HIGH END SYSTEMS

an ETC. Company
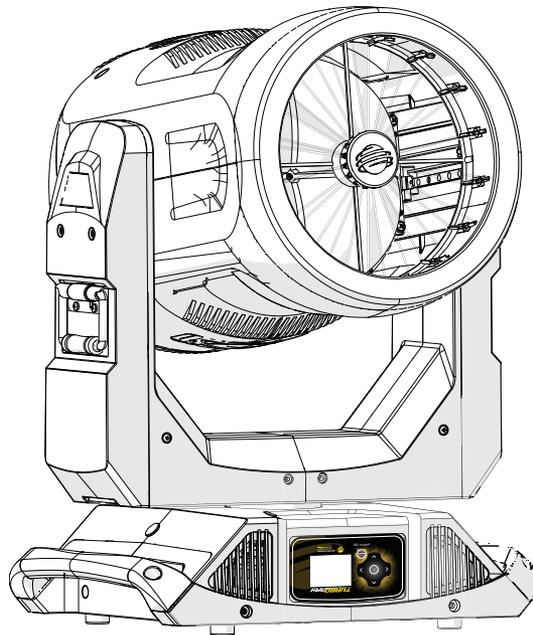
TURBORAY

Automated Luminaire
User Manual

Version 1.1.1 — Revision A

Table of Contents

Introduction

Congratulations on your purchase of the TurboRay automated fixture. This manual provides important information for the safe installation, configuration, and maintenance of your TurboRay fixture.

Contacting High End Systems

High End Systems, Inc. is an ETC company.

Headquarters

For Customer Service or Sales support, please contact our company headquarters:

2105 Gracy Farms Lane

Austin, TX 78758 USA

Tel: 512.836.2242

Fax: 512.837.5290

Toll-free: 800.890.8989

Website: highend.com

Technical Support

If you are having difficulties installing, configuring, or operating your TurboRay, your most convenient resources are the references given in this manual. To search more widely, try the High End Systems, Inc. website at highend.com. Additional technical resources are available on the support website support.etcconnect.com/HES.

If you have additional questions that cannot be answered within these resources, contact High End Systems Technical Services directly at the office nearest you. Emergency support is available outside of regular business hours. Contact information is available at highend.com/about/contact-us.

Patents

NOTICE OF INTELLECTUAL PROPERTY RIGHTS

High End Systems, Inc. products are protected by one or more patents listed on the High End Systems, Inc. website: highend.com/patents and may be subject to one or more pending patents.

Terms and Conditions and Warranty Information

Complete terms and conditions and warranty information can be found on the High End Systems, Inc. website: highend.com/pub/products/HES-Warranty-Information.pdf.

Product Modification Warning

High End Systems products are designed and manufactured to meet the requirements of the United States and International safety regulations. Modifications to the product could affect safety and render the product non-compliant to relevant safety standards.

Mise En Garde Contre La Modification Du Produit

Les produits High End Systems sont conçus et fabriqués conformément aux exigences de règlements internationaux de sécurité. Toute modication du produit peut entraîner sa non conformité aux normes de sécurité en vigueur.

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Design und Hestellung von High End Systems entprechen den Anforderungen der U.S. Amerikanischen und internationalen Sicherheithsvorschriften. Abänderungen dieses Produktes können dessen Sicherheit beeinträchtigen und unter Umständen gegen die diesbezüglichen Sicherheitsnormen verstoßen.

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I prodotti di High End Systems sono stati progettati e fabbricati per soddisfare i requisiti delle normative di sicurezza statunitensi ed internazionali. Qualsiasi modifica al prodotto potrebbe pregiudicare la sicurezza e rendere il prodotto non conforme agli standard di sicurezza pertinenti.

Advertencia De Modificatión Del Producto

Los productos de High End Systems están diseñados y fabricados para cumplir los requisitos de las reglamentaciones de seguridad de los Estados Unidos e internacionales. Las modificaciones al producto podrían afectar la seguridad y dejar al producto fuera de conformidad con las normas de seguridad relevantes.

Declaration of Conformity

Declaration of Conformity

Manufacturer's name:	High End Systems, Inc.
Manufacturer's address:	2105 Gracy Farms Lane
	Austin, Texas 78758 USA
Distributor's name:	High End Systems, Inc.
Distributor's address:	2105 Gracy Farms Lane
	Austin, Texas 78758 USA
Product Name:	Turbo Ray
Product Options:	All

We hereby declare that the above referenced product complies with the essential requirements of Council Directives 2014/30/EU (EMC), 2014/35/EU (LVD) and 2011/65/EC (RoHS) .

Safety: EN 60598-1: 2015 + A1:2018

EN 60598-2-17: 2018: 1991

EN62493 (2015)

EN62031:2008 +A1:2013 +A2:2015

EN62471 (2008)

EN61347-2-11: 2001;

EN61347-1: 2015

EMC: Emission: EN55032: 2015

EN61547:2009

EN 61000-3-2 (2014)

EN 61000-3-3 (2013)

ROHS:	Restricted Substances	Maximum Concentration Value
		(by weight in homogeneous material)
	Cadmium (Cd)	0.01%
	Lead (PB)	0.1%
	Mercury (Hg)	0.1%
	Hexavalent Chromium (Cr VI)	0.1%
	Polybrominated Biphenyl (PBB)	0.1%
	Polybrominated Diphenyl Ethers (PBDE)	0.1%
	Bis(2-Ethylhexyl) Phthalate (DEHP)	0.1%
	Benzyl butyl phthalate (BBP)	0.1%
	Dibutyl phthalate (DBP)	0.1%
	Diisobutyl phthalate (DIBP)	0.1%

Kenneth S. Hansen

Compliance Engineer

September 1 2019

Important Safety Information

Please read all instructions prior to assembling, mounting, and operating this equipment. Continued and safe operation of this fixture is the responsibility of the operator. This manual will give tips for that continued safe operation. At any time please contact High End Systems Technical Support for any safety concerns.

The following international note, caution, and warning symbols appear in margins throughout this manual to highlight important messages.

Note: *Notes are helpful hints and information that is supplemental to the main text.*

CAUTION: *This statement indicates that while operating, equipment surfaces may reach very high temperatures. Allow the fixture to cool before handling or servicing.*

CAUTION: *A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.*

WARNING: A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action

WARNING: RISK OF ELECTRIC SHOCK! This warning statement indicates situations where there is a risk of electric shock.

