Laser Lamps

Flash lamps and arc lamps are used to optically pump solid-state lasers. Through pumping, the population inversion necessary for a stimulated emission is generated. In general, we differentiate between xenon flash lamps for pulsed applications and krypton arc lamps for continuous applications.

In addition to laser applications, LASER COMPONENTS offers special lamps for other industrial applications. For some years now, xenon flash lamps have been used in medical applications. A popular example of this is hair removal through IPL (intense pulsed light), in which the extremely intense flash of light destroys the roots of the hair.

As different as the applications for the lamps are, the lamps themselves are just as multifaceted. Depending on the optical design and the mechanical hook-up to the device, the lamps vary in external design. Customization of the illuminant may be necessary based on individual requests.

In cooperation with the suppliers, LASER COMPONENTS can implement your design requests. Individual lamps can be manufactured in all quantities, from small series to large series.

Technical Details

Inert Gases Used

Krypton and xenon are the most commonly used inert gases to generate plasma in pump lamps. It is crucial to the selection of an ideal pump lamp that the emission spectrum correlates with the laser crystal's absorption bands. The spectrum of the lamp can be varied by means of a defined gas filling pressure. Along with the gas filling pressure, the electrical behavior of the lamp likewise changes.

Line emission dominates at low power densities of less than 4,000 W/cm^2. At high power densities of up to 25,000 W/cm^2, increased radiation results from free transitions. The radiation is broad-bandedly almost equally distributed and exhibits less line emission than at lower energy densities.

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

The choice of gas is further dependent on the application and the electrical operation of the lamp. Electrical adjustment is crucial to ensure the ignitability of the lamp at a selected output power and to guarantee a certain lifetime.

At high power densities and for pulsed applications, xenon lamps are commonly used. They are more efficient and durable at pulse lengths of less than 1 ms compared to krypton lamps.

Krypton lamps are the first choice for pumping Nd:YAG lasers because the emission lines fit perfectly with the absorption bands of Nd:YAG rods. This spectral correlation applies to cw-pumped applications that reach 400 W/cm^2 or to pulsed applications with pulse lengths over 1 ms.

Quarz Bulb Material

Four different kinds of quartz are available for high power lamps. It is primarily the light to be transmitted and the maximum required energy that determine which type of quartz will be selected.

Pure Quartz

Pure quartz is made by melting natural quartz sand. This material has a good transmission starting at 210 nm.

Synthetic Quartz

With synthetic quartz a good transmission can be achieved starting as low as 160 nm. Due to the chemical purity of the material, UV light induced aging does not occur. It exhibits the typical absorption bands in the IR range.

Cerium-Doped Quartz

Cerium-doped quartz is the most commonly used glass. Through cerium doping, a spectral absorption is produced in the UV. For this reason, said material transmits exclusively in the visible and IR range and is therefore recommended for use in flash lamps. The transmission curve exhibits a good transmission (T > 50%) starting at 370 nm.

Titanium-Doped Quartz

Titanium-doped glasses transmit UV light starting at 240 nm and suppress the wavelengths that support a build-up of ozone. This material is therefore suitable for UV lamps for which a build-up of ozone should be avoided.

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

Cathodes

LASER COMPONENTS' partner Amglo Kemlite Laboratories manufactures cathodes in its own factories with state-of-the-art press and sintering equipment. This is what makes Amglo unique and what makes the difference compared to other manufacturers of flash lamps.

Because of the innovative development of cathodes, even high power applications with air and convection cooling are routine for this company. Further developments of cathodes with modified tungsten matrix, altered density, and different sintering processes are being permanently carried out. In addition, electrodes are being modified with different dopants so that certain electrical or other typical characteristics of lamps can be positively affected.

Cooling

The right cooling of flash and krypton arc lamps is crucial to their lifespan. This is affected if the heat caused by the pump lamp is incorrectly dissipated. Possible methods include cooling via the surrounding air (convection), active cooling via air currents (ventilator), and water cooling.

LASER COMPONENTS offers custom-made laser lamps for large and small series.

Replacements of standard lamps for your laser system are also available. Simply state the manufacturer, model number, and lamp type.

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr