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Philips-Advance High Efficiency Ballasts & Energy-Saving Ballast Strategies

Bob Trate - CPMR
Philips/Advance Ballasts
April 20, 2010
Fluorescent Ballast Overview

- There are several generations and design platforms for electronic ballasts
  - There have been 3 major design platform changes since electronic ballasts were introduced in the mid 1980’s
  - There have been numerous revisions and changes in electronic ballast designs to keep up with the changes in lamp technology
- Earlier generations are less energy efficient and some will not operate the energy-saving versions of the 32 Watt T-8 lamp properly or not at all
- There are key aspects of any electronic ballast that need to be understood in order to properly configure and lamp and ballast combination for the application
- Lamps and ballast go together – consider both equally when designing a system
Advance Electronic Fluorescent Ballasts For T-8 Lighting Applications
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Centium®
T-8 Electronic Ballasts
Advance Centium® Ballasts

- IntelliVolt® multiple voltage technology
  - Enables operation from 120 through 277 volts
- Replaces dedicated voltage electronic T-8 ballasts
  - Reduces sku’s required for T-8 lamps
- The standard replacement ballast for T-8 applications
- 1 and 2 lamp T-8 versions have the smallest footprint
- Anti-Striation circuitry added to all 4’ T-8 models
- Also available for standard T-12 and T-12 HO lamps
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Advance Optanium™
High-efficiency Electronic Ballasts
Define “High-efficiency”

- High-efficiency can mean different things to different people
- NEMA established the voluntary premium® ballast program
  - Promotes a more energy efficient environment
  - Assists lighting professionals and end users in recognizing the highest performing ballast products
NEMA Premium Electronic Ballast Program

Overview of the Program

The NEMA Premium Electronic Ballast Program provides the method for identifying the most efficient T8 fluorescent ballasts available in the market and identifies models that are consistent with the Consortium for Energy Efficiency (CEE) specifications for high performance lamps and ballasts, tested in accordance with ANSI C82 Standards. Products eligible to participate in the new NEMA Premium Electronic Ballast Program include either instant-start or programmed rapid-start electronic ballasts designed for use with four-foot 32 Watt T8 fluorescent lamps. Products qualifying for this program bear a special mark that will help lighting professionals and end users to recognize the market’s highest performing electronic ballast products available and will help support energy efficient objectives.

The Special Mark

How to Specify NEMA Premium Electronic Ballasts

For new luminaires, specify: “Luminaire shall contain a NEMA Premium electronic ballast (do not substitute).” Also, specify starting method, number of lamps, and low, normal or high ballast factor.

For lamp and ballast retrofit, specify: “Ballast shall be a NEMA Premium electronic ballast (do not substitute).” Also, specify starting method, number of lamps, and low, normal or high ballast factor.

For spot ballast replacement, specify: “Ballast shall be a NEMA Premium electronic ballast (do not substitute).” Also, specify ballast, starting method, number of lamps, and low, normal, or high ballast factor.

Qualifying Models

The following screens list companies and their currently qualifying electronic ballast models.

Benefits of the Program

This program not only promotes a more energy efficient environment, but also assists lighting professionals and end users in recognizing the highest performing ballasts products on the market. NEMA anticipates that the NEMA Premium Electronic Ballast Program, by making high efficiency ballasts readily identifiable, will help alleviate market and supply-chain barriers that inhibit higher penetration of energy efficient ballasts nationwide.
Advance Optanium™ Ballasts

- High efficiency ~ 3 watt reduction in ballast losses
- IntelliVolt® Operation – 120 to 277 volt applications
- Normal, low, and high ballast factors
- Instant-Start, Programmed-Start and Programmed-Start Parallel models
- Operates standard and energy saving T-8 lamps
- - 20 deg. “F” starting temperature
  - (when used with the standard 32 watt T-8 lamp)=<
- Philips-Advance high-efficiency fluorescent ballasts are applicable for rebates under PA Act 129
  - Example: Met-Ed rebates low ballast-factor ballasts having a ballast factor =< .78
Optanum™ Ballasts - Continued