Fixture Overview

For technical specifications of the TurboRay fixture, see the technical data sheet at highend.com.
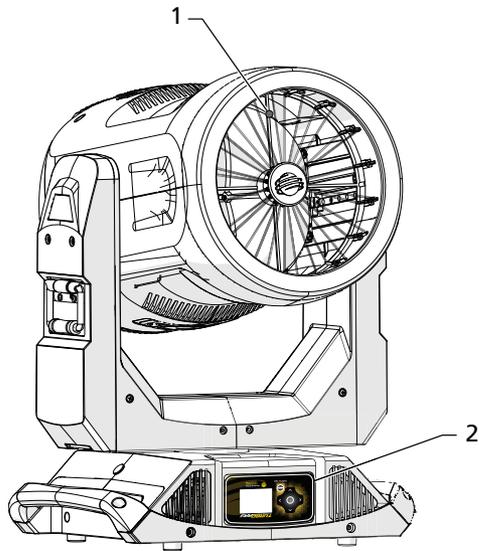
1. Primary (radial) diffusers (16-segments)
2. User interface
   - full-color graphical display
   - six-button navigational controls
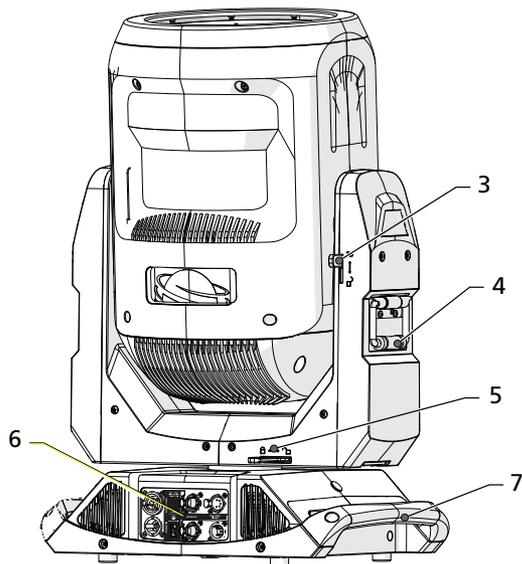
3. Tilt lock
4. Yoke handle
5. Pan lock
6. Input and Output panel
   - powerCON® TRUE1 TOP input and thru
   - DMX five-pin XLR input and thru
   - Ethernet input and thru (Art-Net or sACN)
   - USB
7. Enclosure handle

Dimensions

Dimensions shown are listed as centimeters (inches).

47 cm
(18.5 in)

24.3 cm
(9.8 in)

22.1 cm
(8.7 in)

41.7 cm
(16.4 in)

67 cm
(26.4 in)

41.4 cm
(16.3 in)

11.4 cm
(4.5 in)

29.7 cm
(11.7 in)

66.3 cm
(26.1 in)

48 cm
(18.9 in)

42.9 cm
(16.9 in)

18 cm
(7.1 in)

18 cm
(7.1 in)
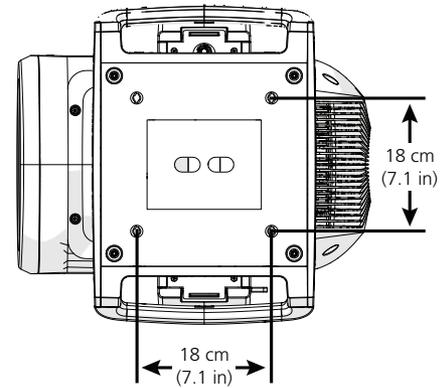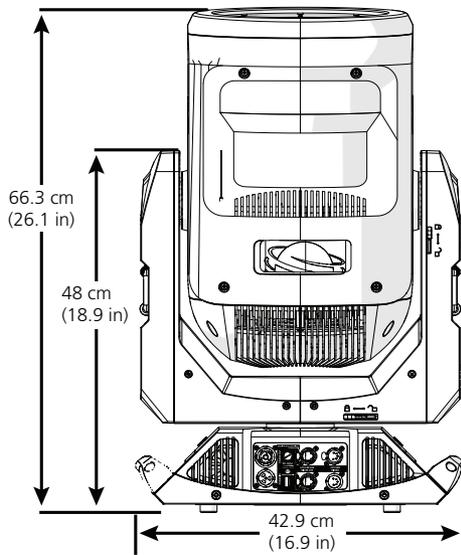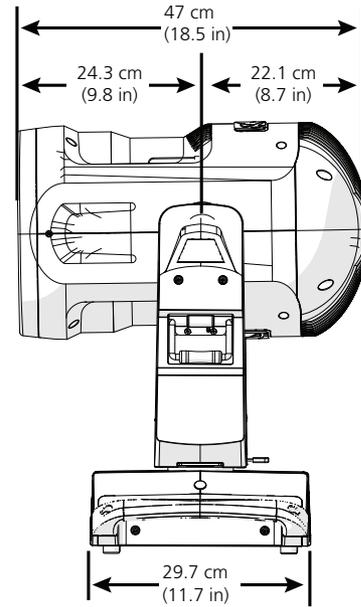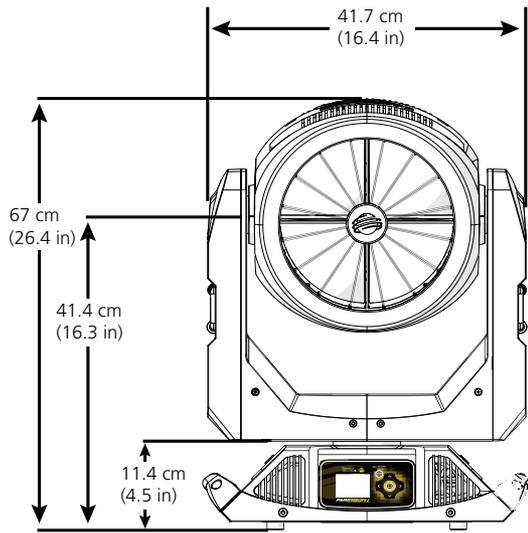
Safety Considerations

In order to ensure safe operation, follow the safety instructions and warning notes in this user manual and any instructions from the manufacturer representative.

- The TurboRay fixture is intended for professional use only. Not for residential use. Read the entire manual before using this equipment.
- Contact your High End Systems authorized dealer or High End Systems Technical Support before performing any service in order to maintain warranty coverage.

WARNING: For your safety, read the following warnings and notices before use:

- This equipment is designed for operation by qualified personnel only.
- Disconnect the unit from power and DMX and data before servicing.
- Make sure that the available voltage is within the stated range. See *Power on page 12*.
- NEMA Type 1 enclosure, indoor use, dry locations only. Do not use outdoors. This fixture is intended for use where humidity does not exceed 90% (non-condensing).
- Do not use this fixture with a damaged power lead (cord set). If the lead is damaged, it must be replaced by a qualified technician with an equivalent type before use. Contact your local authorized dealer for spare power leads.
- Do not use this fixture if the lens is damaged. Damaged lenses must be replaced before use. Contact your local authorized dealer for a replacement.
- When the fixture has been stored or transported in cold temperatures, allow it to warm to room temperature for a minimum of one hour before applying power. Applying power to a cold fixture may cause damage to the fixture and void the manufacturer warranty.
- This is a Class 1 device and must be grounded. Follow national and local codes.
- Keep fixture head at least 1.0 m away from any flammable materials.
- Minimum distance to lighted objects: 1.0 m.

CAUTION: *Hot Surfaces. Allow the fixture to cool completely before handling and servicing.*

⚠ **CAUTION**
LED Radiation.
DO NOT STARE INTO BEAM.
Class 2 LED product.

CAUTION: *Damages caused by the disregard of this user manual are not subject to warranty. High End Systems, Inc. and its authorized dealers will not accept liability for any resulting defects or problems.*

General Operation and Use Guidelines

- This fixture is only allowed to be operated with the maximum alternating current that is stated in the technical specifications label provided on the fixture.
- Lighting effects are not designed for permanent operation. Consistent operation breaks may ensure that the fixture will serve you for a long time without defects.
- Do not shake the fixture. Avoid brute force when installing or operating the fixture.
- When choosing the installation location, make sure that the fixture is not exposed to extreme heat, moisture, or dust.
- If using the supplied Omega brackets with quick-locking thumb screws for fixture hanging, ensure that the thumb screws have engaged a complete 90-degree positive latch.
- Operate the fixture only after having familiarized yourself with its functions. Do not permit other persons who are not qualified and familiar with its functions to operate the fixture.
- Please use the original packaging if the fixture is to be transported. ETC and High End Systems, Inc. will not be responsible for the fixture if packaging other than manufacturer provided packaging is used.
- Do not modify the fixture. Any modifications will void the warranty.
- This manual describes the proper installation and operation of this fixture. Using this fixture in any way other than the intended use may cause damage and may void the warranty.
- Misuse of this fixture or using it in a way different from the methods described in this manual may lead to personal injury and/or equipment failure.
- If it is necessary to replace the light source, the service work should only be performed by qualified personnel.
- If you do not provide power to the fixture for several months, the battery on the TurboRay may drain fully. After you provide power to the fixture, the battery will recharge within 8 hours.

Install the Fixture

WARNING:
- The installation location must support a minimum point load of 10 times the weight of the fixture.
- The installation must always be secured with a secondary safety attachment. An appropriate safety cable is supplied.
- Safety cable attachment must be rated by a safety factor of 10.
- Use of third party clamps are permitted, but they should comply with, and be approved by, the Authority Having Jurisdiction (AHJ).
- A supportive and stable surface must be used when the fixtures are placed on the feet.
- The operating temperature range for this fixture is 0-40°C. Do not operate the fixture outside of this range.
- Never stand directly below the installed fixture when mounting, removing, or servicing the fixture.
- All safety and technical aspects of fixture installation must be approved by a qualified personnel before operation.
- The installation must be regularly inspected by qualified personnel.
- Overhead rigging must be performed by qualified personnel.

CAUTION: *Follow all local codes and recommended practices by the Authority Having Jurisdiction. The installation must only be carried out by qualified personnel.*

