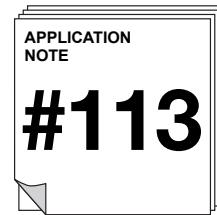


# LUTRON®

## *For Your Information ...*

### Total Harmonic Distortion of Electronic Fluorescent Dimming Ballasts



#### Overview

Line current is delivered at 60 Hz (the fundamental frequency of line voltage) and some current is also delivered at other frequencies that are harmonics (multiples) of 60 Hz. No power is delivered to the electronic device at these other frequencies.

Total Harmonic Distortion (THD) is a measure of the magnitude of all the harmonics of the input current, expressed as a percentage of the fundamental frequency current.

#### Discussion

Line current is supplied to electrical equipment at a fundamental frequency of 60Hz. Harmonics to the fundamental current are integer multiples of the fundamental frequency - the 2<sup>nd</sup> harmonic is at 120Hz, and the 3rd harmonic is at 180Hz, etc. Depending on the electrical design of the equipment, it can distort the input sine wave of the fundamental frequency and introduce harmonics on the power line.

##### ***Why high THD is detrimental***

Significant harmonics are put back on the line if the load type is not linear and draws current from the line in short pulses. Harmonic currents do not provide any power to the load, and flow in the neutral wire in a 3-phase system. Harmonics up to 33% are allowed by ANSI.

When line harmonics are present, the total current is the summation of the fundamental frequency current and the harmonic current. If the THD of an electrical device is 20%, it introduces 20% of the magnitude of its input current back on the line as harmonics. If this device constitutes 10% of the total electric load in a building, then it contributes only 2% to the total building THD. Codes and regulations require that total building THD not exceed 33%.

THD may be a concern for 2-wire line-voltage dimming ballasts as the power wires carry the phase-control dimming signal to the ballast. The current drawn by the 2-wire dimming ballast mimics the phase-control dimming signal and will result in higher THD when dimmed.

##### ***THD regulations***

In the early 1980s when there did not exist a standard for THD of electronics, some dimming ballasts would produce up to 100% THD when dimmed down to low light levels. There have been many design improvements since, and ANSI C82.11-1993 now specifies maximum 33% THD for electronic ballasts.

Lutron dimming ballasts have a THD rating of 20% or less, with our premium Hi-lume ballasts rated at 10%.

## Summary

THD of equipment is an important consideration for electrical safety but in most buildings, lighting amounts to less than 30% of total building load, which translates to less than 10% of total building THD. Limiting the THD of all lighting fixtures to below the ANSI regulated 33% is therefore sufficient to ensure a robust electrical power supply in any building. All Lutron dimming ballasts are rated for 20% THD or less.

### Worldwide Technical and Sales Assistance

If you need assistance call the toll-free *Lutron Technical Support Center*. 24 hours/day + 7 days/week  
Please provide exact model number when calling.

(U.S.A. and Canada) (800) 523-9466  
Other countries call (610) 282-3800  
Visit us on the web at [www.lutron.com](http://www.lutron.com)

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