- UL “CC” rating (“IOP” Models Only)
  - Anti Arc protection
- IOPA Models are standard
- Lamp auto-restrike capability
  - Lower maintenance costs
- No interference with security systems
- Correct lead placement ensures easy installation
Ballast Factor Defined

• “Measure of light output from lamp operated by commercial ballast, as compared to laboratory standard referenced ballast specified by ANSI”

• There are 3 nominal ballast factor choices when selecting electronic ballasts:
  – Normal ballast factor ~ (.88)
  – High ballast factor ~ (1.20)
  – Low ballast factor ~ (.75)
Ballast Factor In Terms Of Control

- Electronic ballasts are offered with different ballast factors (refer to Advance catalog)
- Selection and application of ballast factor can act as a form of lighting control
- Reducing the ballast factor reduces light output and saves energy
- Reduced light output cannot be below minimum requirements
Ballast Factor Is Important

• You can control the amount of light you need by selecting the correct ballast factor
• Low ballast factor = less light and saves energy
• High ballast factor = more light and less energy efficient
• Know when and where to use the different ballast factors
Ballast Factor & Light Output

Performance Comparison of 2 – F32T8 Lamps

- High Power Ballast: 3540 Lumens / lamp, 77 Watts
- Reference Ballast: 2950 Lumens / lamp, 64 Watts
- Normal Power Ballast: 2567 Lumens / lamp, 58 Watts
- Low Power Ballast: 2213 Lumens / lamp, 51 Watts
## System Solutions Comparison

<table>
<thead>
<tr>
<th>Ballast</th>
<th>Ballast Factor</th>
<th>Input Watts</th>
<th>Lamp Type</th>
<th># Lamps</th>
<th>Lamp Lumens</th>
<th>System Lumens</th>
<th>LPW</th>
<th>BEF</th>
<th>% of Base</th>
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<tbody>
<tr>
<td>E.S. Magnetic</td>
<td>0.87</td>
<td>68</td>
<td>F34 T12 Cool White</td>
<td>2</td>
<td>2700</td>
<td>4698</td>
<td>69</td>
<td>1.28</td>
<td>100%</td>
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<tr>
<td>H.E Std. BF</td>
<td>0.87</td>
<td>55</td>
<td>F32 T8</td>
<td>2</td>
<td>2950</td>
<td>5133</td>
<td>93</td>
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<td>0.77</td>
<td>48</td>
<td>F32 T8</td>
<td>2</td>
<td>2950</td>
<td>4543</td>
<td>95</td>
<td>1.60</td>
<td>97%</td>
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<tr>
<td>H.E High BF</td>
<td>1.18</td>
<td>74</td>
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<td>2</td>
<td>2950</td>
<td>6962</td>
<td>94</td>
<td>1.59</td>
<td>148%</td>
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<tr>
<td>H.E Std. BF</td>
<td>0.87</td>
<td>52</td>
<td>F32 T8 30W/ES</td>
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<td>2850</td>
<td>4959</td>
<td>95</td>
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<td>4389</td>
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<td>H.E Std. BF</td>
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<td>48</td>
<td>F32 T8 28W/ES</td>
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<td>2725</td>
<td>4742</td>
<td>99</td>
<td>1.81</td>
<td>101%</td>
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<td>H.E Low BF</td>
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<td>F32 T8 28W/ES</td>
<td>2</td>
<td>2725</td>
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<td>H.E High BF</td>
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<td>F32 T8 28W/ES</td>
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<td>H.E Std. BF</td>
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<td>F32 T8 25W/ES</td>
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<tr>
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<td>5664</td>
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## Lamp Lumens – Based On Philips

