



OEM Design Guide

Philips MasterColor® CDM Elite MW Lighting System



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I. General Introduction of Philips MasterColor® CDM Elite MW System

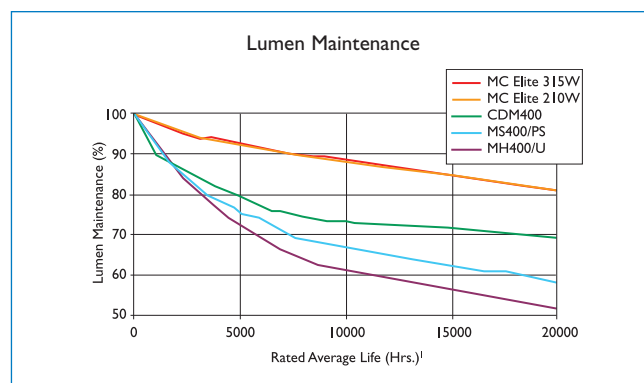
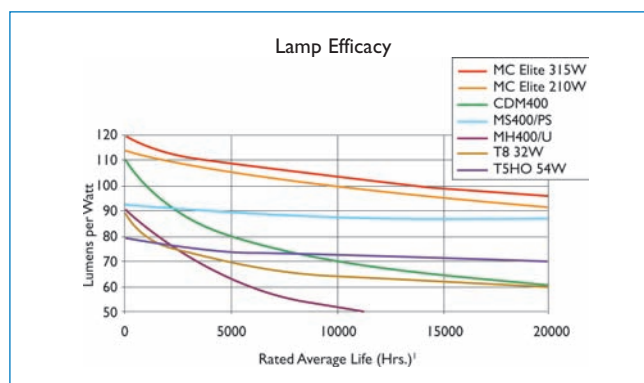
Product description

MasterColor® CDM Elite MW is a medium wattage lighting solution based on Philips unique CDM technology. This new system consists of a specially developed lamp, ballast and socket, which provides high quality and high efficient white light in combination with long life. The MasterColor® Elite product offering will include two wattages (lumen packages) and two color temperatures:

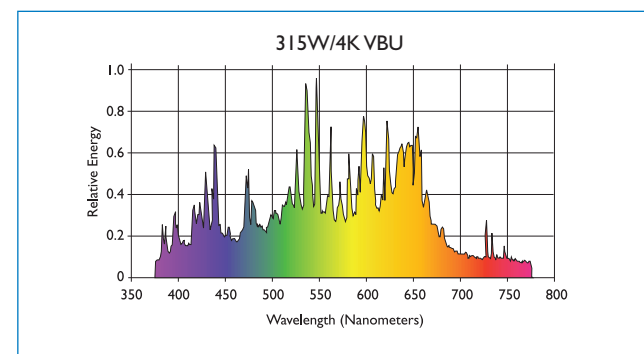
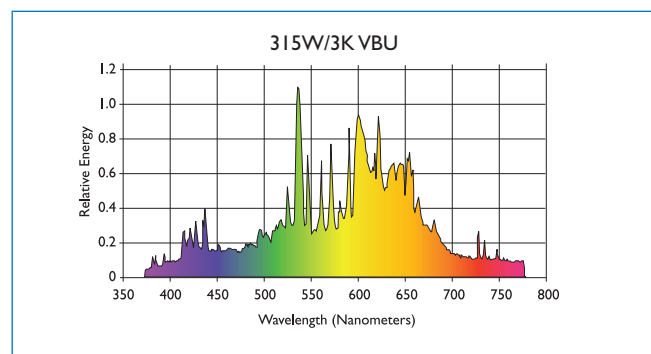
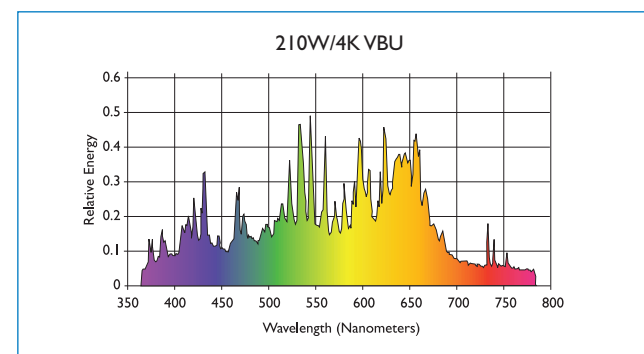
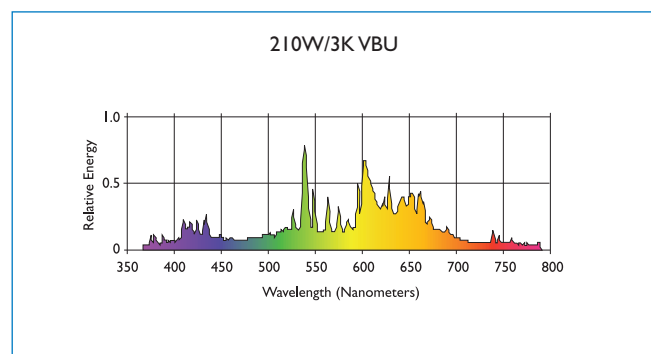
| Lumen package | Wattage | CCT | Lamp type | Referred to as |
|---------------|---------|--------|---------------|----------------|
| 23-24 | 210W | 3000 K | Non-protected | 210W/3K |
| | | 4200 K | Non-protected | 210W/4K |
| 36-37 | 315W | 3000 K | Non-protected | 315W/3K |
| | | 4200 K | Non-protected | 315W/4K |