You can install the fixture in any of the orientations shown below.
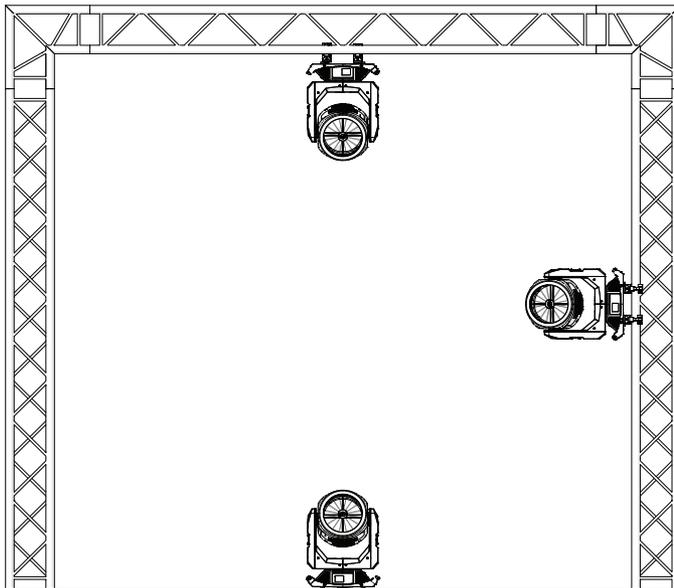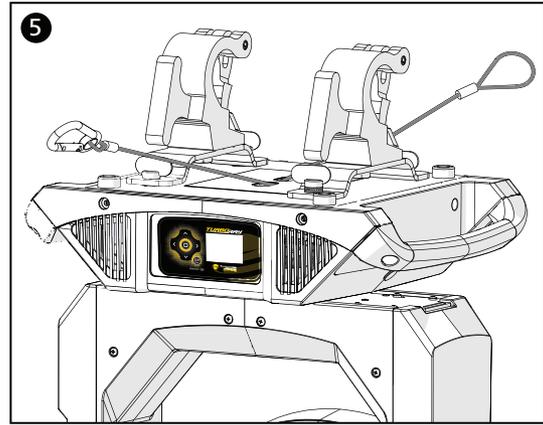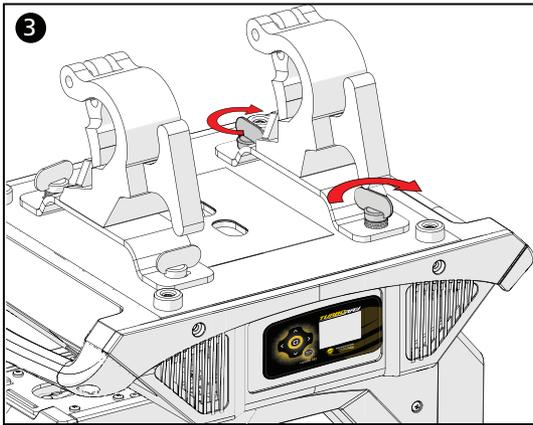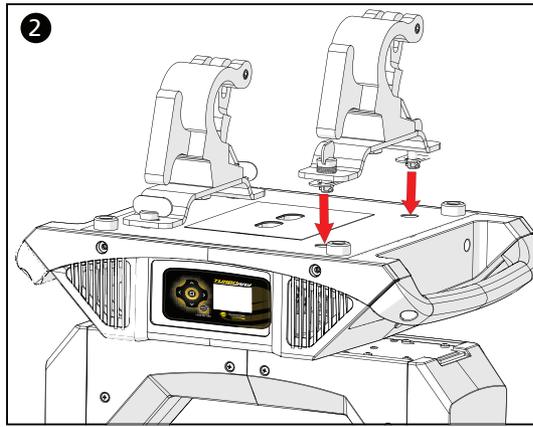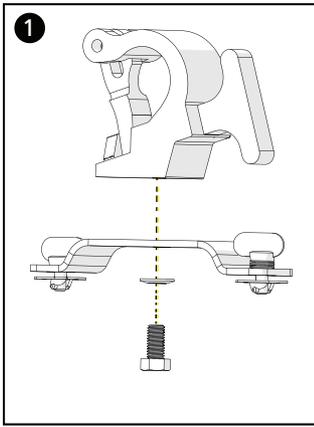
1. Assemble the clamp (provided by others) to the Omega bracket and secure together using appropriately sized hardware (not provided).
2. Align the assembled Omega bracket and quick-lock fasteners into the respective holes on the bottom of the fixture upper enclosure.
3. Tighten each of the quick-lock fasteners fully, turning clockwise. You will hear and feel a click when the fastener is fully secured.
4. Repeat steps 1 through 3 for the second clamp and bracket.
5. Attach the provided safety cable through the attachment point on the bottom of the fixture upper enclosure and secure to the trussing system or other safe installation point. Follow local codes and recommended safety standards for securing the fixture to the installation location.
6. Attach the fixture to the installation location using the installed clamps, using the clamp manufacturer's instructions for a secure fit. When using the Omega clamp, close the safety and fully tighten the clamp wing nut until secure.
7. Inspect the installation prior to lifting the fixture overhead.

Power

Input and Power Factor

VAC	AMPS	Hz	Watts	VA	PF
100	4.29	50	428	430	0.99
120	3.48	60	416	418	0.99
200	2.06	50	400	413	0.97
208	1.97	60	401	411	0.97
220	1.87	50	398	412	0.96
240	1.74	60	403	418	0.96

Connector Specification

A fixture power cord with powerCON® TRUE1® TOP input to bare end is provided. Install a suitable connector to meet the installation requirements. See the following wire color code chart:

Wire Color Code (EU)	Wire Color Code (US Standard)	Connection type	Terminal
Green/Yellow	Green	Earth/Ground	⏚
Blue	White	Neutral	N
Brown	Black	Line (Live)	L

DMX Control

The TurboRay fixture operates on standard DMX-512 control bus, controlled by a DMX console. The fixture requires 53 channels of DMX-512 in standard mode.

Two XLR termination receptacles are available: one for connection of DMX Input, and one for DMX Thru (used when daisy-chaining to additional fixtures on the DMX control bus).

DMX Connector Pinout

For DMX Input, the DMX cable must have a male XLR connector on one end of the cable that connects to the fixture. When daisy-chaining DMX to the next device, prepare a DMX cable with a female XLR connector on one end and a male XLR connector on the other end. Terminate the cable ends as indicated in the pinout image below.

DMX Thru
5-pin XLR

DMX Input
5-pin XLR

1: Ground
2: Signal (−)
3: Signal (+)
4: N/A
5: N/A
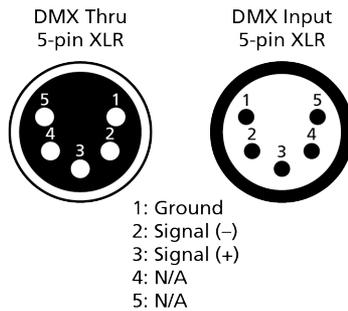
Connect DMX Cables to Fixture

The following instructions are guidelines for connecting DMX to your fixture. Your installation may vary.

1. Connect the male XLR connector of a DMX data cable to the DMX Thru connector on the DMX control source.
2. Connect the female XLR connector of the DMX data cable to the DMX In connector of the first fixture on the DMX control run.
3. Continue linking the remaining fixtures by connecting a cable from the DMX Thru connector of a fixture to the DMX In connector of the next fixture on the control run.

Note: *A maximum of 32 DMX devices may be connected in any one DMX data run when installed in a daisy-chain fashion.*

terminate DMX
with a 120 Ohm
resistor

DMX-512
control
source

DMX-512
(Belden 9729 or equivalent)
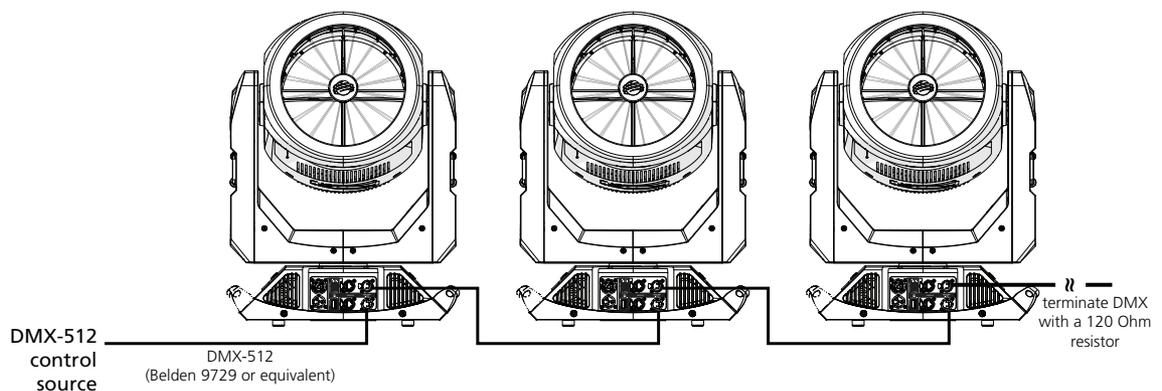
DMX Control and Ethernet Output

You can use DMX-512 control and Ethernet output. When a fixture is set up to receive DMX-512 control input, it converts the signal to Art-Net on IP10 and sends the signal to the Ethernet port, continuing the Art-Net on IP10 signal to the next fixture in the control run.