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<thead>
<tr>
<th>Kelvin Temperature</th>
<th>32 W T-8</th>
<th>30 W T-8</th>
<th>28 W T-8</th>
<th>25 W T-8</th>
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<tr>
<td>ADV</td>
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<td>TL700</td>
<td>TL800</td>
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<td>3000</td>
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<td>5000</td>
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<td>25 W T-8</td>
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<td>3000</td>
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<td>3500</td>
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<td>4100</td>
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<tr>
<td>5000</td>
<td>5000</td>
<td>5000</td>
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<td>Initial Lamp Lumens (ANSI Bench Ballast – Ballast Factor of 1.00)</td>
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<tr>
<td>3100</td>
<td>3025</td>
<td>2800</td>
<td>2700</td>
<td>2950</td>
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</table>
Overview

- There are (4) 4-foot T-8 lamps offered
  - 32 watt - 30 watt - 28 watt - 25 watt
- There are different lumen outputs available for each lamp
- There are also different CRI’s available on some of these lamps
- There are 3 different ballast factors offered in electronic T-8 ballasts
- There are 36 combinations of these lamps and ballasts regarding light levels
- There are additional lamp combinations based on Kelvin temperature
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T-8 Ballast & Lamp Choices
Application

• Choose lamp and ballast factor to meet desired lighting levels
• Choose lamp based on life, lumens, CRI and color temperature
• Choose ballast based on application requirements
  – “Instant-start” for most applications
    • Best energy savings
    • Most economical
  – “Programmed-start” for high switch cycles and long lamp life
    • Higher cost
    • Lower energy savings
    • Longer lamp life
  – “Programmed-start-parallel” for the best of both “Instant-Start” and “Programmed-Start”
Typical Recommendations

- Classrooms
  - 32T8/TL841/XEW/ALTO 25w & IOPA normal ballast factor
- Library
  - F32T8/TL830/XEW/ALTO 25w & IOPA normal ballast factor
- Cafeteria
  - F32T8/TL841/XEW/ALTO 25w & IOPA normal ballast factor
- Hallways
  - F32T8/TL835/XEW/ALTO 25w & IOPA normal ballast factor
- Administrative Offices
  - F32T8/TL835/XEW/ALTO 25w & IOPA normal ballast factor
- Utility
  - F32T8/TL841/XEW/ALTO 25w & IOPA normal ballast factor

Source: Wm. Middlebrook – Philips Lamps
## Centium Vs. Optanum

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</tr>
<tr>
<td>UL “CC” Rating</td>
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<td>Yes (&quot;IOP&quot; Only)</td>
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<td>Instant-Start Models</td>
<td>Yes</td>
<td>Yes</td>
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<td>Optanuim</td>
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<td>No</td>
<td>Yes      (&quot;IOP&quot; Only)</td>
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<tr>
<td>Instant-Start Models</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Programmed-Start</td>
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<td>Yes</td>
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<tr>
<td>Programmed-Start</td>
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<td>Yes</td>
</tr>
<tr>
<td>Programmed-Start Parallel</td>
<td>No</td>
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</table>
Application Guidelines

• “ICN” for MRO applications including T-12 standard and high-output lamps
  – Note: Only offered in standard ballast factor
• “IOPA” for system retrofits and to address specific lighting level requirements
  – Available in low, standard and high ballast factors
  – Available in “Instant-Start”, Programmed-Start” and “Programmed-Start-Parallel
• The most common T-8 lamps sold by Philips is the 28 Watt T-8
• The “IOPA” “LW” ballast is often chosen to operate this lamp due to the energy savings based on the low ballast factor
• “IOP” for freezer case applications or where arc-detection circuitry would benefit the installation
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Advance Dimming & Controllable Ballasts
Fluorescent Dimming

• An excellent method of control resulting in exceptional energy savings
• Varies ballast factor to create ≈100 % to 5 % light output (depending upon model)
• Advance offers 3 types:
  – Mark X® – Powerline 2-wire
  – Mark VII® – 0-10 Volt DC Control
  – EssentiaLine™ – 0-10 Volts DC Control
• Multiple compatible control manufacturers
How can dimming save you energy?

