Frequently Asked Questions

the system solution™

Ballast-Lamp Technology Update

What are the differences among fluorescent lamp starting & operating technologies?

A key factor affecting the life of lamps in a lighting system is the interaction between the ballast and the lamps – both during lamp starting and while the lamps are in operation. Starting and operating methods available in ballasts today are balances between lamp life, energy consumption, and overall system costs that allow the enduser to select the system that is best suited for their application. Initial system costs, maintenance considerations, and the increasing use of controls (e.g., occupancy sensors) all factor into the design and decision process for today's lighting.

The System Solution – our industry leading approach to providing optimized ballast and lamp combinations – has yielded several new options as a result of having our own ballast and lamp engineers working together on system designs. New, micro-controller based electronic ballasts offer improvements in lamp life as well as increases in the allowable number of on/off switching cycles for better lamp life on occupancy sensors. Standard electronic ballasts also provide improved starting performance that alters the stereotypes usually associated with older magnetic ballasts. Improvements now allow combinations that were previously avoided for fear of poor lamp life and maintenance concerns. The following is a short guide to aid in the selection of the ballast that is right for each application.

Lamp Starting and Operation

A fluorescent lamp requires a ballast to apply voltage across the lamp (open circuit voltage) until an "arc" forms and current begins to flow between the coils. This can be accomplished by increasing the open circuit voltage until the arc forms (usually requiring very high voltage), or alternately by heating the coils to create an electron flow to reduce the open circuit voltage required to form the arc. Once operating, the ballast continues to control the heating of the coil, and also regulates the lamp current and power. In short switch cycle operation (15 min./start), the number of starts is a key driver in determining lamp life, and in long cycle operation coil heating plays a key role. Maintained coil heat can improve the life of the lamp due to reducing the evaporation rate of the coil coating during operation.

Instant Start

Instant start ballasts apply high voltage to the lamp to start it without heating the coils. This requires higher open circuit voltage, and puts a greater stress on the coils over life as they are not heated separately. In older magnetic ballasts, this method greatly reduced lamp life due to the limitations of magnetic ballast design. However, with new high frequency electronic ballasts that can start the lamps quickly (~30-40 mS), instant start now provides acceptable lamp life in most applications. The absence of coil heat also provides benefits in efficiency (no power is used to heat the coils), and their wiring is simpler and lamps operate in parallel keeping others lit if one burns out.

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Rapid Start

Rapid start ballasts simultaneously apply open circuit voltage across the lamp while heating the coils. The coil heating reduces the open circuit voltage required to start the lamp, but the coil heat remains constant after starting and consumes additional power. This requires a rapid start ballast to consume more energy for the same light output when compared to an instant start system. However, in applications requiring the longest lamp life, rapid start ballasts provide the coil heating required to get the longest life out of the lamps in typical operating cycles of 12 hrs./day. Also note that the additional coil heat circuitry dictates an added cost for the rapid start option.

Programmed Start

A new starting method made practical by electronic ballasts is programmed start (or programmed rapid start). These ballasts control the voltage across the lamp while applying coil heat providing time for the coils to come to optimum operating temperature. Open circuit voltage is then applied, starting the lamp with the least amount of stress, greatly increasing the number of switching cycles possible without adverse affects on lamp life. The level of maintained coil heat can also be optimized for a balance between lamp life and energy efficiency.

Performance Considerations

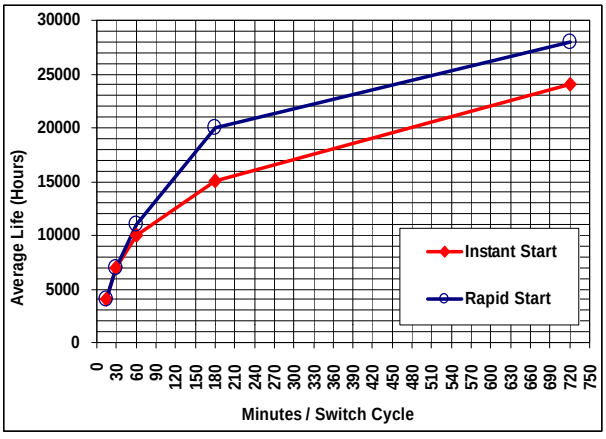
Lamp Life versus Energy and System Acquisition Costs:

In occupancy sensor applications, the old belief was that rapid start ballasts were needed to condition the coils for increased switching cycles. However, with today's instant start electronic ballasts, new choices are possible. For occupancy sensor applications (e.g., 15 min. on / 5 min. off), internal testing and independent lab research has shown both instant start ballasts and rapid start ballasts provide between 15-17K switching cycles. In both systems, lamp life is limited by the number of starts where 16K starts @ 15 min. cycles translates into 4000 hour lamp life - making instant start and rapid start equal choices for occupancy sensors.

However, as cycle times increase to typical 12 hour/day operation, coil heat now plays a key role. Rapid start or programmed start ballasts increase lamp life with an offset for the increased power consumption. Here the balance of operating costs must be weighed against lamp maintenance costs.

Operating Cycle	15min.	30min.	3hr.	12hr.
T8 Instant Start	4000	7000	15000	24000
T8 Rapid Start	4000	7000	20000	28000

Input Power:	3-lamp Rapid Start	92 watts
	3-lamp Instant Start	87 watts



For a normal 12 hour/day, 4000 hour/year operation, rapid start ballasts provide 7 years of lamp life while instant start ballasts provide 6 years. The 5W of coil heat costs $1.60/year

in power costs for a 3-lamp ballast, or about $0.53/lamp/year. Over 7 years this would require $3.70/lamp in additional power costs to gain the year in lamp life.

In areas of high maintenance costs, labor and material would need to be weighed against the added power and ballast costs to determine the best choice for the application. A complete life-cycle costing is recommended to aid in proper system selection.

Today, the balance is between energy and acquisition costs and the cost of maintaining the system. Each system provides unique benefits that should be weighed in selecting the system that's right for you. Guidance in determining you particular needs is available from your local OSRAM SYLVANIA representative or Commercial Engineer or by calling our National Customer Support Center at 1-800-LIGHTBULB or visiting our web site at www.sylvania.com.

Also note that for occupancy sensor applications, programmed start ballasts are a new alternative. These new ballasts now allow up to 50,000 switching cycles (15 min. on / 5 min. off), improving lamp life to 10,000 hours in these conditions. Coil heat is also reduced after starting to conserve energy helping to offset additional power costs. These new ballasts are currently being introduced to the market. Watch for further updates on these exciting new systems.