Terminate DMX

Use a DMX terminator or install a resistor on the last fixture of the DMX control run to prevent corruption (data reflection) of the digital control signal by electrical noise.

A DMX terminator is an XLR plug with a 120 Ω resistor connected between pins 2 and 3 that can be installed into the DMX output receptacle of the last fixture in the DMX control run. This plug is available and sold separately. Contact your local High End dealer for ordering information (visit highend.com/about/contact-us to locate a High End dealer).

Set the DMX Start Address

Give each fixture a unique DMX starting address so that the correct fixture responds to the control signals. This DMX start address is the channel number from which the fixture starts to "listen" to the digital control information sent out from the control source.

Modify the fixture DMX start address on the user interface, located on the upper enclosure. See *DMX Address on page 19*.

Example: The TurboRay requires 53 channels of control in standard mode. If you set the DMX starting address of the first fixture to 1, you could set the second fixture to 54 (53+1), the third to 108, and so on.

DMX Channels

The most current DMX Map data for the TurboRay can be found on the High End Systems, Inc. website:

https://www.highend.com/documentation/TurboRay/TurboRay-protocol.pdf

LED Cell Layout

LED modules are arranged according to the image below.
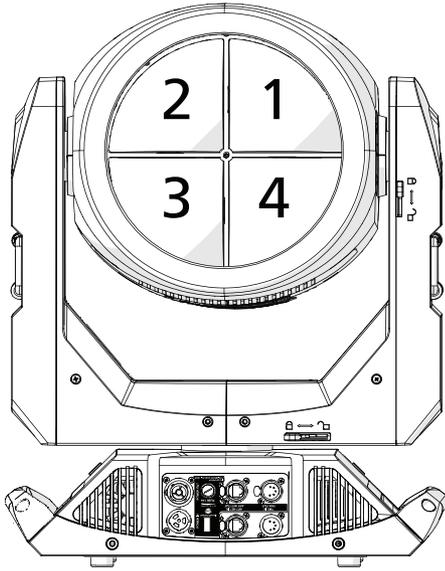
Notice in the above image how the fixture head is oriented in relation to the pan and tilt locks.

Ethernet Control

The TurboRay fixture includes two Ethernet ports that allow sending and receiving of control signals using the Art-Net protocol or sACN.

Use a Cat5e (or better) cable and terminate to RJ45 connectors following the TIA/EIA 568B wiring standard.

Connect Ethernet Cables to a Fixture

The following instructions are guidelines for connecting Ethernet to your fixture. Your installation may vary.

1. Connect a cable from the Ethernet control source to one of the Ethernet ports on the first fixture in the Ethernet control run.
2. Connect the first fixture to a second fixture by connecting a cable from the second Ethernet port on the first fixture to one of the Ethernet ports on the second fixture.
3. Continue linking the remaining fixtures by connecting a cable from Ethernet port to Ethernet port on the fixtures on the control run.

Note: *The Cat5e cable distance should not exceed 100 m (328 ft), and you should not connect more than 20 fixtures in one Ethernet control run when the fixtures are linked together.*

Ethernet control source   Cat 5e (or better)   Cat 5e (or better)   Cat 5e (or better)
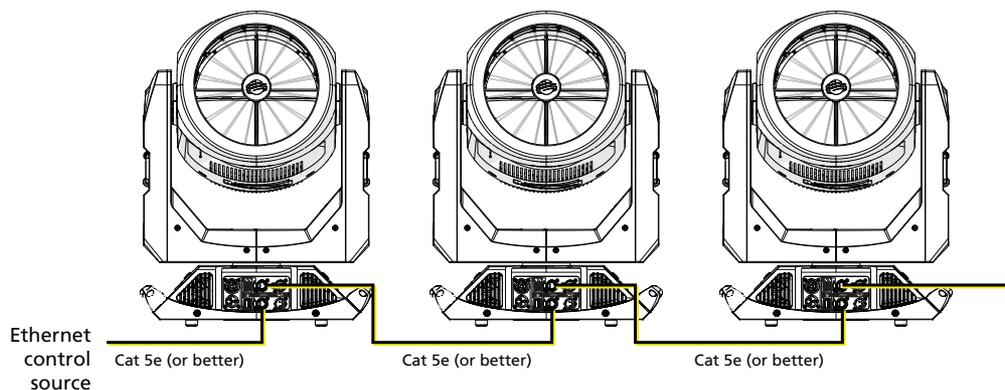
Ethernet Control and DMX Thru

You can use Ethernet control and DMX Thru. When a fixture is set up to receive Ethernet control input, it automatically distributes DMX via the DMX Thru port. The DMX-512 signal is sent as a single universe that corresponds to the universe of the fixture that is receiving Ethernet control.
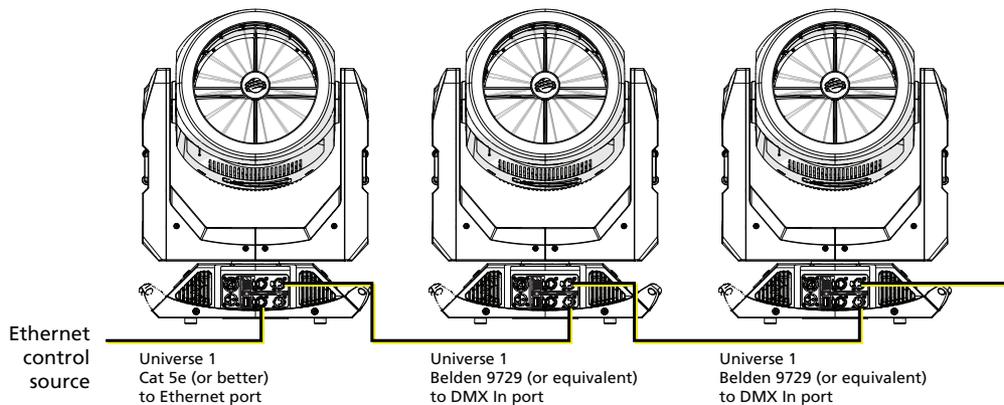
Ethernet control source

Universe 1
Cat 5e (or better)
to Ethernet port

Universe 1
Belden 9729 (or equivalent)
to DMX In port

Universe 1
Belden 9729 (or equivalent)
to DMX In port

Set the DMX Start Address

Give each fixture a unique DMX starting address so that the correct fixture responds to the control signals. This DMX start address is the channel number from which the fixture starts to "listen" to the digital control information sent out from the control source.