- 4200 K available 2009
- Protected designs are under evaluation and may become an option in the future

One of the key features of this lamp/ballast system is the system efficacy (>100 LPW) and the high Lumen Maintenance.



MasterColor CDM Elite Spectral Power Distribution



1) Rated average life is the life obtained, on the average, from large representative groups of lamps in laboratory tests under controlled conditions at 10 or more operating hours per start. It is based on survival of at least 50% of the lamps and allows for individual lamps or groups of lamps to vary considerably from the average.

2. Ordering Information

Packing will be Mid-pack, 12 pieces in one box for each lamp and ballast.

| System | MasterColor® CDM Elite 315W | MasterColor® CDM Elite 210W | Carton Qty |
|---------|-----------------------------|-----------------------------|------------|
| Lamp | CDM Elite MW 315/T9/930/U/E | CDM Elite MW 210/T9/930/U/E | 12 |
| Ballast | IZTMH210315RLF | IZTMH210315RLF | 6 |

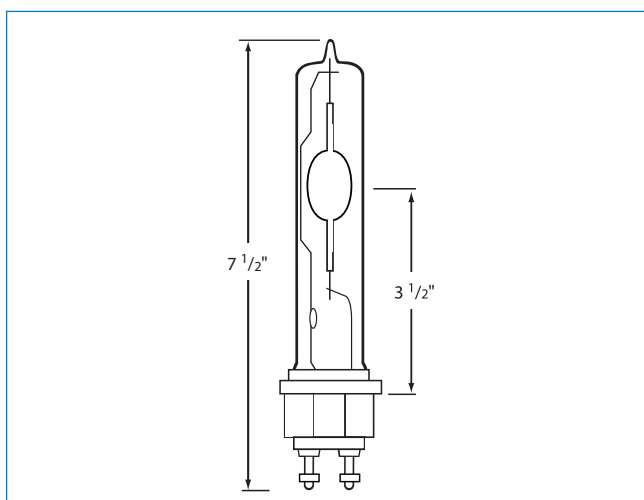
| Product Number | Description |
|----------------|---|
| 218313 | CDM Elite MW 315/T9/930/U/E |
| 220624 | CDM Elite MW 210/T9/930/U/E |
| IZTMH210315RLF | Advance e-Vision ballast Operates both 315W and 210W lamps Lamps and main leads on same end |

3. Dimensions and Mechanical Design

Lamp Dimensions

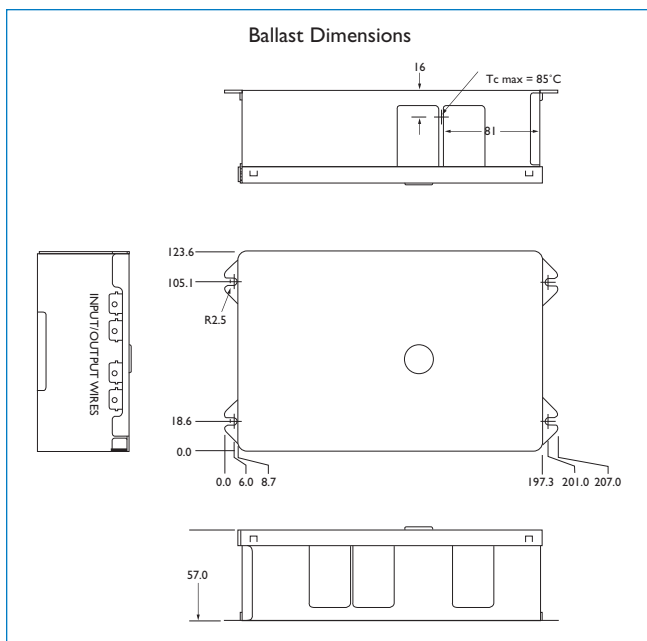
Lamp dimensions for both the MasterColor® CDM Elite 315W and 210W are the same and can be found below.

