>
</tr>
<tr>
<td>Emitter Mounting Stand</td>
<td>42390</td>
</tr>
<tr>
<td>Three-Sided Acrylic Shield</td>
<td>41395</td>
</tr>
<tr>
<td>Emitter Holder Assembly Bracket (MX-150 Only)</td>
<td>42426</td>
</tr>
<tr>
<td><strong>Misc. Accessories</strong></td>
<td></td>
</tr>
<tr>
<td>5-mm Lightguide Simulator (MX-150 Only)</td>
<td>36987</td>
</tr>
<tr>
<td>5-mm x 1,000-mm Liquid Lightguide (MX-150 Only)</td>
<td>35102</td>
</tr>
<tr>
<td>3-mm x 1,000-mm Bifurcated Guide (5-mm Rod) (MX-150 Only)</td>
<td>37043</td>
</tr>
<tr>
<td>Adjustable Focusing Lens (MX-150 Only)</td>
<td>41148</td>
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## Spare Parts

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td><strong>Emitters</strong></td>
<td></td>
</tr>
<tr>
<td><em>BlueWave MX-150, VisiCure (405 nm)</em></td>
<td>42338</td>
</tr>
<tr>
<td><em>BlueWave MX-150, PrimeCure (385 nm)</em></td>
<td>42337</td>
</tr>
<tr>
<td><em>BlueWave MX-150, RediCure (365 nm)</em></td>
<td>42336</td>
</tr>
<tr>
<td><em>BlueWave MX-250, VisiCure (405 nm)</em></td>
<td>42808</td>
</tr>
<tr>
<td><em>BlueWave MX-250, PrimeCure (385 nm)</em></td>
<td>42807</td>
</tr>
<tr>
<td><em>BlueWave MX-250, RediCure (365 nm)</em></td>
<td>42806</td>
</tr>
<tr>
<td><strong>Power Cords</strong></td>
<td></td>
</tr>
<tr>
<td>Power Cord, North America</td>
<td>35255</td>
</tr>
<tr>
<td>Power Cord, Type G</td>
<td>40542</td>
</tr>
<tr>
<td><strong>Key System Components</strong></td>
<td></td>
</tr>
<tr>
<td>AC Power Supply</td>
<td>42144</td>
</tr>
<tr>
<td>Foot Pedal</td>
<td>40402</td>
</tr>
<tr>
<td>Interconnect Cable Assembly</td>
<td>42287</td>
</tr>
<tr>
<td>MX-250 Emitter Glass Replacement Kit</td>
<td>42929</td>
</tr>
</tbody>
</table>
# Specifications

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emitter</strong></td>
<td></td>
</tr>
<tr>
<td>RediCure</td>
<td></td>
</tr>
<tr>
<td>PrimeCure</td>
<td></td>
</tr>
<tr>
<td>VisiCure</td>
<td></td>
</tr>
<tr>
<td><strong>Typical Intensity Output</strong></td>
<td></td>
</tr>
<tr>
<td>MX-150*</td>
<td>24 W/cm²</td>
</tr>
<tr>
<td>MX-250**</td>
<td>680 mW/cm²</td>
</tr>
<tr>
<td>At Array Surface</td>
<td>255 mW/cm²</td>
</tr>
<tr>
<td>At 25 mm</td>
<td>355 mW/cm²</td>
</tr>
<tr>
<td></td>
<td>1,090 mW/cm²</td>
</tr>
<tr>
<td>Output Frequency</td>
<td>365 nm</td>
</tr>
<tr>
<td></td>
<td>385 nm</td>
</tr>
<tr>
<td></td>
<td>405 nm</td>
</tr>
<tr>
<td>Power Supply Input</td>
<td>100-240V≈ 2.5A, 50-60Hz</td>
</tr>
<tr>
<td>LED Timer</td>
<td>0.1 to 999 seconds, max (timer accuracy 0.1%)</td>
</tr>
<tr>
<td>LED Activation</td>
<td>Foot pedal, LCD touchscreen, or PLC</td>
</tr>
<tr>
<td>Cooling</td>
<td>Air cooled</td>
</tr>
<tr>
<td>Controller Dimensions</td>
<td></td>
</tr>
<tr>
<td>(W x D x H)</td>
<td>3.74&quot; x 6.26&quot; x 5.77&quot; [9.5 cm x 15.9 cm x 7.9 cm]</td>
</tr>
<tr>
<td>Emitter Dimensions</td>
<td></td>
</tr>
<tr>
<td>(W x D x H)</td>
<td>MX-150: 1.97&quot; x 1.97&quot; x 7.9&quot; [5 cm x 5 cm x 20.06 cm]</td>
</tr>
<tr>
<td></td>
<td>MX-250: 1.97&quot; x 1.97&quot; x 7.6&quot; [5 cm x 5 cm x 19.3 cm]</td>
</tr>
<tr>
<td>Weight</td>
<td>Controller: 2.6 lbs. [1.18 kg]</td>
</tr>
<tr>
<td></td>
<td>MX-150 Emitter: 1.4 lbs. [0.64 kg]</td>
</tr>
<tr>
<td></td>
<td>MX-250 Emitter: 1.64 lbs. [0.74 kg]</td>
</tr>
<tr>
<td>Unit Warranty</td>
<td>1 year from purchase date</td>
</tr>
<tr>
<td>Operating Environment</td>
<td>10 to 40°C (50°F to 104°F)</td>
</tr>
</tbody>
</table>

* MX-150 measured using Dymax ACCU-CAL™ 50-LED radiometer with a 5-mm lightguide at a distance of 0 mm.
** MX-250 measured using Dymax ACCU-CAL™ 50-LED radiometer in flood mode.
Figure 28. *BlueWave MX-150 Spectral Output*

![Graph showing spectral output for RediCure, PrimeCure, and VisiCure for BlueWave MX-150.](image)

- **RediCure**
- **PrimeCure**
- **VisiCure**

Figure 29. *BlueWave MX-250 Spectral Output*

![Graph showing spectral output for RediCure, PrimeCure, and VisiCure for BlueWave MX-250.](image)

- **RediCure**
- **PrimeCure**
- **VisiCure**
Figure 30. Dimensions - Controller

Figure 31. Dimensions – BlueWave MX-150 Emitter
Figure 32. Dimensions – BlueWave MX-250 Emitter
Validation

Tests should be conducted prior to production to determine the time and light intensity required to fully cure your resin. The following approaches may be used to validate the curing process.

Set Exposure Time, Determine Intensity

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

Set Intensity, Determine Exposure Time

Users can specify light intensity and, through empirical testing, determine the exposure time required to achieve a full cure. As with any manufacturing process, it is advisable to incorporate a safety factor.

Contact the Dymax Application Engineering Team for additional process support.

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 adjust the output to a specific intensity level. To ensure consistent and repeatable process results, intensity levels should be monitored with a radiometer. This enables users to identify light intensity changes and take corrective action (either adjusting the light intensity or performing maintenance).
Warranty

From date of purchase, Dymax Corporation offers a one-year warranty against defects in material and workmanship on all system components with proof of purchase and purchase date. Unauthorized repair, modification, or improper use of equipment may void your warranty benefits. 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.

**IMPORTANT NOTE:** 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 above are limited to this authorization.
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Please note that most 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 standard Conditions of Sale published on our website. Dymax recommends that any intended application be evaluated and tested by the user to ensure 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.