

# EC-2™

## User Manual

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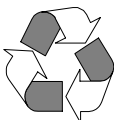
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S.G.



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# Warranty Information

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## Limited Warranty

Unless otherwise stated, your *product* is covered by a two year parts and labor limited warranty. Dichroic filters are not guaranteed against breakage or scratches to coating. It is the owner's responsibility to furnish receipts or invoices for verification of purchase, date, and dealer or distributor. If purchase date cannot be provided, date of manufacture will be used to determine warranty period.

## Returning an Item Under Warranty for Repair

It is necessary to obtain a Return Material Authorization (RMA) number from your dealer or point of purchase BEFORE any units are returned for repair. The manufacturer will make the final determination as to whether or not the unit is covered by warranty. Lamps are covered by the lamp manufacturer's warranty.

Any Product unit or parts returned to High End Systems must be packaged in a suitable manner to ensure the protection of such Product unit or parts, and such package shall be clearly and prominently marked to indicate that the package contains returned Product units or parts and with an RMA number. Accompany all returned Product units or parts with a written explanation of the alleged problem or malfunction. Ship returned Product units or parts to: 2105 Gracy Farms Lane, Austin, TX 78758 USA.

*Note: Freight Damage Claims are invalid for fixtures shipped in non-factory boxes and packing materials.*

## Freight

All shipping will be paid by the purchaser. Items under warranty shall have return shipping paid by the manufacturer only in the Continental United States. Under no circumstances will freight collect shipments be accepted. Prepaid shipping does not include rush expediting such as air freight. Air freight can be sent customer collect in the Continental United States.

REPAIR OR REPLACEMENT AS PROVIDED FOR UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. HIGH END SYSTEMS, INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO ANY PRODUCT, AND HIGH END SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. HIGH END SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGE, INCLUDING LOST PROFITS, SUSTAINED OR INCURRED IN CONNECTION WITH ANY PRODUCT OR CAUSED BY PRODUCT DEFECTS OR THE PARTIAL OR TOTAL FAILURE OF ANY PRODUCT REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE, AND WHETHER OR NOT SUCH DAMAGE WAS FORESEEN OR UNFORESEEN.

Warranty is void if the product is misused, damaged, modified in any way, or for unauthorized repairs or parts. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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# Introduction

The Environmental Color-2 (EC-2™) fixture is a fully weatherized luminaire designed as a reliable high-performance solution for a variety of architectural settings. The EC-2 reflector is based on the patented reflector technology introduced in Technobeam® and uses the same long life MSD 250/2 lamp. High-efficiency optical design in combination with full CMY (cyan, magenta and yellow) subtractive color mixing system provides smooth infinite color mixing.

## Features

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- High-resolution DMX 512 Control.
- TalkBack feature support to allow bi-directional communication between an EC-2 fixture on a DMX link and a controller with TalkBack capabilities. HandShake™ and Whole Hog™ controllers from High End Systems can utilize TalkBack with EC-2 and Color Pro Series fixtures.
- High efficiency 2000 hour MSD 250/2 lamp developed by Philips® Lighting Co. in conjunction with High End Systems®, Inc. for long lamp life.
- CMY subtractive color mixing
- Precision stepper motors used to control dim flags, and color wheels.
- Time code synchronization in stand-alone mode via Master/Slave links (synchronized preset playback) to any combination of Color Pro® series, EC-1®, ES-1™, Technobeam®, Studio Color® 575, Studio Spot®, Studio Color® 250, Studio Spot® 250 and Studio Beam™ fixtures.
- Variable-speed strobe.
- Full dimming and fade-to-black.
- Yoke assembly to facilitate mounting.
- Power factor correction.
- LED status indicators on board.
- Precision stepper motors.
- Remote fixture power up and shut down.

# Caution and Warning Symbols

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The following international symbols appear in margins throughout this manual to highlight caution and warning messages:

## Cautions

Not heeding these messages could result in personal injury and/or damage to equipment.



**Caution:** This symbol indicates caution messages.



**Hot Surface:** This symbol indicates a hot surface.

## Warnings

Not heeding these messages could result in serious personal injury.



**Warning:** This symbol indicates high voltage warning messages.



**Fire Hazard:** This symbol indicates that a fire hazard is present.



**Eye Protection:** This symbol indicates that eye protection is required.



**Explosion:** This symbol indicates an explosion hazard.



**Minimum Distance:** This symbol indicates the minimum distance to a lighted object, which in this case is 1 meter.



**Not Suitable for mounting directly on normally flammable surfaces.**

# Specifications

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## Electrical Specifications



**Warning:** Class 1 equipment - This equipment must be earthed.

Factory setting: 277V, 60Hz

Selectable voltages: 100V, 50/60Hz, 3.75A  
120V, 50/60Hz, 3.13A  
208V, 50/60Hz, 1.8A  
230V, 50/60Hz, 1.6A  
277V, 50/60Hz, 1.35A

Rated power: 375 W

Fuses: F1 - 6.3A, 250V, Slow Blow only (5 mm x 20 mm)  
F2 - 3.5A, 250V, Slow Blow only (5 mm x 20 mm)

## Physical Specifications

Fixture Type EC-2  
Height 20.27 in. (514.9 mm)  
Width 10 in. (254 mm)  
Depth 16.72 in. (424.7 mm)  
Weight 46 lbs. (20.9 kg)

For additional dimensions, refer to Figure intro-1.

## Lamp Specifications

Lamp type: MSD 250/2, 250 watt, metal halide lamp, GY 9.5 base

Color temperature: 6500 K

## Environmental Specifications



**Minimum distance to flammable objects: 1.0m (3.28ft)**

**Minimum distance to lighted object: 1.0m (3.28ft)**



**Maximum ambient temperature, (T<sub>a</sub>): 40°C (104°F)**

**Maximum exterior surface temperature: 212°C (176°F)**



**Not Suitable for mounting directly on normally flammable surfaces.**

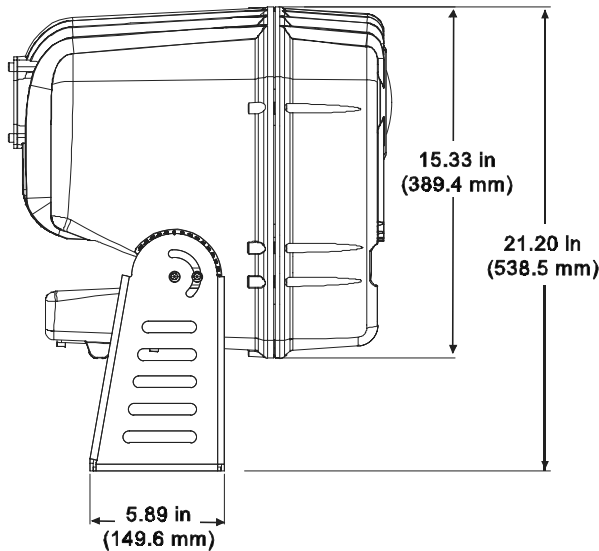
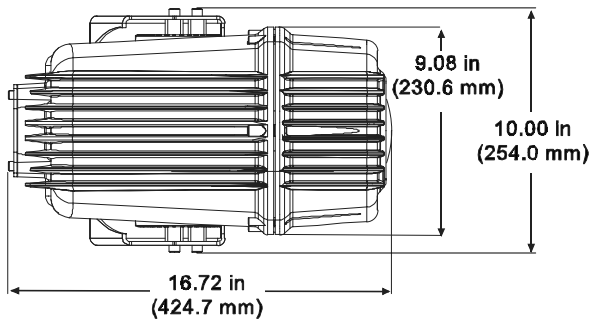


Figure intro-1. EC-2 Dimensions

## Cable and Connector Specifications

### DMX 512 data cables:

Belden® 1419A or equivalent (meets specifications for EIA RS-485 applications) with the following characteristics:

- 2 twisted pairs (4 conductors) plus a shield
- maximum capacitance between paired conductors—30 pF/ft.
- maximum capacitance between conductor and shield—55 pF/ft.
- maximum resistance of 20Ω/1000 ft.
- nominal impedance 120Ω

Pin	Function	Color Code
Pin 1	Common	Shield
Pin 2	DMX Data –	White/Blue Stripe
Pin 3	DMX Data +	Blue/White Stripe
Pin 4	Aux Data –	White/Orange Stripe
Pin 5	Aux Data +	Orange/White Stripe

## DMX 512 data connectors:

Standard: DMX data connectors hardwired into a pluggable terminal strip

Optional: 5-pin male and female XLR connectors

## DMX 512 data terminator:

120Ω resistor

# Optional Accessories

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The following table lists the EC-2 optional accessories available from your High End Systems dealer/distributor.

*Table intro-1 Optional Accessories*

<b>Part Description</b>	<b>Part Number</b>
Replacement Philips® MSD250/2 lamp	55030051
Whole Hog® II Lighting Console	25020001
Handshake handheld controller	10020001
Neutrik 5-to-3 pin XLR convertor set	55050015
Neutrik 3-to-5 pin XLR convertor set	55050016
Heavy Duty 5-pin XLR cable (10')	55050017
Heavy Duty 5-pin XLR cable (25')	55050018
Heavy Duty 5-pin XLR cable (50')	55050019
Heavy Duty 5-pin XLR cable (100')	55050020
Galvanized safety cable	12040001
Narrow-angle pebble convex lens	99090052
Medium-angle pebble convex lens	99090051
Wide-angle pebble convex lens	99090050
Lens guard	99260367
Glare block	80071583
Lightwave Research® Upload Dongle	26040002
5-pin XLR Wallplate	49040001



# Chapter 1

# Setup and Installation

This chapter presents an overview of setup and installation considerations as well as instructions on setting the fixture voltage, setting the beam angle, and setting the DMX 512 start channel. For specific instructions on mounting and wiring instructions, see the *EC-2 Installation Guide* that was shipped with your fixture.

## Mounting Considerations

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- Caution:**
- 1) **Not Suitable for mounting directly on normally flammable surfaces.**
  - 2) **Maintain a minimum distance of 1 m (3.28 ft.) from combustible materials.**
  - 3) **Maintain a minimum distance of 1 m (3.28 ft.) from lighted object. This means the fixture must be positioned at least 1 meter away from the object it is illuminating.**

The EC-2 fixture is designed for surface mounting on the ground or a wall. Ceiling and truss-mounting are not recommended using the EC-2 fixture's installed yoke. If you adapt the fixture for a non-recommended application, verify the truss or other support will handle the weight of *all* the devices you are mounting. Each EC-2 fixture weighs 46 lbs. (20.9kg).

