



## MERCURY XENON LAMP USER INSTRUCTIONS

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Please review the following user instructions for mercury xenon lamps from Lighting Technologies International.

**WARNING: HIGH PRESSURE; HANDLE WITH CARE. GOVERNMENT-APPROVED (OSHA-APPROVED IN USA) SAFETY GLASSES, FACE SHIELD, GLOVES, AND CHEST PROTECTION MUST BE WORN WHEN HANDLING LAMPS TO PREVENT INJURY FROM LAMP EXPLOSION.**

All mercury xenon lamps have high operating pressures and may explode, resulting in hot fragments of quartz, metal, mercury, and mercury vapor. To prevent personal injury and/or property damage, mercury xenon lamps should be handled in accordance with the following safety instructions.

### 1. Pressure

Mercury xenon lamps are under high internal pressure, whether in use or non-operating. Always keep a non-operating lamp in its safety cover, and wear protective eyewear, a facemask, and gloves when handling.

### 2. Brilliance

Because the brightness of operating mercury xenon lamps can have UV intensities many times that of the sun, never look directly at the arc gap of an operating lamp. Severe eye damage can result. Lamp housings should be designed to prevent the arc from being viewed directly.

### 3. UV radiation

Mercury xenon lamps are capable of emitting UV radiation in the spectral region below 380nm. To avoid UV exposure to the lamp operator, lamp housings should be designed so such radiation is contained within the housing. The UV radiation may cause severe eye damage or blindness and skin burns.

### 4. Ozone

Because some types of mercury xenon lamps are ozone-producing, care must be taken to avoid inhalation at high concentrations. Housings should include a suitable means of extracting or diminishing the ozone that is produced. Ozone levels may be monitored using commercially available equipment. Most mercury xenon lamps are manufactured using doped quartz to eliminate ozone production.

### 5. Lamp housings

Because mercury xenon lamps are subjected to high thermal loads and are under high internal pressure, they must only be operated in enclosed housings. In case of lamp explosion, housings should contain all fragments of the exploded lamp without allowing any elements to escape. Similarly, housings must be designed to provide protection against any UV radiation produced by the lamp. It is also advisable that housings be designed so the arc cannot be viewed directly, thus avoiding the potential for serious eye damage.

### 6. Lamp life

Average lifetime is stated by LTI for each mercury xenon lamp. Lamps that are operated with the correct equipment and to the recommended specifications will typically be operable beyond their average lifetimes. However, to decrease the risk of lamp failure, replace the lamp once it has exceeded its average life by 25%.

## MERCURY VAPOR RELEASE AND DISPOSAL

Lamp fixtures for mercury xenon lamps should be well ventilated to the outside of the building through a separate exhaust system. In the event of an explosion, all personnel should leave the area for 30 minutes or longer, until any mercury vapor has been ventilated from the area. Inhaling mercury or its vapor can be harmful. When the lamphouse has cooled, the mercury residue may be cleaned using mercury absorbing agents or a mercury vacuum cleaner and disposed of in accordance with local, state, and federal regulations.



## HANDLING

### 1. Mechanical installation

Mercury xenon lamps should be exposed to as little mechanical stress as possible during installation, and care must be taken to install them with the correct polarity. In addition, to anticipate the forces of thermal expansion, lamps should be rigid mounted at one end only. Do not use a lamp if it is scratched, cracked, or damaged in any way.

Mercury xenon lamps are subjected to high thermal loads, and they are under high internal pressure. They must only be operated in enclosed housings. When installing or removing a lamp from the equipment, the safety cover must be in place on the lamp.

### 2. Electrical connection

Clean and inspect electrical connections periodically. A layer of oxidation can build up as a result of lamp heating and cooling, ultimately leading to overheating and failure. Also, electrical connections endure severe strains as a result of high current and temperature; periodic inspection thus reduces the possibility of damage.