Modify the fixture DMX start address on the user interface, located on the upper enclosure. See *DMX Address on page 19*.

> **Example:** The TurboRay requires 53 channels of control in standard mode. If you set the DMX starting address of the first fixture to 1, you could set the second fixture to 54 (53+1), the third to 108, and so on.

Set the Control Input and Universe

For Ethernet control, you must configure the control input (Art-Net or sACN) and set a universe for each fixture. See *Set the Control Options on page 19* and *Set the Network Options on page 20* for details.

Configure the Fixture

You can configure the TurboRay fixture through the onboard user interface.

Navigate the User Interface
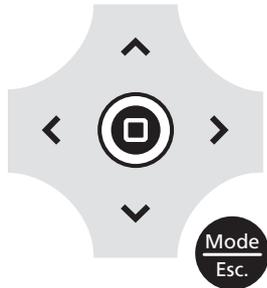
1. Press the [MODE/ESC] button to access the menu. (The display is powered by battery when the fixture has no power; press and hold the [MODE/ESC] button for three seconds to access the main menu.)
2. Browse the menu by pressing the up, down, left, or right navigation buttons.
3. Press the Enter button to select a menu item.
4. Modify the selection by pressing the up, down, left, or right navigation buttons according to the selection.
5. Press the Enter button to confirm a modified selection.
6. To exit the menu or selection, press the [MODE/ESC] button.

> **Note:** *If you press the Enter button to confirm a selection and push no other buttons, the user interface returns to the default display after 10 seconds.*

DMX Address

Set the DMX address for the fixture. The default value is 001.

Settings Menu

The Settings menu provides access to configure and set up the TurboRay. See *Navigate the User Interface on the previous page* for information about the navigation buttons.

The fixture user interface is supplied with an auxiliary battery which enables configuration and menu navigation when AC power is removed.

Set the Control Options

Parameter	Value	Description
DMX Mode	Standard (53) Reduced (25)	Sets the DMX control mode. The default setting is Standard.
Data Loss	Hold Last Look Wait and Fade	Sets the control mode when DMX is not connected. The default setting is Hold Last Look.
Protocol	DMX sACN Art-Net	Sets the control mode. The default setting is DMX. When Art-Net or sACN is selected, additional properties are required in the Settings → Network menu.

Set the Network Options

Note: *The Network menu is hidden when the Control Protocol setting is DMX.*

Parameter	Value	Description
Universe	When **sACN** is the selected **Protocol**, set a value of 1-256. When **Art-Net** is the selected **Protocol**, set a value of 0-255.	Sets the universe. The default setting for sACN is 1. The default setting for Art-Net is 0.
IP Address	When **sACN** is the selected **Protocol**, the IP address format is 192.XXX.XXX.XXX When **Art-Net** is the selected **Protocol**, the IP address format is 10.XXX.XXX.XXX	Sets the IP address. Use the left (<) and right (>) navigation buttons to select the section of the IP address that you need to change. Use the up and down navigation buttons to change the selected value. **Note:** If **IP Mode** is set to **DHCP**, the IP address is assigned by the DHCP server and you cannot change it. The phrase "Waiting Address" appears below the IP address when the fixture is waiting for an IP address from the DHCP server. If the DHCP server times out, "Timeout Default" appears below the IP address and the fixture uses the last assigned IP address.
Subnet Mask	The subnet mask IP address format is 255.XXX.XXX.XXX.	Sets the subnet mask IP address. Use the left (<) and right (>) navigation buttons to select the section of the IP address that you need to change. Use the up and down navigation buttons to change the selected value. **Note:** If **IP Mode** is set to **DHCP**, the subnet mask IP address is assigned by the DHCP server and you cannot change it.
IP Mode	Static IP DHCP	Sets the IP mode.

Set the Pan/Tilt Options

Parameter	Value	Description
Pan Invert	Off On	When set to On, inverts pan movement of the fixture to the opposite direction. The default setting is Off.
Tilt Invert	Off On	When set to On, inverts tilt movement of the fixture to the opposite direction. The default setting is Off.
Pan/Tilt Swap	Off On	When set to On, pan responds to the tilt channels and tilt responds to the pan channels. The default setting is Off.
Pan/Tilt Feedback	Off On	When set to On, the pan and tilt encoder's will feedback, correcting the fixture position when it has been manually moved outside of control. You may want to turn Pan/Tilt Feedback to the Off setting when working on a fixture so that you can move the pan and tilt without correction. The default setting is On.

Set the Dimming Options

Parameter	Value	Description
Curve	Square Law Inv Square Law S Curve Linear	Set the dimming curve. The default setting is Square Law.
PWM Frequency	17.6 kHz 4.4 kHz 2.2 kHz 1.1 kHz	Set the frequency in Hz at which the LED array pulses, or blinks, as a function of Pulse Width Modulation (PWM). The frequency is adjustable in order to avoid visible flicker on video and film. The default setting is 17.6 kHz.
Red Shift	On Off	When set to On, the output replicates the warming of an incandescent filament's color temperature change as it dims. The default setting is Off.

Set the Fan Options

Displays the fan mode settings. Options include: Standard, Studio, Continuous, Studio Continuous. The default setting is Standard.

- Standard
- Studio (reduces fan noise, but decreases fixture output by ~20%)
- Continuous
- Studio Continuous (fan runs continuously at a reduced rate, but fixture output decreases by ~20%)

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Set the Display Options

Parameter	Value	Description
Timeout	Always On 30s Delay	Set the display timeout. The default setting is 30s Delay which turns the display back light off after 30 seconds of inactivity.
Flip	Automatic Flip	Set the display orientation. When set to Automatic, the accelerometer in the fixture determines the orientation. Use the Flip menu option to manually override the current orientation, flipping the current state 180°. The default setting is Automatic.
Brightness	1-100 (full)	Set the display back light brightness. The default setting is 100.