| Overall lamp length | Light center length | Lamp diameter | Base diameter |
|---------------------------|--------------------------|--------------------------|--------------------------|
| 7.50" max 188.0 mm max | 3.50" nom 90.0 mm nom | 1.10" max 28.5 mm max | 1.61" max 41.5 mm max |

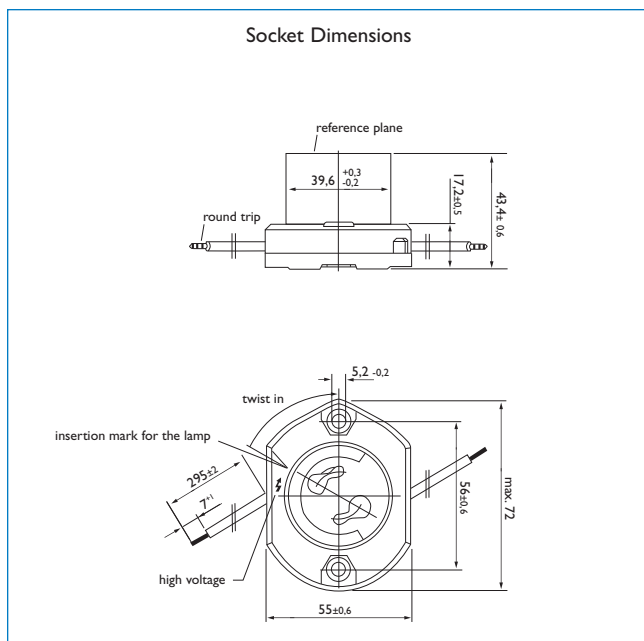


Ballast Dimensions

Dimensions of Metal housing (excluding grommets) is 188 x 124 x 57 mm, see drawings below.

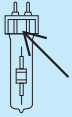
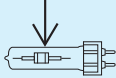


Socket Dimensions



4. Temperature Behavior

Following temperature limits have to be taken into account for the MasterColor CDM Elite 315W and 210W:

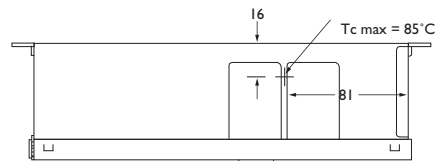
| Temperature maximum for MasterColor® CDM Elite 315W/3K | | |
|---|------------|--|
|  | Pinch | 300°C (nominal) 320°C (+5% overwattage) |
|  | Outer bulb | 650°C (nominal) 700°C (+5% overwattage) |

Temperatures are measured on burning lamps. Exceeding the maximum temperature will not guarantee optimal performance (lifetime, lumen maintenance).

Application tips for optimal thermal performance:

- Ensure good thermal contact on the side with the mounting feet
- Minimize air gaps for maximum heat transfer
- Shield lamp heat

Ballast Hot Spot



NOMINAL: 60,000 hours/90% survivals @ $t_{(case)} = 80^{\circ}\text{C}$

MINIMAL: 50,000 hours/90% survivals @ $t_{(case)} = 85^{\circ}\text{C}$

Lifetime and temperature

The temperature is the most important parameter for lifetime and reliability. In the design of the lamp and ballast, everything is done to keep the temperature as low as possible. But the luminaire can affect that. Therefore, the design of the luminaire and its ability to guide the heat out of the luminaire is very important.

5. Wiring

Connection

Lamp: Blue and red wire

Input: Black (line 200-277V), White (Neutral) and Green (Earth Ground)

Dimming Leads: Violet and Grey

All lead lengths are 18.0" +/- 1.0".

Red lead must be connected to center terminal of lamp in case of a screw base.

Do not connect red or blue wire to neutral or line.