*Note: Certain orientations in ceiling mounting will make the fixture's logic board susceptible to heat damage since the EC-2 has no fan and uses only natural convection for cooling.*

For instructions on mounting the EC-2, see the **Installation Guide** that came with your fixture.

## Wiring Considerations

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EC-2 requires installation by a qualified electrician according to the local electrical codes. The EC-2 is designed for permanent installation using conduit. Use Data grade cables specified in "Cable and Connector Specifications" on page Intro-4. For complete wiring instruction, see the **EC-2 Installation Guide** that came with your fixture.

## Terminating the Fixture

EC-2 fixtures are shipped with a package including one 120 ohm resistor for terminating the fixture. When mounting the fixture in a standalone application, the termination resistor must be attached to pins 2 and 3 of the data connector as shown in Figure 1-3). If you are adding the EC-2 to a link, see “Terminating the Link” on page 1-6.

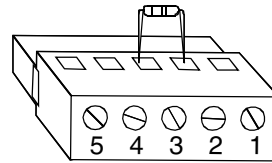


Figure 1-1. Termination resistor placement

## Setting/Changing the Fixture Voltage

EC-2 fixtures are factory-set to 277V, 60Hz. If your power source differs, you must change the fixture’s input voltage to match your power source. EC-2 has a selectable input voltage that allows you to choose 100V, 120V, 208V, 230V, or 277V at 50 or 60 Hertz frequency. The voltage range for each setting is  $\pm 10$  percent. For example, if you have a 220V or 240V power source, use the 230V input setting.



**Warnings:** 1) Disconnect power before servicing.

2) This fixture must be serviced by qualified personnel. The information in this section is intended to assist qualified service personnel only.

3) Be sure to match the voltage selection jumper to your power source prior to operating this equipment.

You will need:

- 1/4 in. allen wrench
- small flathead screwdriver
- small phillips screwdriver

To change the fixture’s voltage or frequency setting:

1. Disconnect power to the fixture.
2. Use the 1/4 in. allen wrench to loosen the tilt screws on both sides of the yoke and rotate the fixture to the position shown in Figure 1-2. Tighten the tilt screws. Use a small, flathead screwdriver to loosen the access panel retaining screws and remove the access panel.
3. Locate the voltage and frequency jumpers on the logic board (see Figure 1-3).

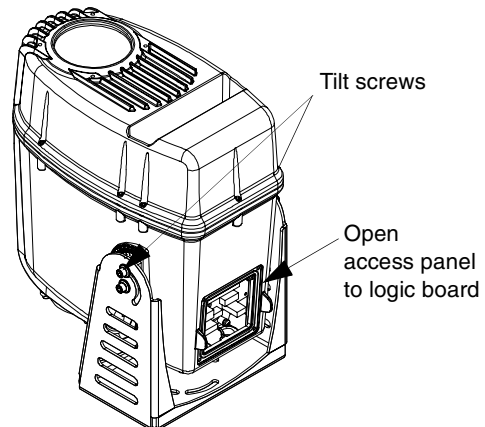


Figure 1-2. Rotate fixture and open access panel



4. To move a jumper, use the small phillips screwdriver to loosen the screw that secures the jumper end to the voltage or frequency contact. Remove the jumper end and re-insert it behind the screw for the desired voltage or frequency contact (see Figure 1-4). After you move the jumper, tighten its corresponding screw to secure the jumper to the pin.

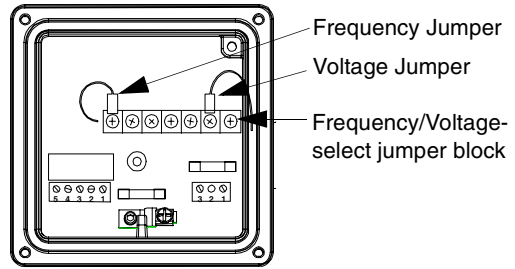


Figure 1-3. Logic board

5. After changing the voltage and/or frequency jumper, check that all the terminal screws are tightened securely.
6. Reattach the access panel. *Tighten the panel screws to a torque setting between 3–4 ft.lb. (4–5 Nm)* This action is needed to ensure a weather-tight seal.

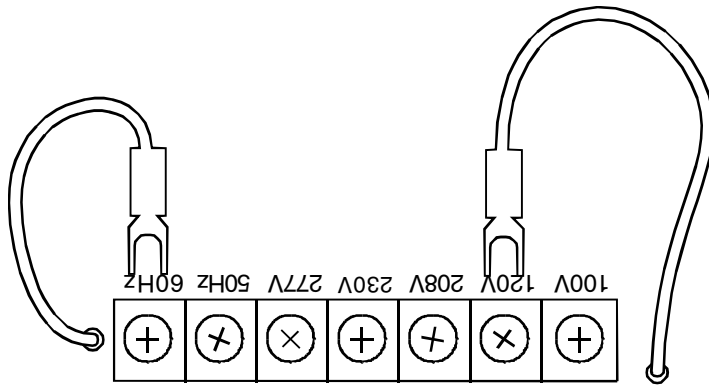
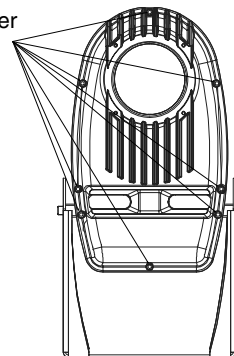


Figure 1-4. Set jumpers to correct frequency and/or voltage

## Setting/Changing the Beam Angle

The standard EC-2 fixture is shipped with a medium pebble convex lens and an internal zoom lens. The zoom lens can be positioned manually to obtain four different beam angles.

Perimeter  
Screws



### Positioning the Zoom Lens

To set or change the angle by adjusting the zoom lens, you will need:

3/16in. allen wrench

To adjust the angle:

1. Loosen the eight perimeter screws with a 3/16in. allen wrench to open the housing, (see Figure 1-5).

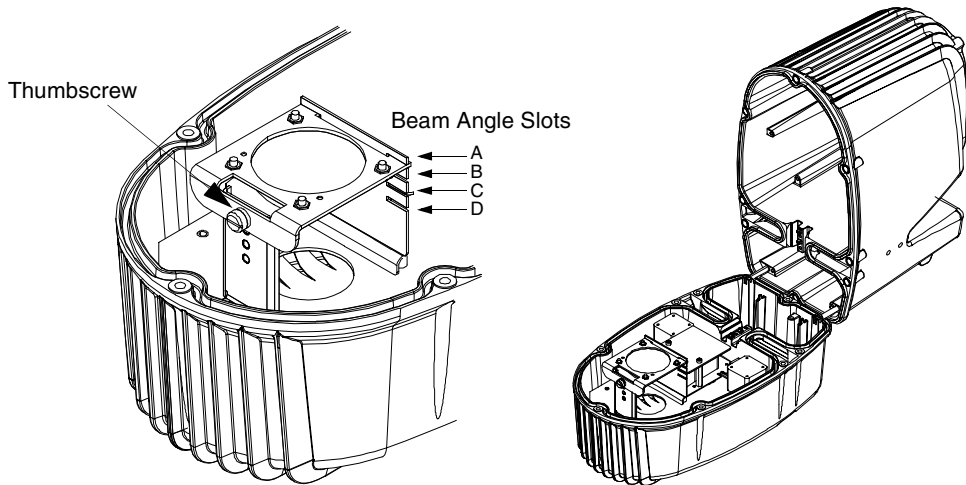


Figure 1-6 Locating the Beam Angle Slots

2. Slide the front housing forward and tilt into position to access the lens, (see Figure 1-6).
3. Loosen the thumbscrew on the lens assembly
4. Move the zoom lens into the correct slot for the beam angle you select. Table 1-1 shows the field angle metrics for each setting.
5. Retighten the thumbscrew.
6. Check that the housing gasket is secure.
7. Ensure that cables are not trapped; then raise the front housing and secure the top screw first.
8. Tighten the remaining perimeter screws in the order indicated in Figure 1-7 equalizing the torque to ensure a weathertight seal.

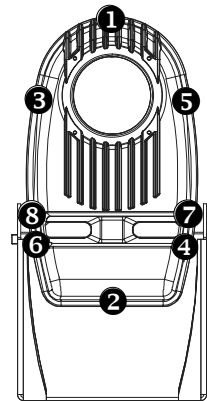


Figure 1-7 Screw tightening order

Table 1-1 EC-2 Field Angles

Zoom Lens Position	Pebble Convex Lens Type*		
	Narrow	Medium	Wide
A	18°	22°	28°
B	20°	24°	30°
C	23°	27°	33°
D	25°	29°	35°

*\*Note: The EC-2 fixture is shipped with a medium pebble convex lens as standard. Narrow- or Wide-angle lens are also available. See “Optional Accessories” on page Intro-5.*

## Changing the Convex Lens

You can also adjust the beam angle by replacing the pebble convex lens. To replace the convex lens you will need:

- 3/16in. allen wrench
- 10/24in. allen wrench

To replace the convex lens:

1. Loosen the front housing perimeter screws with a 3/16 allen wrench and open the fixture, (see Figure 1-5 and Figure 1-6).
2. Use the 10/24in. allen wrench to loosen the three socket screws which hold the optical assembly into the front housing as shown in Figure 1-8. Lift optical module up to expose the front lens retaining ring.
3. Use the 10/24in. allen wrench to loosen the four socket screws around the retaining ring. Remove ring and inner rubber seal.
4. Remove lens, leaving the outer rubber seal in place.
5. Insert new lens. Replace inner rubber seal. Secure retaining ring with 3–4ft.lbs (4–5Nm) torque.
6. Replace and secure optical module.
7. Ensure that cables are not trapped; then raise the front housing and secure the top screw first.
8. Tighten the remaining perimeter screws in the order indicated in Figure 1-7 equalizing the torque to ensure a weathertight seal.