Software Update

Contact High End Systems, Inc. Technical Support for assistance if you need to update your TurboRay fixtures to firmware version 1.1.1. Once a fixture is running firmware version 1.1.1, use the options in the **Software Update** menu (described below) for subsequent firmware updates.

Displays the software update options for the TurboRay.

USB Update

Note: *The USB Update feature is supported in fixtures that are running version 1.1.1 or later firmware.*

1. Save the firmware update file (.upl) to the root directory of a FAT32-formatted USB drive.
2. Insert the USB drive in the fixture base (see *Fixture Overview on page 6* for the USB port location).
3. On the **Main Menu**, select **Settings → Software Update → USB Update**. The fixture reads the USB drive and displays the version of firmware that is currently installed on the fixture and the version of the firmware contained on the USB drive.
4. Press the Enter button to begin the update process.
5. Press the Enter button a second time. The firmware update begins.
   - The display provides information about the progress of the update.
   - The fixture restarts when the update is complete, and the display returns to its default state.
6. Remove the USB drive from the fixture when the fixture restart is complete.

Push Firmware

Load firmware from one fixture to another over the DMX cable.

Note: *The Push Firmware feature is supported in fixtures that are running version 1.1.1 or later firmware. All of the fixtures on the data run must be using firmware version 1.1.1 or later. Use a USB drive to update individual fixtures that are running versions older than version 1.1.1.*

Fixtures cannot be updated using the Push Firmware option if an sACN or Art-Net signal is present.

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1. If necessary, follow the instructions in *USB Update on the previous page* to install the new firmware version on the host fixture (the fixture from which you will initiate the firmware update to the remaining fixtures on the data run).
2. Disconnect the DMX control source from the host fixture's DMX IN port.
3. On the **Main Menu** on the host fixture, select **Settings → Software Update → Push Firmware**.
4. Press the Enter button to initiate the update process. The firmware update begins.
   - The display provides information about the progress of the update.
   - Each fixture restarts when the update is complete, and the display returns to its default state.
5. When all of the TurboRay fixtures on the data run have been updated to the new firmware version, reconnect the DMX control source to the host fixture's DMX IN port.

Calibration Options

This menu is passcode protected and reserved for authorized technician use only. Contact High End Systems Technical Support for assistance.

Restore Defaults

Selecting and confirming this option restores the fixture to its factory default settings.

Home/Test Menu

The Home/Test menu provides access to rehome and test the TurboRay fixture mechanical features and attributes.

The fixture must be powered prior to rehoming or testing features and attributes. If you do not provide power, the fixture will use battery power to power only the user interface.

Home Options

Home (reset) the selected features:

- All - homes all mechanical features of the fixture including pan, tilt, color, gobo, diffusion, and zoom
- Pan/Tilt - homes the pan and tilt
- Color - homes the color wheel
- Gobo - homes the gobo wheel
- Diffusion - homes the primary (radial) diffuser
- Zoom - homes the optics system

Test Options

Run a self-test program on features and attributes of the TurboRay fixture. When you run the test, the display indicates "Running" and the fixture automatically runs a self-test procedure, testing each of the functions. Press [MODE/ESC] button to end the self-test and return the display to the previous menu.

- All - runs a self-test on all mechanical features of the fixture including pan, tilt, color, gobo, diffusion, and zoom
- Pan/Tilt - runs a self-test on the pan and tilt
- Color - runs a self-test on the color wheel
- Gobo - runs a self-test on the gobo wheel
- Diffusion - runs a self-test on the primary (radial) diffuser
- Zoom - runs a self-test on the optics system
- Light Engines - runs a self-test on the LEDs

Diagnostics Menu

Set Time Options

Parameter	Value	Description
Total Fixture Hours	read only value in hours	Total run time of the fixture, shown in hours (h). The counter cannot be reset by the user.
Fixture Hours	read only value in hours	Run time of the fixture since the last reset, shown in hours (h). The counter is reset only from the Reset option which is passcode protected.
Total LED Hours		Total run time of the LED engine, shown in hours (h). The counter cannot be reset by the user.
LED Hours		Run time of the LED engine since the last reset, shown in hours (h). The counter is reset only from the Reset option which is passcode protected.
Reset	Enter Passcode	This protected menu provides access to reset Fixture and LED hours. As needed, contact Technical Support at High End Systems for access. See *Contacting High End Systems on page 1*.

View Errors

Errors that are present in the fixture are shown. Errors will automatically clear from the list as they are mitigated. See *Error Codes on page 27* for information about the errors.

View Fan Speed

Displays the speeds (in %) of the fixture's fans. Information is available for the LED light engine and the power supply unit (PSU).

View Sensors

Displays the status of sensors, which can help you to determine whether the fixture is recognizing movement and position of the fixture attribute. Attributes that report sensor status include pan, tilt, color, gobo, zoom 1, and zoom 2. The status of the sensor is shown as a green or red icon that toggles as the magnet passes the sensor.

View Temperatures

Displays the current measured temperature for the internal fixture attributes (**Main Menu →
Diagnostics → Temperatures → PCB Temperatures**) such as the display, motor driver, and LED
driver boards. Separately, temperature information is available for the LED Sensors (**Main Menu
→ Diagnostics → Temperatures → LED Sensors**) on each of the light engines.

View DMX Monitor

Displays the current DMX value for each of the fixture's channels (parameters of the fixture).
Scroll the list to view all available parameters. DMX data is not available when DMX is not
connected.

View Software Version

Displays the current software version for the fixture, including the display board, fixture pan /
tilt, motor driver boards, and the LED driver boards.

View Device

Displays the fixture RDM and IP address information (read only).

- RDM Device Label - a compatible RDM controller can read and write the device label
- RDM Device ID - this is a unique device ID
- IP Address - this is the address assigned in the **Main Menu → Settings → Control →
  Network → Set IP Address** menu.

Error Codes

When you apply power to the fixture, it runs a calibration (homing) sequence and displays any errors that it detects.