The maximum distance between lamp and ballast is 30 feet (1nF of lamp load)

6. Electromagnetic Interference (EMI)

The ballast is tested and approved according to FCC regulations; however, when mounted in a luminaire, different behavior can be found.

To assist in the reduction of radiated EMI, the ballast should be grounded by either mounting feet or green ground wire.

7. Factory Handling

Fixation in luminaire

Mounting feet can be bent over if needed.

Lamp Date Code System:

0 to 9: Representing last number of the calendar year.

A to M (excluding I): Representing January to December.

Note: During odd numbered decades, the first character designates the year of manufacture; the second character designates the month of manufacture.

During even numbered decades, the first character designates the month of manufacture; the second character designates the year of manufacture.

Designations are listed below and example shown to the right:

| Year character | Month character | Examples |
|----------------|-----------------|-------------|
| 1972-2 | Jan-A | Jan 1972-2A |
| 1983-3 | Feb-B | Feb 1983-B3 |
| 1984-4 | Mar-C | Mar 1984-C4 |
| 1992-2 | Apr-D | Apr 1992-2D |
| 1995-5 | May-E | May 1995-5E |
| 2005-5 | Jun-F | |
| | Jul-G | |
| | Aug-H | |
| | Sept-J | |
| | Oct-K | |
| | Nov-L | |
| | Dec-M | |

Note: The decade 2000 to 2009 is considered even.

Ballast Date Code System:

For tracking purposes, every ballast will be marked with a date-code after the final testing. The code consists of production Year and Day of the Year.

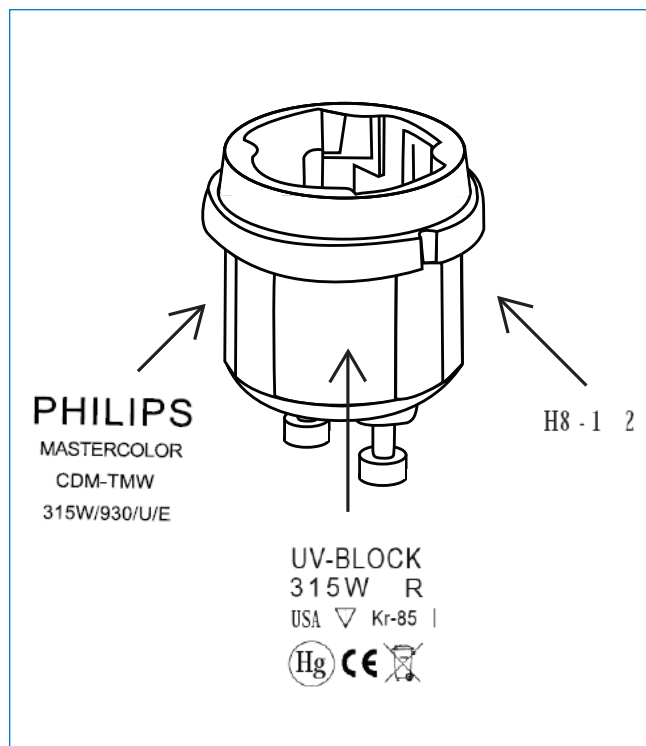
Last two (2) digits of year: 2000 = 00, 2006 = 06, 2099 = 99.

Day of Year: Sequential Julian date, January 1 = 001, December 31 non-leap years = 365, December 31 leap year = 366.

IBM Code: Code from Identification of Ballast Model Data Base. For those units not having an assigned IBM Code, the placeholders XXX shall be inserted to maintain the 2 x 8 character integrity.

Plant Code: F = PLEM Tijuana

SAP Work Order Number: Manufacturing lot work order as assigned by the SAP system



| Last two digits of year | Day of Year: 1-366 | IBM Code |
|----------------------------|--------------------------------------|----------|
| # # | # # # | # # # |
| # | # # # # | # # # |
| Plant Code | SAP Work Order Number—Advance Plants | |

8. Installation/Mounting

Lamps that can be driven by the ballast

MasterColor® CDM Elite MW 210W or 315W can be driven with the Advance e-Vision ballast.

Suitable application for the Advance e-Vision ballast

Input voltage: 200V-277V

9. Operating in Abnormal Conditions

Thermo-switch behavior

If the ballast is used at too high temperatures, a so-called thermo-switch will switch off the ballast to protect it against damage. The ballast will automatically turn off at a case temperature of $90^{\circ}\text{C} \pm 5^{\circ}\text{C}$

Input voltage

The ballast is designed to operate within an input tolerance of $\pm 10\%$. In this range, the lamp power is regulated within $\pm 3\%$ of its nominal power.

