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Light and Color

Ballasts Technology

Ballast Basics

Fluorescent and HID lamps require a ballast to apply starting voltage to the lamp and establish current flow – an “arc” – between the lamp electrodes. Once the lamp is operating, the ballast also regulates lamp current and power. Ballast types fall into two broad categories:

1. Magnetic

A simple device that uses a core and coil assembly transformer to perform the minimum functions required to start and operate a lamp. Magnetic ballasts are often found in HID systems, as well as older fluorescent systems.

2. Electronic

A more complex device that substitutes electronic components for the core and coil assemblies found in magnetic ballasts. Electronic ballasts, such as OSRAM’s QUICKTRONIC® products, are significantly smaller, lighter and quieter than their magnetic counterparts – and offer distinct advantages in energy efficiency and lamp operation.

Let’s Get Started

Ballasts, particularly for fluoresecent systems, can be further categorized by their lamp starting and operating method. Starting and operating methods now available are balanced between lamp life, energy consumption and overall system costs that allow the user to select the system best suited for their application. These methods include:

1. Rapid Start (RS)

Simultaneously applies starting voltage across the lamp while heating the electrodes. The electrode heating reduces the voltage needed to start the lamp, but the electrode heating remains constant after starting and consumes additional power. As a result, RS systems consume more energy than IS systems – but put less stress on electrodes and deliver longer lamp life in typical operating cycles.

2. Instant Start (IS)

Applies high voltage to the lamp to start it without heating the electrodes. This higher starting voltage puts greater stress on the electrodes and can shorten lamp life. However, with new QUICKTRONIC® ballasts, instant start now provides acceptable lamp life in many applications. The absence of electrode heating also reduces system energy consumption, which more than offsets the slightly shorter lamp life.

3. Programmed Rapid Start

Is a new, “smart” starting method that heats the electrodes to their optimum operating temperature, before voltage is applied to start the lamp. This greatly reduces stress on the electrodes, and greatly increases the number of lamp switching cycles without adverse effects on lamp life – a critical issue in occupancy sensor applications. The level of maintained electrode heat can also be optimized for a balance between lamp life and energy efficiency. Initial system costs, maintenance considerations, and the increasing use of dimming and occupancy sensor controls, all factor into the selection of lamp starting and operating methods. To this end, OSRAM’s lamp and ballast engineers work together to provide The System Solution™ – optimal lamp/ballast combinations that address today’s complex needs.

The SYLVANIA System



Solution™ Advantage, first introduced in the early 1980s, electronic ballasts are now commonplace in modern fluorescent systems, and will become more prevalent in HID systems. These devices offer many advantages over magnetic ballasts, notably in their smaller size and lighter weight, which allow manufacturers more options in fixture design. Another important feature of electronic ballasts for fluorescent systems is high frequency (≥ 20kHz) operation, which eliminates the noise and visible flicker associated with magnetic ballasts, and yields approximately 10% more light output than equal wattage magnetic systems. This increased luminous efficacy can then be parlayed into significant energy savings if the user wants to maintain existing light levels. OSRAM QUICKTRONIC® ballasts also offer additional features such as universal input voltage (120V – 277V), end-of-life protection for T5, smaller diameter lamps and the unique QUICK 60+® system warranty.

Dimming

Both fluorescent and HID systems can be dimmed for energy savings and/or architectural applications. For example, dimming may be used in daylight harvesting systems to compensate for available natural light. In multi-purpose spaces such as conference rooms and auditoriums, dimming is used to match light levels with the occupants’ needs. QUICKTRONIC® HELIOS™ ballasts from OSRAM are compatible with 0-10V dimmers and can operate T8 fluorescent lamps over a wide (100-5%) dimming range. HID lamps can be dimmed to approximately 50%; dimming below this level can result in color shift and shortened lamp life.



Spectral Power Distribution



Lamp Color Characteristics



Applying the Technology

Hello, DALI



Traditionally, controls have been external to their associated systems, resulting in numerous system components, complex wiring and limited flexibility. In response to these limitations, OSRAM and other major manufacturers have developed a new interface definition called DALI (Digital Addressable Lighting Interface). In contrast with 0-10V dimming systems or complex building control systems, DALI allows flexible management with a few low-cost components, minimal wiring and user-friendly operation. The "intelligence" of the system is distributed in devices (e.g., QUICKTRONIC® HELIOS™ dimming fluorescent ballasts) that can be addressed individually, or controlled in groups via digital communication. DALI also allows the user to monitor system parameters, such as dimming settings and lamp failures. Although DALI was designed primarily as a convenient means of local control, it can be connected to building management systems to aid in maintenance and energy management.



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