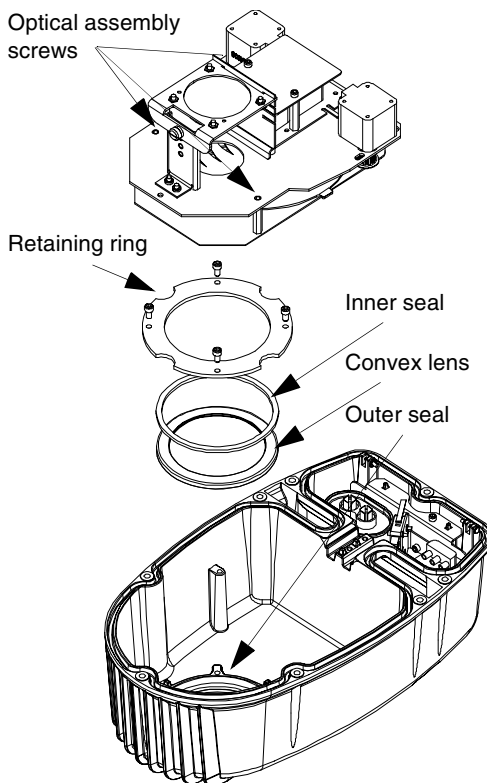


Figure 1-8 Convex lens assembly

## Linking Fixtures

The 8-channel protocol allows you to link up to 64\* EC-2 fixtures on one DMX universe.

*\*Note: You must use a DMX splitter to connect more than 32 fixtures per link. Connecting more than 32 devices per link without a DMX splitter will eventually deteriorate the digital signal. The 32 device limit complies with the EIA-485 standard.*

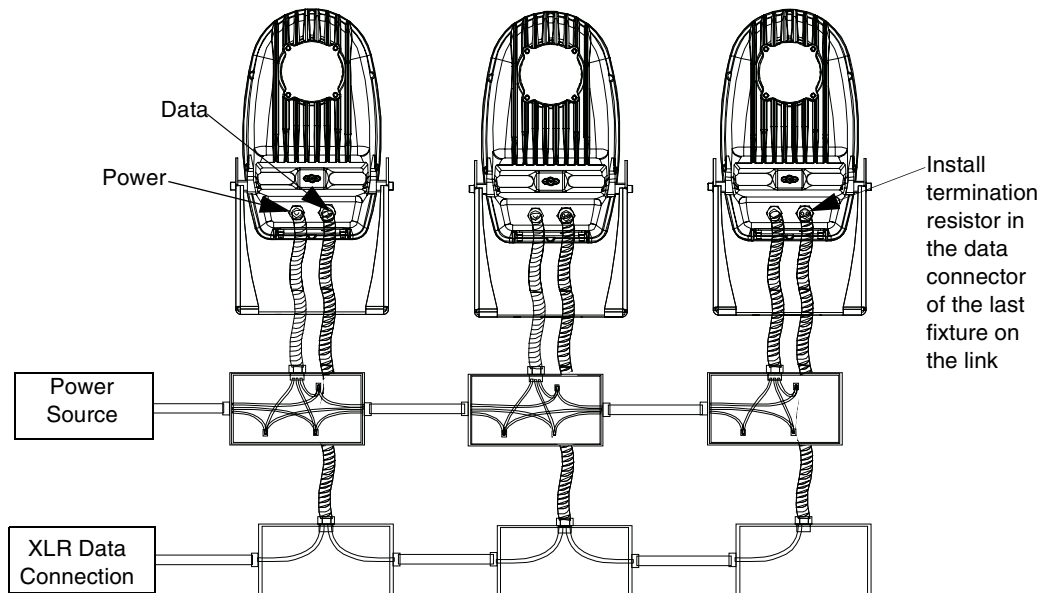


Figure 1-9. Linking the fixtures.

To link fixtures to a controller and/or to each other with conduit requires data cabling. If you choose to construct your own cabling, it must adhere to the specifications listed in “Cable and Connector Specifications” on page Intro-4.

Fixtures must be linked in a “daisy chain” as shown in Figure 1-9 to allow for accurate data transfer.

## Terminating the Link

Each EC-2 fixture is shipped with a termination resistor. When linking fixtures together, only the last fixture on the link is terminated. EC-2 fixtures are terminated by inserting the resistor in pins 2 and 3 of the data connector as shown in Figure 1-1 on page 1-2.

For complete instructions on linking EC-2 fixtures, see the installation guide that came with your fixture.



**Caution:** High End Systems does *not* recommend running your fixtures off a dimmer.

## Powering on the Fixture



**Warning:** This equipment for connection to a branch circuit having a maximum overload protection of 20A.

EC-2 fixtures do not have a power switch and is intended for a connection to a power source with a disconnect that meets all national and local electrical code requirements.

Once connected, you can remotely power up or shutdown the fixture via the Control channel (see “Programming with a DMX Controller” on page 2-2). However, it is very important that you disconnect power from the fixture before performing adjustment, maintenance, and service procedures shown in this manual.

## Homing the Fixture

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The fixture’s homing procedure verifies that the major functions of the fixture (color wheels and dim wheel) are oriented properly. The homing procedure is also used to bring the fixture out of shutdown mode.

When you connect any EC-2 fixture to an appropriately-rated power source, the fixture automatically begins a homing procedure. You can also remotely home the fixture via the Control channel (see “Programming with a DMX Controller” on page 2-2).

At the end of the homing procedure, the fixture lamp will strike and the shutter will open if there is no incoming DMX data. This allows for focusing and testing prior to programming. If the EC-2 is receiving DMX data, it will end the homing procedure in whatever state the DMX data defines for the fixture.

## Assigning a DMX Start Channel

---

The DMX start channel identifies each unique fixture on a DMX link. If you plan to control your fixtures with a DMX controller (or using synchronized preset playback), you must assign a DMX start channel to each fixture on the link. However, if you *always* plan to use the fixture in stand-alone mode (without a controller or synchronized preset playback), you can skip this section.

There are 512 available channels on each DMX link. These 512 channels are divided among *all* the devices on a particular link. The number of channels each fixture requires is called the fixture’s channel range. The DMX start channel is the first channel available to a fixture in its channel range. EC-2 fixtures have an 8-channel range. The fixture’s channel range must not overlap any other device’s channel range on the link.\* When two devices on the same DMX 512 link have overlapping channel ranges, one or both devices will be disabled or behave erratically.

*\*Note: The single exception to the non-overlapping rule is if you want the fixtures to respond to controller commands in exactly the same way. In this case, the fixtures must be the same type and be assigned the same protocol and the fixtures must share the entire channel range.*

If you plan to mix different fixture types (and/or protocols) on the same DMX link, see “Determining the Unique DMX 512 Start Channel” on page 1-8. If your DMX link will have only EC-2 fixtures, see Table A-1 on page A-1 for a listing of available DMX start channels for successive fixtures on the link.

## Determining the Unique DMX 512 Start Channel

To determine each fixture's DMX start channel in a link, you must know the number of channels used by each fixture. Knowing that the first fixture on the link will use DMX start channel 1, you can determine the DMX start channel for each successive fixture by adding the number of DMX channels used by the fixture to the fixture's DMX start channel. For example, in Table 1-9, 8 (channels used by EC-2) + 1 (DMX start channel for the first fixture) = 9 (DMX start channel for the next fixture on the link).

Table 2-9. Example: Determining the DMX 512 Start Channel

Fixture location on the link*	Fixture name	DMX 512 channels used per fixture	DMX 512 start channel	Channel range used
First	EC-2	8 channels	C001	1-8
Second	Other Device (using 14 channels)	14 channels	C009	9-22
Third	EC-2	8 channels	C023	23-30

*\*Note: The fixture location on the link does not have to comply with this example. The fixtures can be addressed in any order on the link.*

If you have other fixtures in the link or plan to skip channels, note that the maximum address for the last EC-2 fixture on the link is 505.

# Chapter 2

## Operating the Fixture

The EC-2 can be programmed for operation with a DMX-compatible controller or with preset programming (for stand-alone operation). Handshake™ and the Whole Hog® II controllers are the High End Systems controllers available with TalkBack capabilities. This chapter provides a programming overview, EC-2 DMX protocol and the TalkBack parameters available.

### Programming Overview

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A *construct* is a specific feature of the fixture that helps to define the “look” of the light beam (such as the color, effect, or dim level). A *scene* is a combination of all the available construct values you selected. When you play back more than one scene in sequence, it becomes a *program*. A program that continuously repeats is called a *loop*.

Some constructs allow you to choose a construct value set by MSpeed (motor speed). Unlike other construct values which are completed in the shortest length of time after the motor starts moving, an MSpeed change occurs smoothly over the entire MSpeed time value you select. For example, if you select an MSpeed time of 30 seconds, the motor will gradually change position until it reaches its new destination at the end of 30 seconds.

Using a DMX controller, you can program an unlimited number of sequences and retain direct control over the EC-2 fixtures at all times. You may choose to save time by programming your fixtures using a controller and then capturing the scene(s) to the on-board memory of multiple EC-2 fixtures.\*

*\*Note: Because controllers do not transmit crossfade or delay construct values, you must use preset programming to manually set those construct values for each fixture.*

You can use either a controller or the fixture’s on-board memory to create and play back scenes, but not both at the same time. In other words, you cannot create a scene using preset programming and play it back using a DMX controller. You also cannot use a controller while on-board scenes are playing.

You can synchronize preset playback among all fixtures with no DMX controllers connected to the link. During synchronized preset playback, the *master fixture* (the fixture assigned DMX start channel 1) synchronizes playback for all fixtures.

# Programming with a DMX Controller

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When you program your fixtures with a DMX controller, you use the controller to assign a value to each of the fixture's available constructs. Each construct is assigned to a specific DMX channel in the fixture's channel range.

Handshake™ and the Whole Hog® II Lighting Console are the DMX controllers available from High End Systems for EC-2 fixtures (see “Optional Accessories” on page Intro-5). Both of these controllers utilize TalkBack to allow remote access to parameters of High End Systems fixtures.

Each High End Systems fixture has a number that uniquely identifies the fixture. High End Systems fixtures are also capable of bi-directional communications.

Talkback requires a discovery process to find the unique number that is embedded inside each fixture, similar to a serial number. Whatever controller is being used that supports Talkback will go out and utilize a discovery process to find all the fixtures connected to the link.

Once the fixtures have all been identified, using the Talkback protocol, all the current fixture parameter settings and information can be discovered. Fixture discovery can happen at anytime, but the Talkback messages are only valid after the fixture has completed homing, so it will not respond to any talkback message until homing is complete.

