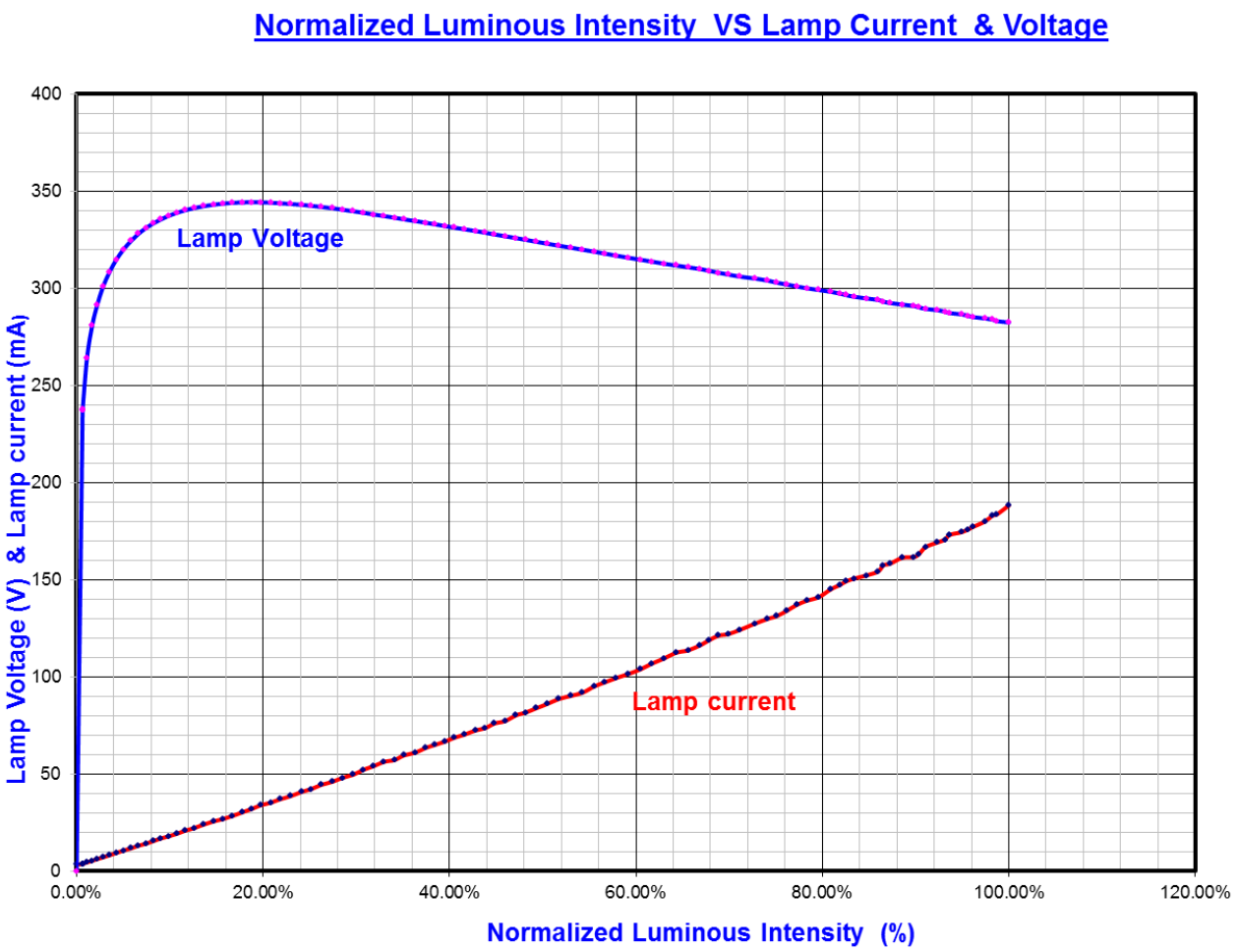
Brief Overview of Fluorescent Dimming Ballast Technology