Mercury xenon lamps are best operated between 85% to 110% of rated power. New lamps should be operated at 85% power, and as the lifetime progresses, power may be increased until the maximum 110% of rated power is achieved. Replace lamps that do not provide sufficient output at the maximum rated power.

### 3. Cleaning lamps

Take care to keep the lamp envelope clean of fingerprints, dirt, and dust, as each can cause early failure. If necessary, carefully clean the lamp with alcohol and a cotton swab or lint-free cloth, always using appropriate facial and skin protection.

### 4. Transportation

Lamps should only be shipped in their original packaging.

## OPERATION

### 1. Steady-state operation

LTI's mercury xenon lamps are specifically designed for DC operation. The typical manufacturing tolerance on the lamp voltage is  $\pm 3$  volts. During the life of the lamp, the voltage will rise as the cathode tip erodes slightly, which causes the arc gap to increase.

LTI's mercury xenon short arc lamps are constant current lamps. The operating current range for each lamp is specified by model, however in general the current should not be run at less than 85% of the nominal or more than 110% of nominal.

### 2. Lamp starting

LTI's lamps are operated using a power supply and igniter. The power supply must supply the minimum rated current to safely establish the arc formation. LTI's lamps have reached their operating vapor pressure when all of the mercury is vaporized, which results in a very constant lamp voltage. Depending on the application, the warm-up time can vary from 5 to 25 minutes.

## OPERATING PARAMETERS

### 1. Operating position

LTI's mercury xenon lamps are designed to be operated vertically, some with the anode at the top and the



cathode at the bottom, and others with the cathode at the top and the anode at the bottom. Refer to individual lamp specifications for the correct operating position.

**2. Cooling**

Mercury xenon lamps must be adequately cooled during operation. This is best achieved by forced air cooling to the lamp's end fittings. If too much cooling is directed at the envelope, partial condensation of the mercury might occur, thus reducing both the lamp operating voltage and the spectral intensity. Once the lamp is turned off, continue the cooling process for several additional minutes. During operation, lamp seal temperatures must be kept below 225°C.

**3. Current range**

While a rated current is specified for all LTI lamps, a current range is also specified. It is recommended that a lamp be operated at slightly less than its rated current at the beginning of its life, while being operated at the maximum range at the end of its life. The main purpose of this adjustment in current is to compensate for the slight loss of light that occurs with lamp age. It is not advisable, however, to continuously operate the lamp at minimum or maximum current, as the lamp's performance and lifetime will be negatively affected.

**4. Operating cycle**

Because frequent ignitions hasten electrode wear, mercury xenon lamps have the highest life expectancy when the number of ignitions is minimized whenever possible.

**MERCURY FILL**

Mercury xenon lamps from LTI are filled with mercury and 99.99% pure xenon gas, a rare noble gas. The lamps are specifically designed to distribute the mercury vapor evenly; the result is increased UV output and extended lamp life. Mercury xenon lamps are filled to a positive pressure between 0 and 10 atmospheres; this pressure rises dramatically during operation due to the increase in lamp temperature.

**Properties of mercury:**

Chemical symbol:	Hg
Atomic number:	80
Molecular weight:	200.59
Density:	13.6 g/cm <sup>3</sup> at 20°C / 68°F
Melting point:	-39°C / -38.2°F
Boiling point:	357°C / 674°F
Vapor pressure:	160 Pa at 20°C / 68°F 370 Pa at 30°C / 86°F 823 Pa at 40°C / 104°F
Concentration in air:	13.6 mg/m <sup>3</sup> at 20°C / 68°F 29.6 mg/m <sup>3</sup> at 30°C / 86°F 62.7 mg/m <sup>3</sup> at 40°C / 104°F
CAS registry number:	7439-97-6
RCRA waste number:	U151
Other names:	Hydrargyrum, colloidal mercury, kwik, mercure, mercurio, metallic mercury, quecksilber, quick silver, liquid silver

**LAMP DISPOSAL**

Mercury xenon lamps must be disposed in accordance with applicable local, state, and federal regulations. State laws differ in their disposal requirements for lamps containing mercury.