TalkBack is implemented through the primary DMX link (pins 2-3) in a half-duplex communication mode. This means that it does not require pins 4-5 to be connected or used to receive talkback messages coming from the fixture.

*Note: If a conventional DMX data splitter is used between the fixture and the controller sending talkback commands, then the fixture data will not be able to return through the data splitter. The same holds true for any type of DMX processing device which regenerates the data link between its input and output (this includes HES Intellabeam fixtures and AF1000 strobes).*

For more information on whether your DMX controller will support EC-2 fixtures, and TalkBack™ contact the controller's vendor.

Table 2-1 lists the EC-2 constructs and their corresponding DMX controller values. If you have a numeric-type controller, use the Value Decimal (dec.) column. If you have a fader-type controller, use the Value Percentage (%) column. If your controller allows you to program hex values, use the Value (hex) column. The % values in the table may vary slightly depending on your controller's rounding convention.



Table 2-1 EC-2 DMX Protocol

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
1	Dim	Continuous Positioning (closed to open)	0-255	0-100	00-FF
2	Shutter <i>(Note: Snap instantly opens or closes at full speed. Ramp opens or closes at specified speeds.)</i>	Close	0-31	0-12	00-1F
		Periodic Strobe (Variable)	32-63	13-25	20-3F
		Random/Rand Strobe (Variable)	64-95	25-37	40-5F
		Random/Sync (Variable)	96-127	38-50	60-7F
		Ramp Open/Ramp Shut (Variable)	128-159	50-62	80-9F
		Random Ramp/Ramp (Variable)	160-191	63-75	A0-BF
		TBD ( <i>Reserved for future use</i> )	192-223	75-88	C0-DF
		Open	224-255	88-100	E0-FF
3	Color Function	<b>Full Speeds</b>			
		Continuous	0-15	0-6	00-0F
		TBD	16-31	6-12	10-1F
		TBD	32-47	13-18	20-2F
		Spin (Puts all the color wheels in spin mode. Wheel spin speed, direction, or fixed position can be set individually on Red, Green, and Blue channels)	48-63	19-25	30-3F
		Cycle (3 wheels use color mix portion to cycle colors. Rate set by Red channel)	64-79	25-31	40-4F
		Color Scan (Puts all the color wheels in scan mode. Scans only the continuous color portion of the wheel - not the open "white" portion. Fixed position or scanning speed can be set individually on Red, Green, and Blue channels)	80-95	31-37	50-5F
		Random (3 wheels perform pseudo-random color chase. Rate set by Red channel)	96-111	38-44	60-6F
		Blink (Closes shutter between color wheel changes. Blink Mode is defined using continuous wheel operation)	112-127	44-50	70-7F
		<b>MSpeed Controlled (same functional descriptions as Full Speeds)</b>			
		Continuous	128-143	50-56	80-8F
		TBD	144-159	57-62	90-9F
		TBD	160-175	63-69	A0-AF
		Spin	176-191	69-75	B0-BF
		Cycle	192-207	75-81	C0-CF
		Color Scan	208-223	82-88	D0-DF
		Random	224-239	88-94	E0-EF
		Blink	240-255	94-100	F0-FF

Table 2-1 EC-2 DMX Protocol

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
4	Red (-Cyan)	<b>Continuous Mode</b>			
		Full Red	0	0	00
		Open	255	100	FF
		<b>Spin Mode</b>			
		Continuous Positioning	0-127	0-50	00-7F
		Spin Reverse fastest (variable)	128-157	50-62	80-9D
		Spin Reverse slowest (variable)	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3
		Spin Forward slowest (variable)	196-225	77-88	C4-E1
		Spin Forward fastest (variable)	226-255	89-100	E2-FF
		<b>Color Scan Mode</b>			
		Continuous Positioning	0-127	0-50	00-7F
		Scanning (slow to fast)	128-255	50-100	80-FF
		<b>Cycle &amp; Random Modes</b>			
		Slow Rate	0	0	00
		Fast Rate	255	100	FF
5	Green (-Magenta)	<b>Continuous Mode</b>			
		Full Green	0	0	00
		Open	255	100	FF
		<b>Spin Mode</b>			
		Continuous Positioning	0-127	0-50	00-7F
		Spin Reverse fastest (variable)	128-157	50-62	80-9D
		Spin Reverse slowest (variable)	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3
		Spin Forward slowest (variable)	196-225	77-88	C4-E1
		Spin Forward fastest (variable)	226-255	89-100	E2-FF
		<b>Color Scan Mode</b>			
		Continuous Positioning	0-127	0-50	00-7F
		Scanning (slow to fast)	128-255	50-100	80-FF
6	Blue (-Yellow)	<b>Continuous Mode</b>			
		Full Blue	0	0	00
		Open	255	100	FF
		<b>Spin Mode</b>			
		Continuous Positioning	0-127	0-50	00-7F
		Spin Reverse fastest (variable)	128-157	50-62	80-9D
		Spin Reverse slowest (variable)	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3

Table 2-1 EC-2 DMX Protocol

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)	
6 cont.	Blue (-Yellow) cont.	Spin Forward slowest (variable)	196-225	77-88	C4-E1	
		Spin Forward fastest (variable)	226-255	89-100	E2-FF	
		<b>Color Scan Mode</b>				
		Continuous Positioning	0-127	0-50	00-7F	
		Scanning (slow to fast)	128-255	50-100	80-FF	
7	MSpeed	(see Table A-2 on page A-2)				
8	Control (Note: The Shutter channel must be set to "0" to access Control channel settings.)	Safe (disables all Control settings)	0-9	0-4	00-09	
		Home	60-68	24-27	3C-44	
		Lamp On	80-88	31-35	50-58	
		Lamp Off	90-98	35-38	5A-62	
		Shutdown*	120-130	47	78	

\*Note: Fixture shutdown allows you to remotely deactivate the fixture. When a fixture is shut down, the lamp is extinguished, and power to the motors is disabled. If a fixture is in shutdown mode, you must home the fixture to bring it back into operation.

## EC-2 Parameters

Table 2-2 describes the parameters available on the EC-2 fixture for configuration by a controller with DMX TalkBack capabilities. The HandShake™ controller from High End Systems provides access to all of these parameters. If you are using another DMX controller, check with the manufacturer to determine which parameters you can access.

Table 2-2 TalkBack parameters available on EC-2 fixtures

Parameter	Options	Description
<b>Settings</b>		
Factory Defaults	Off	When you set this parameter on, all factory options return to their default settings. The factory defaults for EC-2 are: <ul style="list-style-type: none"> <li>• Preset play mode—Off</li> <li>• Lamp Life Limit—Disabled</li> <li>• Data Loss—Short time-out</li> </ul>
	On	
Fixture Channel*	C###	Identifies the starting DMX address offset for the fixture. The EC-2 channel number can range from 1–505.
Lamp Limit Enabled	Off	Turn this parameter on to monitor the lamp life. When the lamp hours are 10% past the rated lamp life, the lamp will not strike. This is a safety feature to reduce potential lamp explosion.
	On	

Table 2-2 TalkBack parameters available on EC-2 fixtures

Parameter	Options	Description
User Mode	A	Use this parameter to switch the user type between User A and User B. Each user type includes values for Fixture Channel, Lamp Limit Enabled, Preset Play Mode, and Data Loss parameters and 16 different preset scenes to give the fixture its total of 32 possible preset scenes.
	B	
Preset Play Mode	Off	This parameter puts the EC-2 into Preset Playback mode to play the internally stored fixture presets and ignore incoming DMX.
	On	
Data Loss	Long	This parameter shuts off the shutter and lamp when no data is received for a period of time. The Short option closes the shutter after not receiving DMX data for 1 second and turns off the lamp after 5 minutes of no data activity. The Long option closes the shutter after a DMX data loss of 3-5 minutes and turns off the lamp after 5 minutes of no data activity.
	Short	
<b>Operations</b>		
Identify Fixture		This parameter allows you to identify a fixture by causing that fixture to rapidly strobe when you address it.
Boot		Use this parameter to copy boot code after uploading new software to EC-2 fixtures.
XLD		Crossload allows you to copy the firmware from one fixture to another. This gives you the ability to bring all fixtures to the same software version.
View Preset Scene		Use this parameter to ignore incoming DMX data and play a selected scene. This allows you to view a scene isolated from its sequence.
Copy User Mode Setting	A→B	Use this parameter to copy the fixture's user settings from User A to User B or from User B to User A.
	B→A	
Copy User Mode Presets	A→B	Use this parameter to copy the fixture's user presets from User A to User B or from User B to User A. Each user type includes 16 different presets (scenes) that can be copied to the other user type.
	B→A	
Copy User Mode All	A→B	Use this parameter to copy the fixture's 16 user presets and fixture setting from user A to user B or from user B to user A.
	B→A	
Fixture Hour Reset		Use this parameter to reset the hours the fixture has been on to 0
Self Tests		Use this parameter to test channel operation on the following selections <ul style="list-style-type: none"> <li>• Dim</li> <li>• Cyan</li> <li>• Magenta</li> <li>• Yellow</li> <li>• All</li> </ul>
Lamp Hour/ Strike Reset		Use this parameter to reset the number of hours the current lamp has been on and the number of times the fixture has attempted to turn on (struck) to 0.

Table 2-2 TalkBack parameters available on EC-2 fixtures

Parameter	Options	Description
<b>Information</b>		
Lamp Status*	On	This parameter identifies the current state of the lamp as On, Off, in the process of Striking or Error if it is unable to strike.
	Off	
	Striking	
	Error	
Lamp hours/ strikes*		This parameter indicates the number of hours the current lamp has been on and the number of times the fixture has attempted to turn on (struck) the current lamp.
Sensors Optical/Interlock	Open	This parameter allows you to view the operation of this pair of sensors.
	Closed	
Preset Play Status	Off	This parameter lets you view whether Presets are playing, and, if they are, it will display the current preset scene that is playing.
	Scene #	
Operating Mode	RS422 (DMX)	This parameter indicates the current data source
	Preset Play	
	Self-Tests	
Temperature		This parameter shows the current fixture temperature in degrees C
Software Version*		This parameter allows you to view the current software version

*\*Note: The Whole Hog ®II lighting console provides access to these parameters plus error analysis.*



# Chapter 3

## Troubleshooting and Maintenance

This chapter lists typical symptoms and solutions for problems you might experience when using your EC-2 fixture. Information is also included on replacing parts, optimizing the lamp, and updating fixture software. Please note the warnings under each heading before servicing your fixture.