Dec 6, 2016

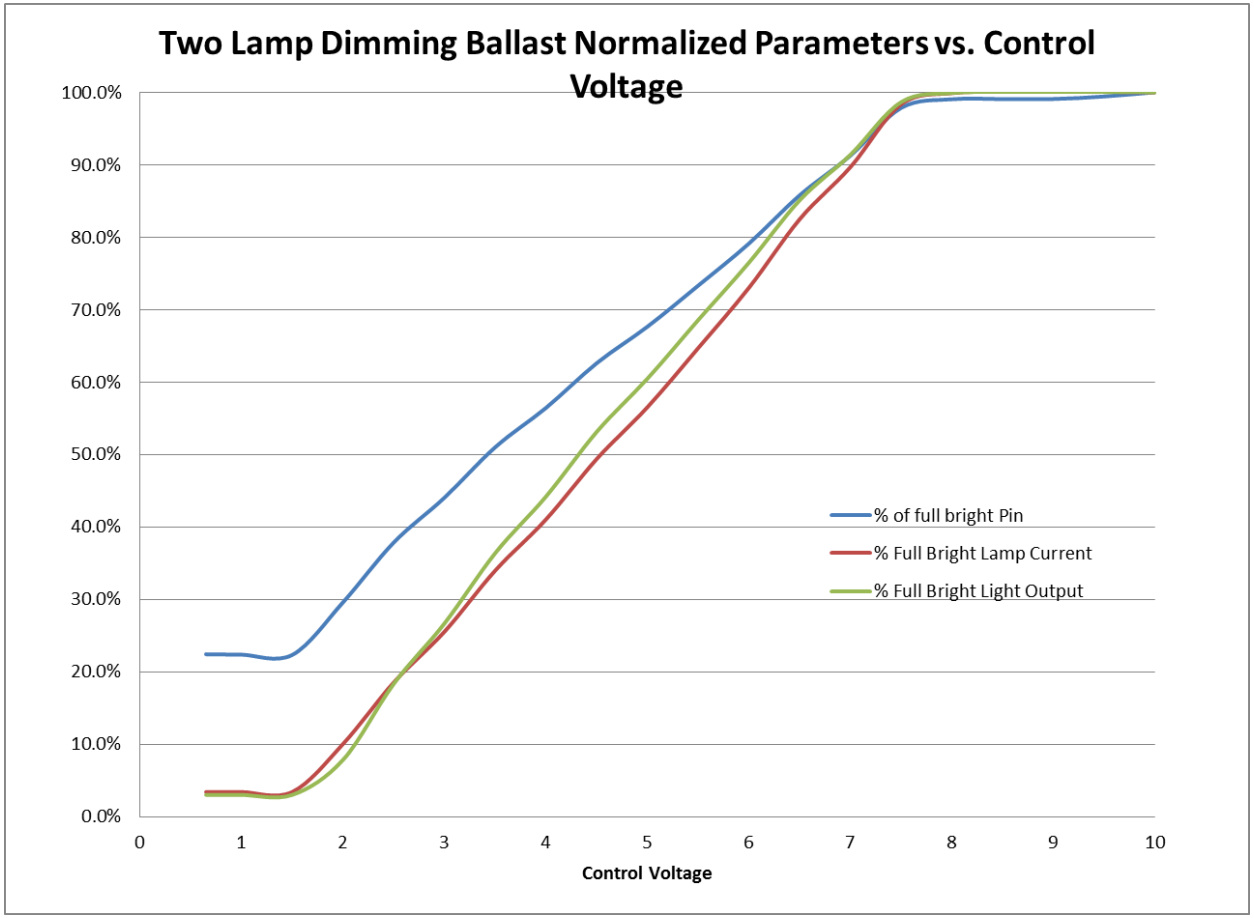
Dimming has been saving energy for 40 years

- Intensity of light emitted by fluorescent lamp is related to current through the lamp
- Dimming ballasts are current sources, the current through the lamp is tightly controlled
- Dimming is accomplished by changing the operating frequency of the ballast, changes lamp current and lamp power
- Dimming ballasts must properly heat the lamp filaments to preserve lamp life