> 💡 **Example:** When the display shows "Gobo Wheel Sensor", it means the gobo wheel sensor was not present when the calibration (homing) process occurred. When multiple errors are present they will cycle on the display twice, and then the fixture will reset (restart). Any errors that remain after two reset cycles are not correctable by a reset alone and will require service. Please contact support for technical assistance.

This message displays after the reset of the fixture if any of the following conditions exist:

Boot Diff

This message displays after the reset of the fixture if the bootloader for one of the Boot Sectors does not match the copy of the bootloader stored in the system.

Color Wheel Sensor

This message displays after the reset of the fixture if any of the following conditions exist:

- the Hall sensor has malfunctioned
- the magnet is missing from the color wheel
- the motor or sensor wire harness is disconnected or damaged
- there is an obstruction, preventing the wheel from moving during homing
- the drive motor has malfunctioned
- the motor driver circuit has malfunctioned

Driver Board 1 NR

This message displays after the reset of the fixture if any of the following conditions exist:

- the driver board has malfunctioned
- the driver board power or data wire harness is disconnected or damaged

EE-R Write

This message displays after the reset of the fixture if an error has been detected writing to the internal setting memory. If this error is encountered, you may have a bad display PCB. Contact technical support for assistance.

Gobo Wheel Sensor

This message displays after the reset of the fixture if any of the following conditions exist:

- the Hall sensor has malfunctioned
- the magnet is missing from the gobo wheel
- the motor or sensor wire harness is disconnected or damaged
- there is an obstruction, preventing the wheel from moving during homing
- the drive motor has malfunctioned
- the motor driver circuit has malfunctioned

LED Driver 1 NR

This message displays after the reset of the fixture if any of the following conditions exist:

- the driver board has malfunctioned
- the driver board power or data wire harness is disconnected or damaged

LED Driver 2 NR

This message displays after the reset of the fixture if any of the following conditions exist:

- the driver board has malfunctioned
- the driver board power or data wire harness is disconnected or damaged

Pan and Tilt NR

This message displays after the reset of the fixture if any of the following conditions exist:

- the driver board has malfunctioned
- the driver board power or data wire harness is disconnected or damaged

Pan Driver Fault

This message displays after the reset of the fixture if any of the following conditions exist:

- the pan driver board is above operating temperature
- the driver board power or data wire harness is disconnected or damaged

Pan Encoder

This message displays after the reset of the fixture if any of the following conditions exist:

- the pan lock is engaged
- the magnetic encoder has malfunctioned
- the motor driver circuit has malfunctioned
- the drive motor has malfunctioned
- the motor or encoder wire harness is disconnected or damaged

Pan Encoder Time Out

This message displays after the reset of the fixture if any of the following conditions exist:

- there is an obstruction preventing the unit from correcting itself within 20 seconds
- the pan lock is engaged
- the magnetic encoder has malfunctioned
- the encoder wire harness is disconnected or damaged

Pan Sensor

This message displays after the reset of the fixture if any of the following conditions exist:

- the Hall sensor has malfunctioned
- the magnet for the Hall sensor is missing
- the motor or sensor wire harness is disconnected or damaged
- the drive motor has malfunctioned
- the drive motor circuit has malfunctioned
- the pan belt is broken

Tilt Driver Fault

This message displays after the reset of the fixture if any of the following conditions exist:

- the tilt driver board is above operating temperature
- the driver board power or data wire harness is disconnected or damaged

Tilt Encoder

This message displays after the reset of the fixture if any of the following conditions exist:

- the tilt lock is engaged
- the magnetic encoder has malfunctioned
- the motor driver circuit has malfunctioned
- the drive motor has malfunctioned
- the motor or encoder wire harness is disconnected or damaged

Tilt Encoder Time Out

This message displays after the reset of the fixture if any of the following conditions exist:

- there is an obstruction preventing the unit from correcting itself too long
- the tilt lock is engaged
- the magnetic encoder has malfunctioned
- the encoder wire harness is disconnected or damaged

Tilt Sensor

This message displays after the reset of the fixture if any of the following conditions exist:

- the Hall sensor has malfunctioned
- the magnet for the Hall sensor is missing
- the motor or sensor wire harness is disconnected or damaged
- the drive motor has malfunctioned
- the drive motor circuit has malfunctioned
- the tilt belt is broken

Zoom 1 Sensor

This message displays after the reset of the fixture if any of the following conditions exist:

- the Hall sensor has malfunctioned
- the magnet for the Hall sensor is missing from the zoom slide
- the motor or sensor wire harness is disconnected or damaged
- the drive motor has malfunctioned
- the drive motor circuit has malfunctioned
- the zoom 1 belt is broken

Zoom 2 Sensor

This message displays after the reset of the fixture if any of the following conditions exist:

- the Hall sensor has malfunctioned
- the magnet for the Hall sensor is missing from the zoom slide
- the motor or sensor wire harness is disconnected or damaged
- the drive motor has malfunctioned
- the drive motor circuit has malfunctioned
- the zoom 2 belt is broken

Cleaning and Maintenance

WARNING: Disconnect the fixture from mains power before starting any maintenance procedures.

Keep the following in mind during regular service and inspection:

- All screws for installing the fixture or parts of the fixture must be tightly connected and must not be corroded.
- There must not be any deformations to the housing, lenses, rigging, and installation points (ceiling, suspension, trussing).
- Moving parts must not show any signs of wear and must move smoothly without issue.
- The power supply cables must not show any damage, material fatigue, or sediment.
- If spare parts are required, order only genuine parts from your local authorized dealer.

To ensure that the fixture remains in good working condition and does not fail prematurely, regular maintenance is recommended.

CAUTION: *The lenses and the output window in the TurboRay fixture are coated with a HazeFree lens coating technology (patent pending) that keeps the lenses and output window clear when the fixture is used with theatrical haze. Use of paper toweling or other abrasive, high-friction wipes and ammonia-based glass cleaners may permanently damage the coating.*

If the coating wears away, contact High End Systems, Inc. Technical Services for assistance.

1. Clean the lenses and the output window only when necessary, and only use a Silky Microfiber Optical Cloth with purified water or an ammonia-free glass cleaner such as Miller Stevenson MS-260 Glass Cleaner.
2. Clean the fans regularly to ensure maximum airflow and efficient cooling. This will ensure that the light source operates in the best possible condition.
3. Have an approved electrician check the fixture each quarter to ensure that circuit contacts are in good condition. This prevents poor circuit contacts and the overheating that results from it.