- Magnetic T12 Systems
- Non-dimming Electronic Instant Start T8 Systems

0-10V Ballasted Fixture

- Reduced Light Levels
- Maintain Security
- Energy Savings Due to Daylighting and 0-10V Controllable Electronic Ballast
- Reduced Light Levels For Cleaning

Building Occupied
• Applications
  – Linear Fluorescent
  – 4-Pin Compact Fluorescent
  – T5-HO
• 100% to 5% full-range continuous dimming (down to 1% in T5/HO models)
• Delivers up to 65% energy savings over standard Fixed Output T8 ballasts
Advance Mark X® Powerline

- Standard Wiring – no special control leads
- Programmed Start Ignition
- Lamp ignition at any light setting, including the 5% level (1% in T5/HO models)
- Uses:
  - Atriums, Auditoriums, Classrooms, Conference Rooms, and Dining areas
- Use a line voltage control specifically designed for this ballast
Advance Mark VII® 0-10 VDC

- 100% to 5% full-range continuous dimming (down to 1% in T5/HO models)
- Direct operation from a 0-10V DC control device
- IntelliVolt® multiple-voltage technology enables operation at any input voltage from 120 to 277 volts, 50/60Hz
- Use controls offered by various control manufacturers
Advance EssentiaLine™

- Continuous dimming range from 100% to 20%
- Direct operation from a 0-10V DC control devices from more than 30 manufacturers
- “Programmed-start” operation
  - Use in frequent switching applications
- IntelliVolt® multiple-voltage technology enables operation at any input voltage from 120 to 277 volts, 50/60Hz
- Leviton and others provide specific controls for this ballast
- Meets NEMA Premium and CSA Energy Efficiency requirements
- RoHS compliant
- For F17, F25 and F32 T-8 lamps
- Ballast factor - .88 to .20
“Step-dim” Ballasts For T-5

- Designed to operate (2) 28 watt T-5 lamps
- Controlled by any line voltage switching device
  - Separate line voltage leads for operation of each lamp
- IntelliVolt™ design
  - Operates on any voltage between 120 and 277 VAC
- Programmed-Start for use with occupancy sensors and other control devices
“Step-dim” Wiring

<table>
<thead>
<tr>
<th>Power Output</th>
<th>Position S1</th>
<th>Position S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>50%</td>
<td>On</td>
<td>Off</td>
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<tr>
<td>50%</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>0%</td>
<td>Off</td>
<td>Off</td>
</tr>
</tbody>
</table>

Line (black) inputs must be connected to the same phase of the line voltage.
Magnetic & HID Update

• Magnetic ballasts for many common T-12 lamps will be discontinued on July 1, 2010
  – You must purchase electronic ballast for these lamps going forward
• All new Metal Halide fixtures through 500 watts must now be “Pulse-Start” per the “EISA” act of 2007
  – The government has established new efficiency standards for Metal-Halide lamps
  – Metal-Halide lamps above 500 watts are NOT affected
• Many new “Pulse-Start” ballasts are available from Philips
Solid State Lighting

Philips Affinium LED modules

Affinium LED String
Channel Letter Applications

Affinium LED PosterBox
Backlit Signage Applications

Affinium LED RDL
Refrigeration Applications
Philips LED Lighting Products

• Philips is the only company in the world that manufactures the entire system
  – LED chip
  – Module/Lamp/Light source
  – Power Supply
• Proper management of thermal dissipation
  – Over driving the lamp will dramatically shorten the life
• Simple rules to move forward with when considering an LED system:
  – Can they explain their Thermal Management for the system?
  – How do they bin/sort their product to ensure even color and illumination over thousands of units?
  – How do they drive their LED units to ensure proper forward voltage, to not damage LED?
Philips LED Lighting Products

- Philips is the only integrated company capable of controlling all of the aspects of manufacturing LED lighting products.
- Without full top to bottom manufacturing integration you lose internal control of the process, thus losing the probability of accurately predicting the life of the LED unit over tens/hundreds of thousands of units over time.
Questions?

PHILIPS

sense and simplicity