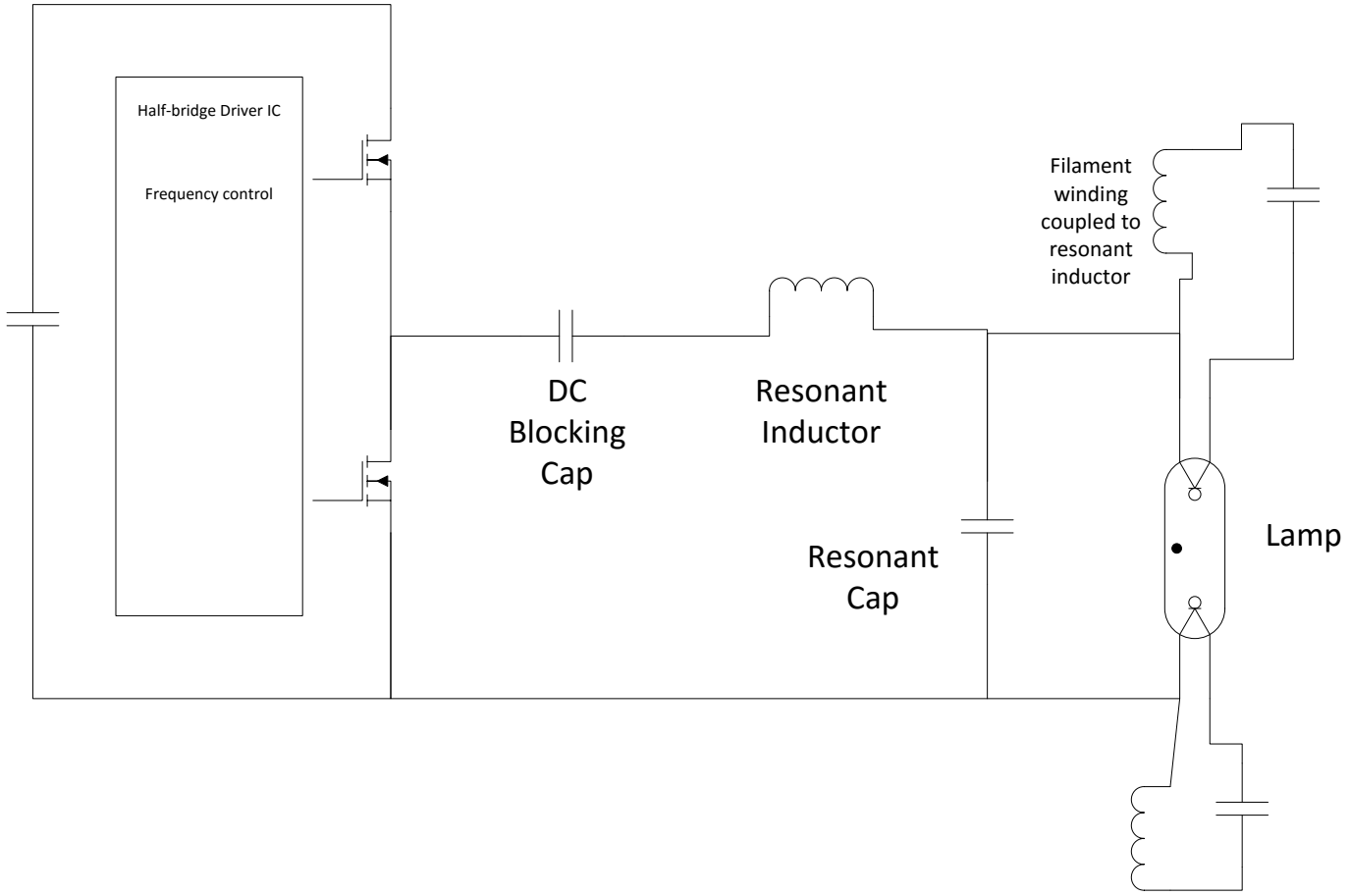
Light output follows lamp current



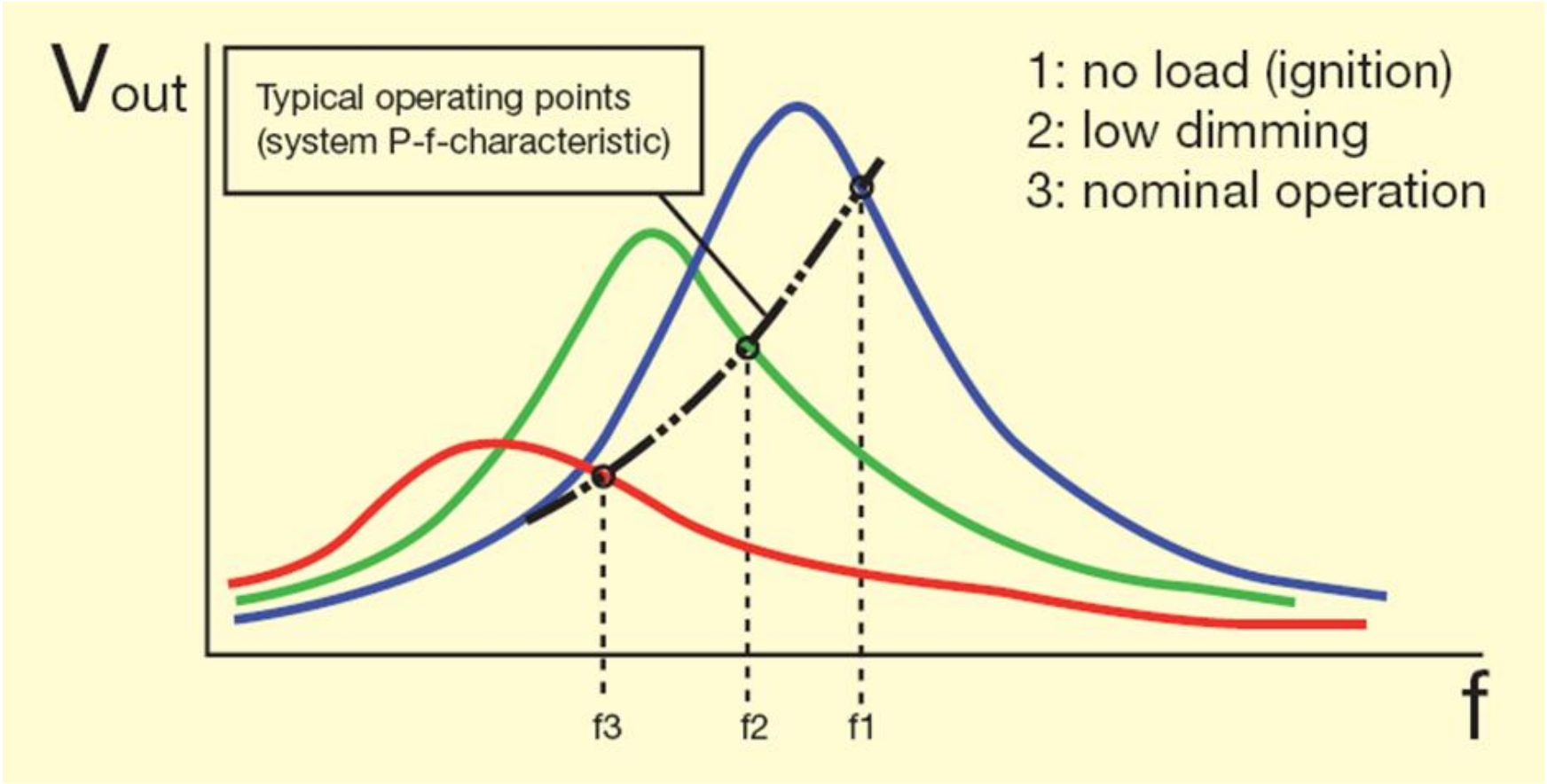
Light output follows lamp current



Simplified Dimming Ballast Schematic



Frequency Shift Dimming



It's all about the filaments

Lamp operated at full bright

Lamp operated at minimum bright

Filament heating

Filaments are heated by discharge current and filament current

The filament heating current must be increased as the lamp is dimmed to maintain proper filament temperature

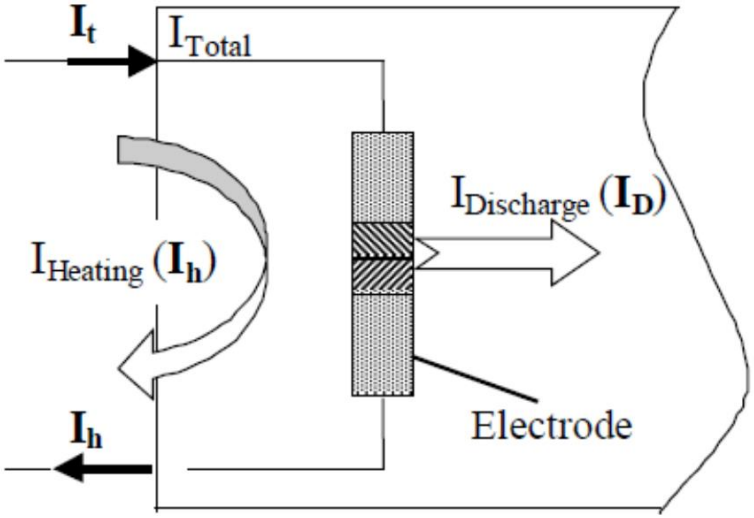
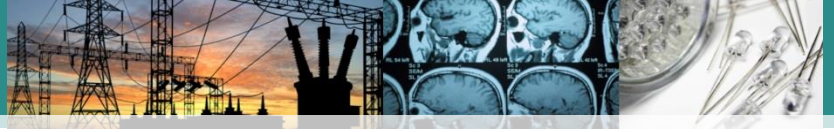


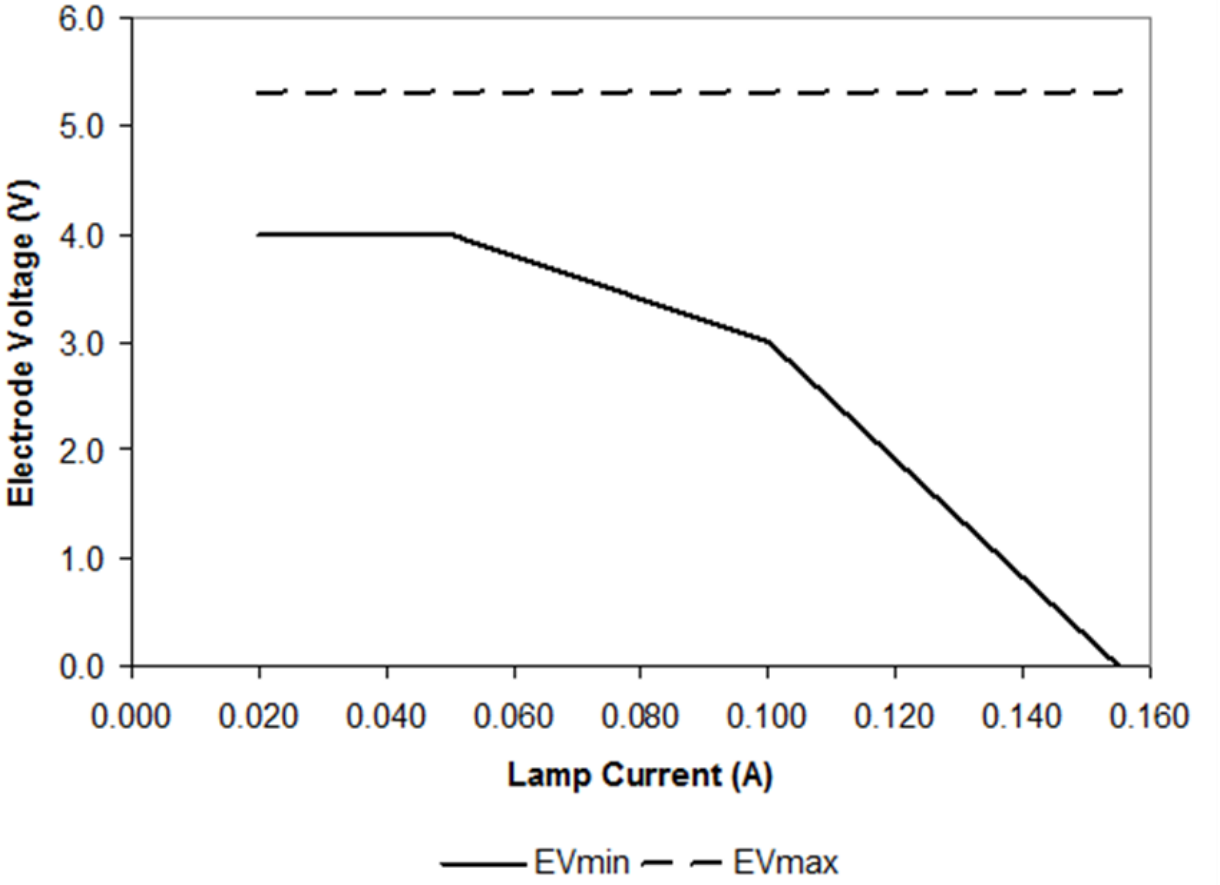
Fig.1. Schematic presentation of an electrode



NEMA LL-9

- Filaments are heated by discharge current and filament current
- At full power, discharge current may be sufficient to heat filaments
- Filament voltage (and power) is increased to maintain filament temperature while dimming
- Lamp life is preserved by following LL-9 guidance
- LL-9 is the result of 20,000 hour life test between June 2005 and 2007
- Life test was collaborative effort between lamp and ballast manufacturers, LRC, and DOE

LL-9 Safe operating area



See NEMA LSD-73 for additional information