### Troubleshooting

Table 3-1 describes solutions to some general fixture problems. If the problem you are experiencing is not listed in this section or the solution listed does not solve the problem, contact High End Systems customer service (see “Contacting High End Systems” on page ii).

*Table 3-1 General Troubleshooting*

<b>Problem</b>	<b>Probable Cause</b>	<b>Solution</b>
Fixture will not turn on.	No power is connected.	Connect power to the fixture.
	Breaker is turned off.	Turn the breaker on.
	Power connectors are defective.	Replace power connectors
Fixture functions but lamp does not strike.	The lamp is defective.	Replace the lamp (see “Replacing the Lamp” on page 3-6).
	The DMX start channel for the fixture is incorrect.	Verify that the fixture’s DMX start channel and/or channel range is valid for your controller and link (see “Assigning a DMX Start Channel” on page 1-7).
	The voltage setting is incorrect.	Provide correct power source voltage, and input voltage setting (see “Setting/Changing the Fixture Voltage” on page 1-2).
	The lamp is currently too hot to strike.	Allow the lamp to cool, then restrike the lamp either via the control channel (see “Programming with a DMX Controller” on page 2-2).
	The ignitor connection is loose.	Tighten the connection
Lamp is dimmer than other fixtures.	The lamp is defective or the wrong type of lamp is installed	Replace lamp with the specified type (see “Replacing the Lamp” on page 3-6).
	The voltage setting is incorrect.	Provide correct power source voltage or change input voltage setting (see “Setting/Changing the Fixture Voltage” on page 1-2)
	The lamp is not optimized.	Optimize the lamp (see “Optimizing the Lamp” on page 3-8).

Table 3-1 General Troubleshooting

Problem	Probable Cause	Solution
Lamp shuts off during operation.	The lamp is defective.	Replace the lamp (see “Replacing the Lamp” on page 3-6).
	The fixture has exceeded the maximum temperature.	Allow the fixture 5 to 10 minutes to cool, then attempt to strike the lamp via the control channel (see “Programming with a DMX Controller” on page 2-2).
	The lamp socket is loose and causing arcing.	Contact your Dealer or High End Systems Technical Support (1-800-890-8989).
Color system does not produce the correct color.	The fixture is not properly homed.	Home the fixture (see “Homing the Fixture” on page 1-7).
Fixture is not responding to controller commands or is producing unexpected results.	The data cable is faulty.	Test and replace the data cables as necessary.
	No controller is attached to the link or the controller is not generating any output.	Verify that a controller is connected to the link and is generating output by sending commands to a known working device.
	The fixture has an incorrect fixture number or DMX start channel.	Verify the DMX start channel does not overlap another fixture’s DMX start channel (see “Assigning a DMX Start Channel” on page 1-7).
	The link was not terminated.	Terminate the link (see ).

## Upload and Crossload Troubleshooting

To find solutions to problems encountered while uploading or crossloading new software versions, see Table 3-2.

Table 3-2 Upload, Crossload, and TalkBack Troubleshooting

Problem	Probable Cause	Solution
Not all fixtures on the link are receiving the upload.	Defective DMX cable(s)	Test and replace cable(s) if necessary
	Cable(s) disconnected	Reconnect DMX cable(s)
Fixture could not erase Flash ROM.”	Cable(s) disconnected	Reconnect cable(s)
	Defective cable(s)	Test and replace cable(s) as necessary
	The fixture’s electrical circuitry is damaged	Call High End Systems Technical Support (1-800-890-8989).
There is no response from Fixture xx (Link xx Address xx).”	The controller was configured with a fixture at that address, but no fixtures were found there.	If there is not a fixture at that address, ignore this message - if there is a fixture at that address, verify the DMX start channel (see “Determining the Unique DMX 512 Start Channel” on page 1-8).
	Controllers, serial data distributors, data line Optoisolators, or fixture(s) using RS-422 communication is connected <i>before</i> EC-2 fixtures on the link.	Remove or bypass the offending devices from the data link or move them <i>after</i> the EC-2 fixtures.



Table 3-2 Upload, Crossload, and TalkBack Troubleshooting

Problem	Probable Cause	Solution
The fixture's Status LED periodically flashes rapidly on and off .	Some manual intervention is needed to reset the fixture.	Remove the lamp cap and the internal removal plate to activate the Interlock switch and automatically Copy the Boot code. See "Boot Code Copy Backup" below.
Fixtures are not uploading or crossloading.	Controllers, serial data distributors, data line Optoisolators, or fixture(s) using RS-422 communication are connected <i>before</i> EC-2 fixtures on the link.	Remove or bypass any offending devices from the data link or move them <i>after</i> the EC-2 fixtures.

## Interlock Sensor Switches

The EC-2 has two interlock sensor switches as a safety feature. The first switch is located internally behind the lamp socket assembly. The other is on the front section of the fixture's housing. If someone attempts to open either of these while the Lamp is on, an interlock switch shuts off the Lamp to protect from direct UV exposure.

### Boot Code Copy Backup

The Lamp interlock has another function. If there is a new software upload for the EC-2, the Boot code needs to be changed. When this happens, the fixture gives a BOOT Error indicated by the status red LED flashing on and off rapidly and the Boot code must be manually copied.

If your controller is utilizing Talkback, there is a command to Copy the Boot Code. If there is a problem that effects communications and Talkback is disabled, activating the Lamp interlock while the power is on will cause it to automatically Copy the Boot code.

*Note: User intervention is required for this function because of the extreme vulnerability of the fixture during this operation. Power failure during the Boot code copy operation could disable the fixture permanently.*

You will need:

- 9/64in. allen wrench

To Activate the Lamp interlock sensor switch:

1. Locate the lamp cap screws shown in Figure 3-1 and loosen with the 9/64in. allen wrench.
2. Remove the lamp cap.
3. Twist the internal lamp removal assembly to the left and pull straight out to disengage. This causes the Lamp interlock switch to shut off the lamp and automatically Copy the Boot code.

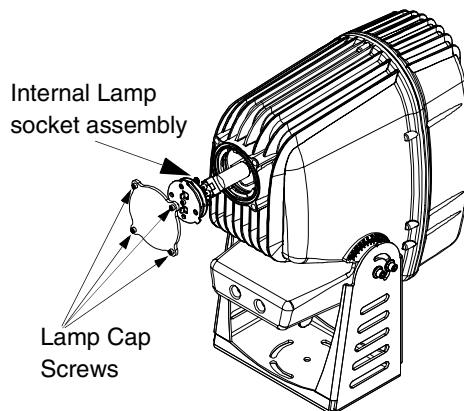


Figure 3-1 Activating the Lamp Interlock switch to Copy the Boot code

- Reinsert the lamp assembly and twist to the right to lock (the arrow on the camlock plate points up in the locked position).

## Status LEDs

Figure 3-2 shows the four Status LED's on the EC-2 logic board as viewed through the access panel. See Table 3-3 for a description of the status LEDs. See Figure 3-3 on page 3-5 for location of access panel to logic board.

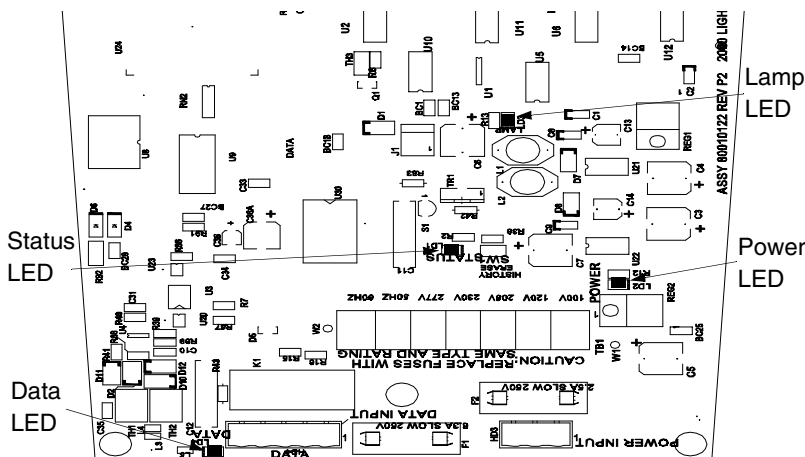


Figure 3-2 Status LEDs on EC-2 logic board

Table 3-3 Status LEDs

LED	State	Problem Indication?	Description
Data Transmit (red LED) & Receive (green LED)	solid red	No	Fixture is crossloading software to other fixtures on the link.
	OFF	Not necessarily*	No DMX 512 data is being transmitted.
	flashing red	No	The fixture is in preset playback mode, and is the master fixture.
	solid/flashing green	No	Fixture is receiving data.
	OFF	Not necessarily*	No DMX 512 data is being received.
Power	solid	No	The motor power supply is receiving adequate voltage.
	OFF	Yes	Fuse or power failure.
Lamp (orange)	solid	No	The lamp power supply is receiving the proper voltage, and the lamp is ON.
	OFF	Not necessarily**	The lamp is extinguished.
	flashing	Yes	The fixture is unable to strike the lamp.
Status (red—indication after Homing is complete)	Normally off with one rapid flash on	No	Normal DMX operation
	Normally off with two rapid flashes	Yes	Error in Normal DMX operation.
	Normally on with one rapid flash off	No	Preset playback operation, no errors
	Normally on with two rapid flashes off	Yes	Error in Preset Playback operation
	Extended on or off	Yes	No connection to main program operation

*\*Note: The Transmit & Receive LED will not be on until you have connected the fixture to a DMX 512-compatible controller using data-grade cabling. If this LED remains OFF even though you have connected the fixture to a controller and are sending DMX 512 commands to the fixture, see “General Troubleshooting” on page 3-1.*

*\*\*Note: If you shut down the lamp using a remote shutdown command, the lamp and the Lamp LED will shut off. However, if you have defective data cables, no data cables/controller connected to the fixture, or the controller is off, the lamp and its LED will also be off. If correcting these problems does not turn the lamp on, see “General Troubleshooting” on page 3-1.*

### Other Status LED Indications

If the Status LED is rapidly flashing on and off periodically, it indicates a need for manual intervention to reset the fixture. Follow the procedure described in “Boot Code Copy Backup” on page 3-3 to automatically copy the Boot code.