Because the ballast will regulate the lamp to a constant power, the input current will increase when the input voltage is lower. This will ultimately influence the power losses, so the worst-case temperature should therefore be measured at lowest mains voltage.

Over voltage

The ballast has a limited protection against over voltage and the ballast will switch off at mains voltage above 330V; this will however negatively influence the lifetime and reliability. It is advised to prevent higher mains voltages than $+10\%$. The ballast will attempt to reignite the lamp once input voltage goes back down below 310V.

Overcurrent

Protection against surges are built in the ballast.

(6KV ring wave (diff. Mode), Common mode 2KV)

EOL lamp protection

The ballast has a protection against End Of Life Lamps. The ballast will detect these lamps and switch off. Mains needs to be cycled (> 2 seconds) to reset ballast.

10. Specifications

Lamp Technical

Specifications for the MasterColor®
CDM Elite MW 315W lamp at 100 hours

| MasterColor® CDM Elite 315W Lamp | | |
|-------------------------------------|------|-------------|
| Approx. Initial Lumens ¹ | Lm | 37,800 |
| Approx. Design Lumens ² | Lm | 34,000 |
| Lumen Maintenance | % | 80 @20khrs |
| Efficacy | Lm/W | 120 |
| Lamp Voltage | V | 100 |
| Lamp power | W | 315W |
| Color Temperature | K | 3000 |
| Color Rendering | CRI | 90 |
| | R9 | > 45 |
| Operating position | | Universal |
| Lamp base | | PGZI8 |
| Rated Average Life ³ | K | 20,000 hrs. |

Note: For Enclosed fixtures only. For horizontal operation, the lamps are not recommended to rotate over 90° in sockets after operation. When turning an operating lamp orientation over 90°, or turning a non-operating lamp over 90° then switching it on, there is a risk for arc tube to rupture. This holds during operation as well as after a cooling period after switching off the lamp. If one wishes to rotate the lamp over more than 90° around the lamp axis, one should do so in steps of less than 90° and let the lamp burn for at least 2 hours between steps.

1) Measured at 100 hours of life in a horizontal operating position.

2) Approximate lumen output at 40% of lamp rated average life.

3) Rated average life is the length of operation (in hours) at which point an average of 50% of the lamps will still be operational and 50% will not.

Specifications for the MasterColor®
CDM Elite MW 210W lamp at 100 hours

| MasterColor® CDM Elite 210W Lamp | | |
|-------------------------------------|------|-------------|
| Approx. Initial Lumens ¹ | Lm | 24,150 |
| Approx. Design Lumens ² | Lm | 21,700 |
| Lumen Maintenance | % | 80 @20khrs |
| Efficacy | Lm/W | 115 |
| Lamp Voltage | V | 100 |
| Lamp power | W | 210W |
| Color Temperature | K | 3000 |
| Color Rendering | CRI | 90 |
| | R9 | > 40 |
| Operating position | | Universal |
| Lamp base | | PGZI8 |
| Rated Average Life ³ | K | 20,000 hrs. |

Ballast Technical

Input

| Parameter | Conditions | 210W | | | Unit |
|--------------------------------------|--|------|------|------|--|
| | | Min | Typ | Max | |
| Mains voltage V_{mains} | Operational performance | 180 | 277 | 305 | V |
| | Operational safety ⁴ | 160 | | 330 | V |
| Mains frequency f_{mains} | Operational performance | 47.5 | | 63 | Hz |
| | Operational safety | 45 | | 66 | Hz |
| Mains power P_{mains} | $P_{\text{la}} = 210\text{W}$ | | 233 | | W |
| Mains current I_{mains} | At $P_{\text{la,nom}}, V_{\text{mains}} = 200\text{V}$ | | TBD | | A |
| | At $P_{\text{la,max}}, V_{\text{mains}} = 180\text{V}$ | | TBD | | A |
| Power factor | Within oper. performance | | | | |
| | mains and at $P_{\text{la,nom}}$ | 0.9 | | 0.95 | |
| Distortion | THD | | | 15 | % |
| | Within oper. performance | | | | |
| Inrush current $I_{\text{mains,pk}}$ | $V_{\text{mains}} = 200\text{V}$, | | | | |
| | $Z_{\text{mains}} = 0.4\Omega + 0.8\text{mH}$ | | <TBD | | A |
| EMI | | | | | FCC, Title 47. Part 18. Subpart C Non-consumer (Class "A") |

