



GE Consumer & Industrial Lighting

1975 Noble Road
East Cleveland, OH 44112
USA

High Intensity Discharge Lamp Dimming

There is an increasing demand to maximize energy savings of lighting sources. While HID lamps are inherently very efficient, many users would like to further increase the energy savings of HID lamps through dimming.

There are two general classes of HID dimming systems. In bi-level dimming, HID lamps are run in a low mode of reduced lamp power when less light is required. Lamps are then switched to 100% lamp power (high mode) when full illumination is needed. The other common class of dimming systems is called "continuous" and allows for user settings from 0% to 100% wattage, and thus, complete light control.

This dimming statement is valid for any kind of dimming system that meets the stated criteria. In general, most bi-level dimming systems meet the criteria, while many of the continuous dimming systems do not.

GE Lighting will warrant its mercury vapor lamps, Multi-Vapor®, PulseArc®, metal halide lamps and Lucalox® high pressure sodium lamps on bi-level or continuous dimming systems provided the following operational guidelines, in addition to those provided on the lamp packaging and in the GE lamp catalog, are met:

GE Multi-Vapor®, PulseArc®, Watt-Miser®, ConstantColor® CMH®, Metal Halide Lamps and ChromaFit™ HPS-Retrofit Lamps:

- Vertical base up (+/-15°) operation only for all types when dimmed per the approved guidelines within this document, except for:
 - The MVR1000/U which can be operated in vertical base up (+/- 15° to horizontal (+/- 15°) position
 - And ConstantColor® CMH® Chromafit™ HPS retrofit lamps, which can be operated in any burning position.
- Open or enclosed fixtures according to the fixture requirements specified on the lamp labeling and caution notices.
- Lamp must be started in full-power mode and must be operated in that mode for a minimum of fifteen minutes prior to reduced-power operation.

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GE Multi-Vapor®, PulseArc®, Watt-Miser®, ConstantColor® CMH®, Metal Halide Lamps and ChromaFit™ HPS-Retrofit Lamps: (continued)

- Minimum open circuit voltage (OCV) of dimming system must meet ANSI requirements in both high and low modes of operation (see appropriate ANSI C78.xxxx documents for specific metal halide lamp minimum OCV requirements.)
- Minimum lamp operating wattage as indicated in the following table. If operated below these wattages, the bimetal switch that normally shorts the main and starting electrodes in standard type lamps may not function properly, and this could result in rupture of the arc tube. PulseArc® lamps do not utilize a bimetal switch and may also be dimmed as specified below.

<u>Nominal Lamp Power</u>	<u>Minimum Lamp Operating Power (see "General Comments," Item 2)</u>
150 watts (Watt-Miser®)	97 watts
175 watts	97 watts
250 watts*	138 watts
320 watts	138 watts
350 watts	175 watts
360 watts (Watt-Miser®)	200 watts
400 watts	200 watts
750 watts	375 watts
1000 watts	500 watts
1500 watts	750 watts

*250w ChromaFit™ ConstantColor® CMH® metal halide lamps may be dimmed to 50% of full rated wattage.

Mercury Vapor Lamps

All guidelines listed for metal halide lamps in the previous section also apply for mercury vapor lamps.

Lucalox® High Pressure Sodium Lamps

- Any burning position is allowed.
- Open and enclosed fixtures are allowable.
- Minimum open circuit voltage (OCV) of dimming system must meet ANSI requirements in both high and low modes of operation (see appropriate ANSI C78.xxxx documents for specific high pressure sodium lamp minimum OCV requirements.)

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Lucalox® High Pressure Sodium Lamps (continued)

- Lamps must be operated in the full-power mode for at least fifteen minutes prior to operation in the reduced-power mode.
- For dimming systems that reduce line voltage (which can affect the ANSI open circuit voltage value), it is important to reduce the line voltage slowly to avoid premature lamp cycling, especially with older lamps that are already high in voltage and close to the normal dropout point. In changing from the full-power mode to the reduced-power mode, the time between full power and reduced power must be no less than ninety seconds, and the rate of change of power at any power level between full power and reduced power must be no greater than that corresponding to a linear (uniform) reduction between those extremes in a ninety-second time interval.
- For dimming systems that instantaneously switch capacitors into the system, but retain the ANSI ballast OCV value at all times, normal lamp performance can be expected.
- Minimum lamp operating wattage for all standard and deluxe high pressure sodium lamps are indicated in the following table.

<u>Lamp Power Rating</u>	<u>Minimum Lamp Operating Power (see "General Comments," item 2)</u>
35 watts	13 watts
50 watts	18 watts
70 watts	25 watts
95 watts	34 watts
100 watts	35 watts
110 watts	39 watts
125 watts	44 watts
150 watts	53 watts
200 watts	70 watts
215 watts	76 watts
250 watts	88 watts
310 watts	109 watts
360 watts	126 watts
400 watts	140 watts
750 watts	263 watts
1000 watts	350 watts

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General Comments

- Saf-T-Gard® lamps must not be used in dimming systems.
- The effects of line voltage fluctuation, ballast wattage control and lamp operating voltage variation within the range of the ANSI specifications must be considered so that no combination of factors causes the lamp power to go below the specified limits.
- With dimming, the color of metal halide lamps shifts to a cooler (higher Kelvin) temperature and CRI decreases. The dimming of 20-150w CMH® lamps is normally not recommended.
- HID should be brought up to full power for a minimum of 15 minutes each day to minimize a decline in lamp performance.
- Rated life of HID lamps is the total burning time in dimmed and full-power modes.
- GE Lighting warrants life, lumens and lumen maintenance will meet published rating performance on bi-level or continuous dimming systems, however, performance criteria such as CCX, CCY, CCT and CRI and lumen maintenance may vary from specification when lamps are used at lower than full-wattage mode. Lamp efficacy will be lower in dimmed modes than in full power modes.
- The dimming device should maintain the lamp current crest factor, current off time and line dip tolerance, as well as the open circuit voltage, within ANSI and IEC specifications at all operating levels of the lamp.
- Lamps that were not specifically mentioned include the 325-watt metal halide lamp and low-wattage metal lamps <150 watts. Guidelines for using these lamps on dimming systems may be published at a later date.

The GE Lighting and Electrical Institute
www.gelighting.com

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