Ballasts – Power Supplies

Technical Data, Real World Use

UV lamps cannot be directly operated on 115 /230 AC power. Lamps have negative resistance, meaning that the lamp's electrical resistance falls with rising lamp current. Without limiting the current, the lamp would burn out. The ballast's primary function is to limit the lamp current to its rated value.

Magnetic ballasts have been replaced by electronic ballasts. They incorporate a series of transistors, filter capacitors and electronics which allow it to take AC input and convert it to DC. This eliminates the effects of frequency variations.

Capacitors store energy and modulate the electrical output. The ballast then converts this DC back to AC and delivers this current back to the lamp.

Features – key issues

- Operates Low-pressure mercury lamps
  - Standard and High Output
  - Amalgam
- Energy efficient
- Low operating temperatures
- Designed to start or pre-heat lamp
- Needs to be located in dry/cool location
- Manufactured in Germany / China
- 10+ year life

UVSYSCO LIGHT TECHNOLOGIES

Applications, Installations and Operation

Electronic ballasts are the standard drivers for low-pressure lamps. Lamp operation is flicker free and the ballast produces virtually no noise or hum.

The incoming 50/60 Hz power (110 or 230 volts) is converted to high-frequency AC (usually 20 to 40 kHz). This allows constant gas discharge and prevents cathode flicker. Electronic ballasts are efficient in converting input power to the proper lamp power. Remember: Capacitors store electricity and you need to be careful when servicing.

The operation of UV-lamps at higher frequencies reduces end losses, resulting in an overall lamp-ballast system efficiency.

Low pressure standard and high output use similar technology to fluorescent lighting. The lighting and UV disinfection industries are similar in application environments. Systems are made for hot, cold moist and rough environments.

Original magnetic ballasts were made in NJ. They were inefficient. Advances in the fluorescent industry allowed for electronic ballasts which are energy efficient.

Mission: Data sheet information has been provided to help understand ballasts and their use in various UV systems. If you have suggestions for improvement, please contact us at info@uvsysco.com.

UVSYSCO LIGHT TECHNOLOGIES

Need to Know – *Engineers & Operators*

Engineers and System Designers

UV lamps were introduced by Westinghouse in the early 1960s. Early lamps were driven by electro magnetic power supplies. In 2000, advances in electronic ballast technology allowed for more powerful lamp technology.

Our Experience

- **Electro-magnetic (1965)**
- **Electronic HO (1999)**
- **Electronic Amalgam (2003)**

Electronic ballasts for low pressure standard and high output lamps are time tested and stable "fluorescent like" products. With over 20 years of field use, they are standard.

Amalgam lamps require more sophisticated ballasts.

Our Experience

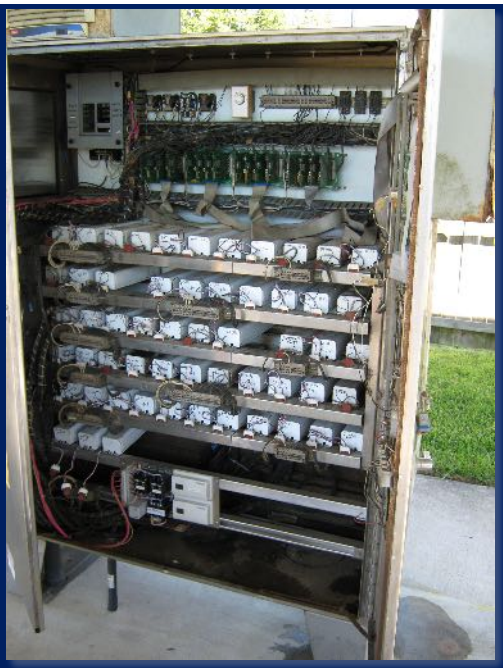
Our first UV amalgam lamp ballast combination was brought to market in 2003.

Operation and Ownership

Ballasts need to be kept in a cool dry environment to operate a peak performance. UV system manufacturers will locate the ballasts in different locations.

These include remote electrical enclosures that house electronics in a fan cooled environment. They are designed for locations ranging from controlled indoor to outdoor harsh installations.

Fans, air-conditioners and heaters are often integrated for environmental control. This allows peak performance and prolongs ballast life.



Old magnetic ballasts were inefficient and took up space.

Typical control center. If outdoors, a protective structure helps operation and increases longevity.

Ballast Specification – *Amalgam Lamps*

While other low-pressure lamps use simple electronic ballasts, the electronic required for amalgam style lamps are more sophisticated.

UV lamps are like fluorescent lamps, but the tube contains no fluorescent phosphor, it's the coating on the inside the lamp that makes it glow.

In addition, rather than being made of ordinary borosilicate glass, UV lamps are made of fused quartz, which allows the 253.7 nm ultraviolet light produced by the mercury arc to pass out of the lamp unmodified.

Germicidal lamps produce a small amount of visible light due to other mercury radiation bands and is why you will see "blue" or "green" light.

Amalgam lamps are built with more robust filaments and include a combination of mercury and other metals (amalgam) which allow the lamp to run The following are some typical data points for this technology.

- Integrated microprocessor control
- Operates low pressure amalgam lamps
- Powering and controlling of lamps independently
- High frequency operation (more than 40 kHz)
- Power factor > 98 %
- Electric efficiency > 92 %
- Independent of AC line voltage in a range of 208~277 Vrms ± 10% Singe phase
- Programmed preheating time 22 sec
- Automatic monitoring of lamp power after ignition pulse
- Automatic re-start if lamp failed to ignite
- Variable power control via 4~20 mA with operating range 10~20 mA (60%~100% of lamp power)

Additional Information – *Safety*

We want you to work safe. UVC light systems place specialty lamps into wet environments. Lamps can be powered by different control centers.

Proper Lock Out Tag Out (LOTO) procedures should be always be followed. These are recommendations, but please follow your site's rules.

1. All maintenance personnel shall be provided with a good lock. The lock shall have the individual workers' name and other identification on it. Each worker shall have the only key to the lock. Signs, tags and other visual warnings should be used to ensure safety.
2. The worker shall check to be sure that no one is operating the machinery BEFORE turning -off the power. The machine operator shall be informed before the power is turned off. Sudden loss of power could cause an accident
3. *Electricity residing in capacitors*, air and hydraulic lines shall be bled, drained, and cleaned out.
4. Any mechanism under tension or pressure, such as springs, shall be released and blocked.
5. Each person who will be working on the machinery shall put a lock on the machine's lockout device(s). Each lock shall remain on the machine until that worker's work is complete.
6. All energy sources that could activate the machine shall be locked out (blocked/tagged).
7. The main main electrical disconnect shall be tested to be sure that the power to the machine is off.
8. Electrical circuits shall be checked with proper and calibrated electrical testing equipment. An electrical failure could energize the equipment even if the switch is in the off position. **Stored energy in electrical capacitors** shall be safely discharged.

Information subject to change. Provided for informational purposes only.