Input

| Parameter | Conditions | 315W | | | Unit |
|--------------------------------------|--|------|------|-----|--|
| | | Min | Typ | Max | |
| Mains voltage V_{mains} | Operational performance | 180 | 277 | 305 | V |
| | Operational guideline ⁴ | 160 | | 330 | V |
| Mains frequency f_{mains} | Operational performance | 47.5 | | 63 | Hz |
| | Operational guideline | 45 | | 66 | Hz |
| Mains power P_{mains} | $P_{\text{la}} = 315\text{W}$ | | 353 | | W |
| Mains current I_{mains} | At $P_{\text{la,nom}}, V_{\text{mains}} = 200\text{V}$ | | TBD | | A |
| | At $P_{\text{la,max}}, V_{\text{mains}} = 180\text{V}$ | | TBD | | A |
| Power factor | Within oper. performance | | | | |
| | mains and at $P_{\text{la,nom}}$ | 0.9 | 0.95 | | |
| Distortion | THD | | | 15 | % |
| | Within oper. performance | | | | |
| Inrush current $I_{\text{mains,pk}}$ | $V_{\text{mains}} = 200\text{V}$, | | | | |
| | $Z_{\text{mains}} = 0.4\Omega + 0.8\text{mH}$ | | <TBD | | A |
| EMI | | | | | FCC, Title 47. Part 18. Subpart C Non-consumer (Class "A") |

4) The input of the driver is protected against transients and over voltage. These typically occur at below or above V , beyond which point the driver will fail (not repairable by the end user).

Output (lamp side)

| Parameter | Conditions | 210W | | | Unit |
|-----------------------------------|---|------|-----|-----|------------------|
| | | Min | Typ | Max | |
| Lamp power P_{la} | $V_{\text{mains}} \pm 10\% (P_{\text{la,nom}})$ | | 210 | | W |
| Ignition voltage V_{ign} | $C_{\text{load}} < 1\text{nF}$ ⁵ | 3.0 | 3.5 | 4.0 | kV _{pk} |

5) Typical cable capacity 100pF/3'

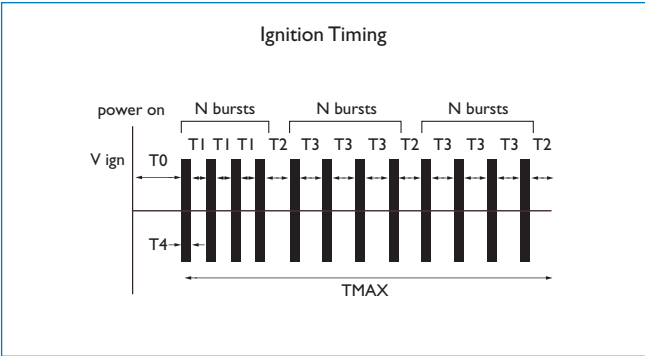
Output (lamp side)

| Parameter | Conditions | 315W | | | Unit |
|-----------------------------------|---|------|-----|-----|------------------|
| | | Min | Typ | Max | |
| Lamp power P_{la} | $V_{\text{mains}} \pm 10\% (P_{\text{la,nom}})$ | | 315 | | W |
| Ignition voltage V_{ign} | $C_{\text{load}} < 1\text{nF}$ ⁵ | 3.0 | 3.5 | 4.0 | kV _{pk} |

Specifications (continued)