If the Status LED does not go to any kind of flashing state after a fixture has powered up for several minutes, to allow for homing, there is a problem with the logic board or with power to the fixture.



**Warnings:** This fixture must be serviced by qualified personnel. The information listed in this section is intended to assist qualified personnel only.



**Disconnect power before servicing.**

**Replace fuses with the specified type and rating only.**

**Equipment surfaces may reach temperatures up to 80° C (176° F). Allow the fixture to cool before handling.**

### Replacing Fuses

You will need:

- replacement fuse (see Table 3-4)
- flathead screwdriver

To replace either of the two fuses located on the fixture’s circuit board:

1. Disconnect power to the fixture. If the fixture has been operating, allow the fixture to cool before handling.

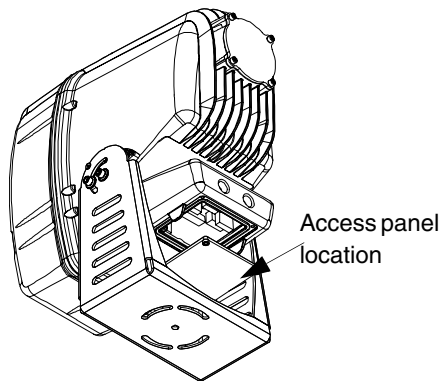


Figure 3-3. Logic board access

2. Determine which fuse needs to be replaced by referring to Table 3-4.

Table 3-4 Description and Function of Fuses

Fuse	Type and Rating	Size	Protects	Symptom of Failure
F1	6.3 A, 250 V, Slow Blow only	5mm x 20mm	Main fuse	Fixture shuts down, all status LEDs are off, the fixture will not receive power, fuse filament is broken or fuse is black.
F2	2.5 A, 250 V, Slow Blow only*	5mm x 20mm	Logic board	Fixture shuts down, all status LEDs are off, the fixture will not receive power, fuse filament is broken or fuse is black.

3. Locate the access panel retaining screws (see Figure 3-3).
4. Using a flat head screwdriver, loosen the panel retaining screw and remove the access panel.
5. Locate the F1 and F2 fuses on the fixture's circuit board (see Figure 3-4).
6. Replace the appropriate fuse(s) with a fuse of the same type and rating (see Table 3-4).
7. Check that the access panel gasket is secure in the gasket groove.
8. Re-attach the access panel. *Tighten the panel screws to a torque setting between 3–4 ft.lb. (4–5Nm). This action is needed to ensure a weather-tight seal.*

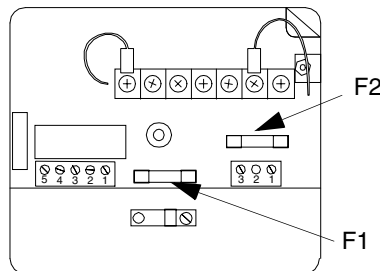


Figure 3-4 Fuse location

## Replacing the Lamp



**Warnings:** Disconnect power before re-lamping or servicing.

Change the lamp if it becomes damaged or thermally deformed.



An operating, unshielded MSD lamp emits ultraviolet and visible (UV-vis) radiation which could damage eyes and skin. Whenever you are working on or near an exposed lamp, wear protective eye gear. Never look directly at the lamp while the lamp is on.



A hot lamp may be an explosion hazard. Do not open for five minutes after switching off. Wear eye and hand protection when re-lamping.

Change shields, lenses, or ultraviolet screens if they become visibly damaged to such an extent that their effectiveness is impaired, for example, by cracks or deep scratches.

Do not operate this equipment without complete lamp enclosure in place or if shields, lenses, or ultraviolet screens are damaged.



Equipment surfaces may reach temperatures up to 80° C (176° F). Allow the fixture to cool before handling.

You will need:

- MSD 250/2, 250 watt, metal halide lamp, GY 9.5 base\*
- protective gloves and eyewear
- 9/64in. allen wrench

*\*Note: Use only the MSD 250/2 lamp in your fixture, not the MSD 250. EC-2 fixtures are optimized for the MSD 250/2 lamp and will give reduced performance with other lamps.*

To install/replace the lamp:

1. Disconnect power to the fixture. If the fixture has been operating, wait for the lamp to cool before handling.
2. Put on your protective eyewear and gloves.
3. Locate and loosen the lamp cap screws (see Figure 3-5a) with the 9/64in. allen wrench. Remove the lamp cap.
4. Twist the lamp socket assembly to the left and pull straight out of the fixture (see Figure 3-5b).

*Note: The lamp assembly is connected to the fixture by lamp socket wires (see Figure 3-5a). Hold the assembly while replacing the lamp. Do not allow the lamp socket wires to support the weight of the lamp assembly.*

5. Holding the existing lamp by its ceramic base, carefully pull the lamp straight out of the lamp socket on the lamp assembly (see Figure 3-5c).

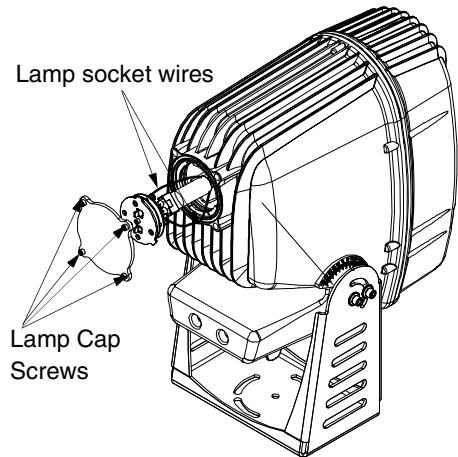


Figure 3-5a Removing the lamp socket assembly

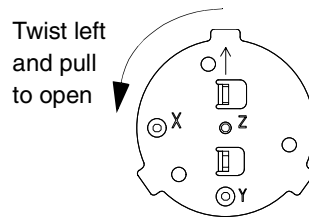


Figure 3-5b Lamp removal plate

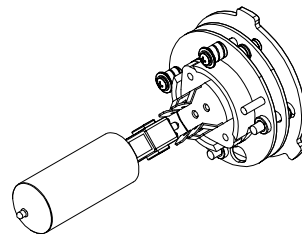


Figure 3-5c Remove lamp from socket



**Caution:** Do not squeeze the lamp glass while removing the existing lamp from the socket. Lamp glass may shatter.

6. Remove all packaging materials from the new lamp. Holding the new lamp by its ceramic base, gently press the two base pins into the lamp socket until the lamp is firmly seated.



**Caution:** When handling the new lamp, avoid contact with the lamp glass. If the lamp glass is soiled by oil or dirt from skin, gloves, etc., clean the cold

**lamp glass with an alcohol wipe. A soiled lamp could overheat and burst, causing damage to the fixture.**

7. Reinsert the lamp assembly straight into the fixture (and reflector).



**Caution:** Make sure the lamp socket wires are not wrapped around the lamp or crimped in the assembly while reinserting the lamp. If the lamp socket wires are wrapped around the lamp or crimped, the lamp and fixture could be damaged.

8. Holding the lamp removal plate, insert and twist the assembly to the right to lock in place (the arrow on the plate will point up in the locked position).
9. Before replacing the outer lamp cap, optimize the new lamp (see “Optimizing the Lamp” below).
10. Replace the lamp cap and tighten the lamp cap screws.
11. Reset the lamp hours to zero so that you can track the lamp life. If desired, enable the lamp warning message to send an error message to the DMX controller via TalkBack when the current lamp hours exceed 2,000.

## Optimizing the Lamp

You should optimize the lamp in a EC-2 fixture after you replace the lamp, or if you notice a “hot spot” of brightness anywhere other than the center of the light beam.

1. Power up the fixture.
2. When automatic homing is complete, set fixture to the open white position.

*Note: If the EC-2 fixture is disconnected from DMX data, this happens automatically.*

3. Orient the fixture so that the beam will project onto a flat, white surface at least 10 feet (3 m) away.
4. Turn the lamp on.
5. Locate the X, Y, and Z optimization 9/64” hex screws (see Figure 3-6).
6. Look at the wall where the beam is projected and use the three optimization screws to adjust the lamp’s position within the fixture until the beam is at its maximum brightness and the light level is even across the beam (or the “hot spot” of brightness is at the center of the beam).
7. Go to step 10 in “Replacing the Lamp” above.

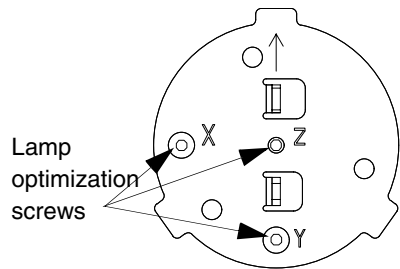


Figure 3-6 Lamp optimization

# Updating Software

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Updating EC-2 fixture software is fast and easy. The latest versions of software are provided on the High End Systems web site, and are also available through High End Systems customer service (see “Contacting High End Systems” on page ii).

There are three ways to upload new software to your EC-2 fixtures:

1. Attach a High End Systems Upload Dongle to your computer and upload the software to a EC-2 fixture. To use a High End Systems Upload Dongle, you will need a 386-based (or faster) computer, MS DOS<sup>®</sup> version 3.3 (or later) or Windows 95/98, and one MB of free disk space. To obtain an Upload Dongle (with installation and operation instructions), contact your High End Systems dealer/distributor (see “Contacting High End Systems” on page ii).
2. Upload the new software using the Handshake controller or another controller supporting TalkBack.
3. Crossload software from one fixture that contains the new software to all other EC-2 fixtures.

Before you can upload or crossload new software, you must disconnect any controllers, bypass any serial data distributors and/or data line optoisolators, and bypass or make sure that any fixtures using RS-422 communications (such as Dataflash<sup>®</sup> AF1000 xenon strobes, and Intellabeam<sup>®</sup> fixtures) are located *after* the EC-2 fixtures on the link. These devices will block communication with any other EC-2 fixtures on the link.

If the upload or crossload fails see “Upload and Crossload Troubleshooting” on page 3-2.





# Appendix A

## DMX Control

This appendix includes tables which list appropriate DMX start channels and MSpeed time conversions. For a listing of the EC-2 fixture's color matching to Rosco® and Lee® common gel colors, refer to the High End Systems' web page (see "Contacting High End Systems" on page ii).

### DMX Start Channels

Table A-1 lists the DMX start channels for EC-2 fixtures. This table assumes that the fixtures are all assigned to the same link, one after another, and that all fixtures use 8 channels..

Table A-1. DMX Start Channels

Fixture Order in the Link	DMX Start Channel	Fixture Order in the Link	DMX Start Channel	Fixture Order in the Link	DMX Start Channel
1	1	23	177	45	353
2	9	24	185	46	361
3	17	25	193	47	369
4	25	26	201	48	377
5	33	27	209	49	385
6	41	28	217	50	393
7	49	29	225	51	401
8	57	30	233	52	409
9	65	31	241	53	417
10	73	32	249	54	425
11	81	33	257	55	433
12	89	34	265	56	441
13	97	35	273	57	449
14	105	36	281	58	457
15	113	37	289	59	465
16	121	38	297	60	473
17	129	39	305	61	481
18	137	40	313	62	489
19	145	41	321	63	497
20	153	42	329	64	505
21	161	43	337		
22	169	44	345		



*\*Note: You can connect up to 64 fixtures to one DMX link.*

*Although there are enough available DMX channels to link up to 64 fixtures you must use a DMX splitter to connect more than 32 fixtures per link. The 32 device limit complies with the EIA-485 standard.*

*Connecting more than 32 devices per link without a DMX splitter will eventually deteriorate the digital signal.*

## MSpeed Times

Table A-2 lists the MSpeed (motor) movement times and their corresponding DMX controller values. If you have a numeric-type controller, use the Value Decimal (dec.) column. If you have a fader-type controller, use the Value Percentage (%) column. If your controller allows you to program hex values, use the Value (hex) column.

The values in Table A-2 may vary slightly depending on your controller's rounding convention.

*Table A-2. MSpeed Times*

<b>Time (sec.)</b>	<b>Value (dec.)</b>	<b>Value (%)</b>	<b>Value (hex)</b>	<b>Time (sec.)</b>	<b>Value (dec.)</b>	<b>Value (%)</b>	<b>Value (hex)</b>	<b>Time (sec.)</b>	<b>Value (dec.)</b>	<b>Value (%)</b>	<b>Value (hex)</b>
0.15	255	100	FF	1.92	234	92	EA	7.22	213	84	D5
0.15	254	100	FE	2.09	233	91	E9	7.56	212	83	D4
0.17	253	99	FD	2.27	232	91	E8	7.91	211	83	D3
0.19	252	99	FC	2.46	231	91	E7	8.27	210	82	D2
0.21	251	98	FB	2.66	230	90	E6	8.63	209	82	D1
0.25	250	98	FA	2.86	229	90	E5	9.00	208	82	D0
0.29	249	98	F9	3.07	228	89	E4	9.39	207	81	CF
0.35	248	97	F8	3.29	227	89	E3	9.77	206	81	CE
0.41	247	97	F7	3.52	226	89	E2	10.17	205	80	CD
0.47	246	96	F6	3.76	225	88	E1	10.58	204	80	CC
0.55	245	96	F5	4.00	224	88	E0	10.99	203	80	CB
0.63	244	96	F4	4.25	223	87	DF	11.41	202	79	CA
0.73	243	95	F3	4.52	222	87	DE	11.84	201	79	C9
0.83	242	95	F2	4.78	221	87	DD	12.28	200	78	C8
0.94	241	95	F1	5.06	220	86	DC	12.72	199	78	C7
1.05	240	94	F0	5.34	219	86	DB	13.17	198	78	C6
1.18	239	94	EF	5.64	218	85	DA	13.63	197	77	C5
1.31	238	93	EE	5.94	217	85	D9	14.10	196	77	C4
1.45	237	93	ED	6.25	216	85	D8	14.58	195	76	C3
1.60	236	93	EC	6.56	215	84	D7	15.07	194	76	C2
1.75	235	92	EB	6.89	214	84	D6	15.56	193	76	C1

Table A-2. MSpeed Times

Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)
16.06	192	75	C0	40.23	155	61	9B	75.38	118	46	76
16.57	191	75	BF	41.04	154	60	9A	76.49	117	46	75
17.09	190	75	BE	41.85	153	60	99	77.60	116	45	74
17.61	189	74	BD	42.68	152	60	98	78.71	115	45	73
18.14	188	74	BC	43.50	151	59	97	79.84	114	45	72
18.68	187	73	BB	44.34	150	59	96	80.98	113	44	71
19.23	186	73	BA	45.19	149	58	95	82.12	112	44	70
19.79	185	73	B9	46.04	148	58	94	83.27	111	44	6F
20.36	184	72	B8	46.90	147	58	93	84.43	110	43	6E
20.93	183	72	B7	47.77	146	57	92	85.59	109	43	6D
21.51	182	71	B6	48.65	145	57	91	86.77	108	42	6C
22.10	181	71	B5	49.54	144	56	90	87.95	107	42	6B
22.70	180	71	B4	50.43	143	56	8F	89.14	106	42	6A
23.30	179	70	B3	51.33	142	56	8E	90.34	105	41	69
23.92	178	70	B2	52.24	141	55	8D	91.55	104	41	68
24.54	177	69	B1	53.16	140	55	8C	92.76	103	40	67
25.17	176	69	B0	54.09	139	55	8B	93.98	102	40	66
25.80	175	69	AF	55.02	138	54	8A	95.21	101	40	65
26.45	174	68	AE	55.96	137	54	89	96.45	100	39	64
27.10	173	68	AD	56.91	136	53	88	97.70	99	39	63
27.76	172	67	AC	57.87	135	53	87	98.95	98	38	62
28.43	171	67	AB	58.84	134	53	86	100.22	97	38	61
29.11	170	67	AA	59.81	133	52	85	101.49	96	38	60
29.80	169	66	A9	60.79	132	52	84	102.77	95	37	5F
30.49	168	66	A8	61.78	131	51	83	104.05	94	37	5E
31.19	167	65	A7	62.78	130	51	82	105.35	93	36	5D
31.90	166	65	A6	63.79	129	51	81	106.65	92	36	5C
32.62	165	65	A5	64.80	128	50	80	107.96	91	36	5B
33.34	164	64	A4	65.82	127	50	7F	109.28	90	35	5A
34.08	163	64	A3	66.85	126	49	7E	110.61	89	35	59
34.82	162	64	A2	67.89	125	49	7D	111.94	88	35	58
35.57	161	63	A1	68.94	124	49	7C	113.28	87	34	57
36.33	160	63	A0	69.99	123	48	7B	114.63	86	34	56
37.09	159	62	9F	71.05	122	48	7A	115.99	85	33	55
37.87	158	62	9E	72.13	121	47	79	117.36	84	33	54
38.65	157	62	9D	73.20	120	47	78	118.73	83	33	53
39.44	156	61	9C	74.29	119	47	77	120.12	82	32	52



Table A-2. MSpeed Times

<b>Time (sec.)</b>	<b>Value (dec.)</b>	<b>Value (%)</b>	<b>Value (hex)</b>	<b>Time (sec.)</b>	<b>Value (dec.)</b>	<b>Value (%)</b>	<b>Value (hex)</b>	<b>Time (sec.)</b>	<b>Value (dec.)</b>	<b>Value (%)</b>	<b>Value (hex)</b>
121.51	81	32	51	160.49	55	22	37	204.88	29	11	1D
122.91	80	31	50	162.09	54	21	36	206.70	28	11	1C
124.31	79	31	4F	163.71	53	21	35	208.52	27	11	1B
125.73	78	31	4E	165.33	52	20	34	210.36	26	10	1A
127.15	77	30	4D	166.96	51	20	33	212.19	25	10	19
128.58	76	30	4C	168.60	50	20	32	214.04	24	9	18
130.02	75	29	4	170.25	49	19	31	215.90	23	9	17
131.47	74	29	4A	171.91	48	19	30	217.76	22	9	16
132.92	73	29	49	173.57	47	18	2F	219.63	21	8	15
134.39	72	28	48	175.24	46	18	2E	221.51	20	8	14
135.86	71	28	47	176.92	45	18	2D	223.40	19	7	13
137.34	70	27	46	178.61	44	17	2C	225.30	18	7	12
138.82	69	27	45	180.30	43	17	2B	227.20	17	7	11
140.32	68	27	44	182.01	42	16	2A	229.11	16	6	10
141.82	67	26	43	183.72	41	16	29	231.03	15	6	0F
143.33	66	26	42	185.44	40	16	28	232.96	14	5	0E
144.85	65	25	41	187.17	39	15	27	234.90	13	5	0D
146.38	64	25	40	188.90	38	15	26	236.84	12	5	0C
147.92	63	25	3F	190.65	37	15	25	238.79	11	4	0B
149.46	62	24	3E	192.40	36	14	24	240.75	10	4	0A
151.01	61	24	3D	194.16	35	14	23	242.72	9	4	09
152.57	60	24	3C	195.92	34	13	22	244.70	8	3	08
154.14	59	23	3B	197.70	33	13	21	246.68	7	3	07
155.71	58	23	3A	199.48	32	13	20	248.68	6	2	06
157.30	57	22	39	201.28	31	12	1F	250.68	5	2	05
158.89	56	22	38	203.08	30	12	1E	252.68	4	2	04

# Appendix B

## Important Safety Information

### **Warning: For Continued Protection Against Fire**

1. This equipment is designed for use with a 250 Watt, GY 9.5 base, metal halide lamp only. Use of any other type lamp may be hazardous and may void the warranty.
2. Maintain minimum distance of 1.0 meter (3.28 feet) from combustible materials.
3. Replace fuses only with the specified type and rating.
4. Observe minimum distance to lighted objects of 1.0 meter (3.28 feet).
5. This equipment for connection to branch circuit having a maximum overload protection of 20 A

### **Warning: For Continued Protection Against Electric Shock**

1. Class I equipment. This equipment must be earthed.
2. Disconnect power before re-lamping or servicing.
3. Refer servicing to qualified personnel; no user serviceable parts inside.

### **Warning: For Continued Protection Against Exposure To Excessive Ultraviolet (UV) Radiation**

1. Do not operate this equipment without complete lamp enclosure in place or if shields, lenses, or ultraviolet screens are damaged.
2. Change shields, lenses, or ultraviolet screens if they have become visibly damaged to such an extent that their effectiveness is impaired, for example by cracks or deep scratches.
3. Never look directly at the lamp while lamp is on.

### **Warning: For Continued Protection Against Injury To Persons**

1. Use secondary safety cable when mounting this fixture.
2. Caution: hot lamp may be an explosion hazard. Do not open for 5 minutes after switching off. Wear eye and hand protection when re-lamping.
3. Equipment surfaces may reach temperatures up to 80° C (176° F). Allow 5 minutes for cooling before handling.
4. Change the lamp if it becomes damaged or thermally deformed.

**B**

# Appendice B

## Importantes Informations Sur La Sécurité

### Mise En Garde: Pour Une Protection Permanente Contre Les Incendies

1. Cet appareil est conçu uniquement pour une lampe métallique à halogène, de 250 watts, à base GY 9.5. Son utilisation avec tout autre type de lampe peut être dangereuse et annuler la garantie.
2. Maintenir à une distance minimum de 1.0 mètre de matières inflammables.
3. Ne remplacer les fusibles qu'avec des modèles et valeurs assignées recommandés.
4. Respecter une distance minimum de 1.0 mètre par rapport aux objets éclairés.
5. Cet appareil de connection au circuit comporte une protection contre les surcharges de 20 A.

### Mise En Garde: Pour Une Protection Permanente Contre Les Chocs Électriques

1. Débrancher le courant avant de changer les lampes ou d'effectuer des réparations.
2. À l'intérieur de l'équipement il n'y a pas de pièces remplaçables par l'utilisateur. Confiez l'entretien à un personnel qualifié.
3. Equipement de Classe I. Cet équipement doit être mis à la terre.

### Mise En Garde: Pour Une Protection Permanente Contre Des Expositions Excessives Aux Rayons Ultra Violets (UV)

1. Ne pas utiliser cet appareil si le boîtier de la lampe n'est pas complètement fixé ou si les blindages, lentilles, ou écrans ultraviolets sont endommagés.
2. Changer les blindages ou les écrans ultraviolets s'ils sont visiblement endommagés au point que leur efficacité aient été altérée, par exemple par des fissures ou de profondes égratignures.
3. Ne jamais regarder directement la lampe quand celle ci est allumée.

### Mise En Garde: Pour Une Protection Permanente Contre Les Blessures Corporelles

1. Lors de l'assemblage, utiliser un câble de sécurité secondaire.
2. AVERTISSEMENT: les lampes chaudes comportent un risque d'explosion. Après l'avoir éteinte, attendre 5 minutes avant de la dégager. Lors du remplacement de la lampe, une protection des yeux et des mains est requise.
3. Les surfaces de l'appareil peuvent atteindre des températures de 80 C. Laisser refroidir pendant 5 minutes avant la manipulation.
4. Changer la lampe si elle est endommagée ou thermiquement déformée.

# Anhang B

## Wichtige Hinweise Für Ihre Sicherheit

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### **Warnung: Zum Schutz Vor Brandgefahr**

1. Dieses Gerät ist nur für den Gebrauch mit einer 250-Watt, Metall-Halogen-Lampe mit GY 9.5-Sockel konzipiert. Der Gebrauch irgend eines anderen Lampentyps könnte Sie gefährden und Ihre Garantie außer Kraft setzen.
2. Stets einen Mindestabstand von 1 Meter zu brennbaren Materialien einhalten.
3. Zum Ersatz nur Sicherungen verwenden, die dem vorgeschriebenen Typ und Nennwert entsprechen.
4. Einen Mindestabstand von 1 Meter zu den angestrahlten Objekten einhalten.
5. Dieses Gerät darf nur an eine Zweigleitung mit einem Überlastungsschutz von höchstens 20 A angeschlossen werden.

### **Warnung: Zum Schutz Gegen Gefährliche Körperströme**

1. Vor dem Austauschen von Lampen oder vor Wartungsarbeiten stets den Netzstecker ziehen.
2. Servicearbeiten sollten nur von Fachpersonal ausgeführt werden. Das Gerät enthält keine wartungsbedürftigen Teile.
3. Dieses Gerät gehört zur Klasse I. Dieses Gerät muß geerdet werden.

### **Warnung: Zum Schutz Gegen Übermässige Ultraviolett (UV)-Bestrahlung**

1. Benutzen Sie dieses Gerät nur, wenn das komplette Lampengehäuse fest eingebaut ist; ebenfalls dürfen keine der Schutzabdeckungen, Linsen oder der UV-Schutz Beschädigungen aufweisen.
2. Die Schutzabdeckungen, Linsen und der UV-Schutz müssen ausgewechselt werden, wenn sie sichtlich dermaßen beschädigt sind, daß sie ihre Wirksamkeit einbüßen, z.B. infolge von Rissen oder tiefen Kratzern.
3. Nie direkt in die eingeschaltete Lampe schauen.

### **Warnung: Zum Schutz Vor Verletzungen**

1. Verwenden Sie bei der Installation des Beleuchtungskörpers ein zusätzliches Sicherheitskabel.
2. VORSICHT: Bei einer heißen Lampe besteht Explosionsgefahr. Nach dem Abschalten der Netzspannung sollten Sie etwa 5 Minuten warten, bevor Sie das Lampengehäuse öffnen. Schützen Sie beim Auswechseln der Lampen Ihre Hände und tragen Sie eine Schutzbrille.
3. Die Oberflächen des Gerätes können Temperaturen bis zu 80 C erreichen. Vor dem Anfassen stets 5 Minuten lang abkühlen lassen.
4. Falls die Lampe beschädigt oder durch Wärmeeinwirkung verformt ist, muß sie ausgewechselt werden.

**B**

# Apéndice B

## Información Importante De Seguridad

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### **Advertencia: Para Protección Continua Contra Incendios**

1. Este equipo está diseñado para utilizarse únicamente con la lámpara de haluro metálico, de 250 vatios y base GY 9.5. El uso de cualquier otro tipo de lámpara podrá resultar peligroso, y podrá anular la garantía.
2. Mantenga una distancia mínima de materiales combustibles de 1.0 metro.
3. Cambie los fusibles únicamente por otros que sean del tipo y la clasificación especificadas.
4. Guarda una distancia mínima a objetos iluminados de 1.0 metro.
5. Este equipo debe conectarse a un circuito que tenga una protección máxima contra las sobrecargas de 20 A.

### **Advertencia: Para La Protección Continua Contra Electrocuiones**

1. Desconecte el suministro de energía antes de recambiar lámparas o prestar servicio de reparación.
2. Derive el servicio de reparación de este equipo al personal calificado. El interior no contiene repuestos que puedan ser reparados por el usuario.
3. Equipo de Clase I. Este equipo debe conectarse a la tierra.

### **Advertencia: Para Protección Continua Contra La Exposición A Radiación Ultravioleta (UV) Excesiva**

1. No opere este equipo sin tener colocada en su lugar la caja protectora completa de la lámpara o bien, si el blindaje, los lentes o las pantallas ultravioletas están dañadas.
2. Cambie el blindaje, los lentes o las pantallas ultravioleta si nota una avería visible, a tal grado que su eficacia se vea comprometida. Por ejemplo, en el caso de grietas o rayaduras profundas.
3. Jamás mire directamente a la lámpara en tanto ésta esté encendida.
4. Advertencia: Para Protección Continua Contra Lesiones Corporales
5. Al montare questa apparecchiatura, usare un secondo cavo di sicurezza.
6. Precaución: una lámpara caliente puede constituir un peligro de explosión. No la abra por 5 minutos luego de haberla apagado. Lleve puestos, un protector ocular, y guantes al recambiar lámparas.
7. Las superficies del equipo pueden alcanzar temperaturas máximas de 80 grados centígrados. Deje que se enfríen por 5 minutos antes de tocarlas.
8. Cambie la lámpara si ésta se avería o deforma por acción térmica.



# Appendice B

## Importanti Informazioni Di Sicurezza

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### **Avvertenza: Per Prevenire Incendi**

1. Questa apparecchiatura è stata progettata per l'uso esclusivo con lampada a sali metallici da 250 watt, base GY 9.5. L'uso di qualsiasi altro tipo di lampada può essere pericoloso e può annullare la garanzia.
2. Mantenere l'apparecchio a un minimo di 1.0 metri (3.28 piedi) di distanza dai materiali combustibili.
3. Rimpiazzare i fusibili usando soltanto quelli del tipo e della taratura adatta.
4. Mantenere una distanza minima di 1.0 metri (3.28 piedi) dagli oggetti accesi.
5. Questa apparecchiatura e' da collegarsi ad un circuito con una protezione da sovraccarico massima di 20 amperes.

### **Avvertenza: Per Prevenire Le Scosse Elettriche**

1. Disinnestare la corrente prima di cambiare la lampadina o prima di eseguire qualsiasi riparazione.
2. Per qualsiasi riparazione rivolgersi al personale specializzato. L'utente non deve riparare nessuna parte dentro l'unita'.
3. Apparecchio di Classe I. Questa apparecchiatura deve essere messa a terra.

### **Avvertenza: Per Proteggersi Contro Le Radiazioni Dei Raggi Ultravioletti**

1. Non usare questa apparecchiatura se il sistema di chiusura della lampadina non e' completo o se gli scudetti, le lenti, o gli schermi ultravioletti si sono visibilmente danneggiati di maniera tale che la loro efficacia sia stata ridotta --- ad esempio, se vi sono visibili spaccature o graffi profondi.
2. Mai guardare direttamente verso la lampadina quando sia accesa.

### **Avvertenza: Per Non Ferire Ad Altre Persone**

1. Use cable secundario de seguridad al montar este aparato.
2. Avvertenza: la lampadina calda potrebbe esplodere. Spegnerla per 5 minuti prima di aprirla. Usare protezioni per le mani e per gli occhi prima di cambiare la lampadina.
3. Le superfici della apparecchiatura possono arrivare a temperature di 80 gradi centigradi (176 gradi f). Aspettare 5 minuti prima di maneggiare.
4. Cambiare la lampadina se si danneggia o se si e' deformata dovuto alle alte temperature.



# Vigtig Sikkerhedsinformation

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Advarsel: Beskyttelse mod elektrisk chock.

Vigtigt!

Lederne med gul/groen isolation maa kun tilsluttes en klemme maerket