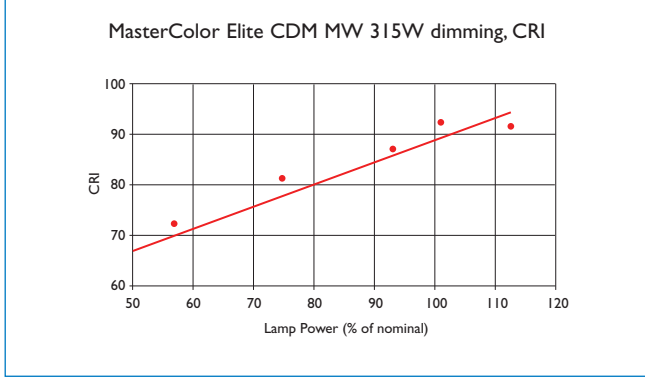
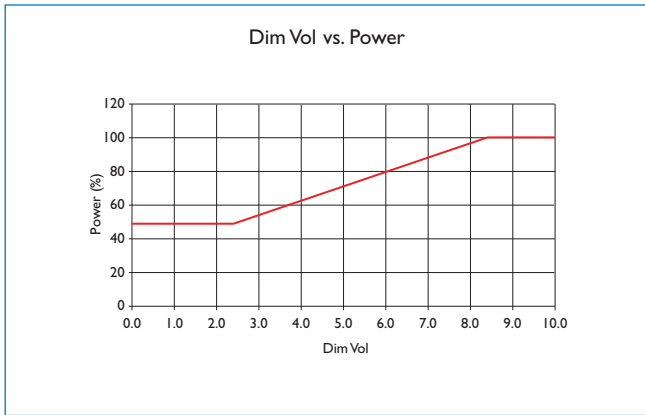
Ignition Timing

| Parameter | Value |
|-----------|-------|
| T0 | <1s |
| T1 | 30s |
| T2 | 60s |
| T3 | 60s |
| T4 | 0.5s |
| TMAX | 30min |
| N | 4 |



Dimming

- Ballast will not dim when it is set to 210W setting
- Ballast is designed to be able to dim the lamp using a 0-10V interface
- Ballast will wait for 10min at full power before it can start dimming
- Lowest dim level: 50% of ballast power
- Dimming rate: TBD
- Dimming Curve: Following graph shows the Nominal dimming curve



10. Specifications (continued)

| Reliability | |
|------------------------------------|---|
| Rated Average Life ¹⁾ : | 60,000 hrs @ $T_c = 80^\circ\text{C}$ |
| Failure Rate: | < 0.25%/1,000 hrs @ $T_c = 80^\circ\text{C}$ |
| Protections: | Against lamp end of life, against overheating (when T_c exceeds 90°C), against not connected lamp, against short circuited lamp |
| Immunity: | Transient protection to comply with 6kV ring wave (diff. Mode), common mode 2.0kV IEC1547; surge test levels phase to phase or phase to neutral: 1kV. Any phase to ground: 2kV. Mains dips: according IEC1547 |

| Regulatory | |
|--------------------|--|
| Approbation: | UL, CSA |
| Standards: | UL935, UL1029 |
| Vibration: | IEC 68-2-6-Fc (Frequency 10 ... 150Hz, acceleration 2G or amplitude 0.15mm. Frequency change 1 oct/min, 3 directions, 5 sweeps/direction) |
| Bumps: | IEC 68-2-29-Eb (Acceleration 10G/16ms, 1000 bumps/direction) ULN-D 1672 (Acceleration 30G, 2 per direction) |
| Drop test: | UND 1400 |
| Temperature shock: | IEC 68-2-14-Na (5 cycles $-25 \dots +80^\circ\text{C}$, 30 min., 2 chamber method) |
| Temperature cycle: | IEC 68-2-14-Nb (400 cycles $-20 \dots +100^\circ\text{C}$) |

| Environmental Conditions | |
|--------------------------|---|
| Temperature: | $-30^\circ\text{C} < T_{\text{amb}} < 45^\circ\text{C}$ (Depending on luminaire) |
| Humidity: | Ballast to be built into a sealed enclosure (IP63), relative humidity < 85% (under all operating conditions) |
| Storage: | $-30^\circ\text{C} < T_{\text{amb}} < 80^\circ\text{C}$ relative humidity < 95% (non condensing) |

| Other Specifications | |
|----------------------|---|
| Hum and Noise: | < 30dBA at nominal operating conditions |

1) Rated average life is the life obtained, on the average, from large representative groups of lamps in laboratory tests under controlled conditions at 10 or more operating hours per start. It is based on survival of at least 50% of the lamps and allows for individual lamps or groups of lamps to vary considerably from the average.

II. Frequently Asked Questions

Q1: Can the Advance e-Vision ballast be used with all ceramic metal halide lamps?

A1: No, the Advance e-Vision ballast has been designed to be compatible only with Philips MasterColor® CDM Elite Medium Wattage Lamps.

Q2: Is this product also available in 347-480V version?

A2: Not at this time, other input voltage ranges are under consideration.

Q3: Is there a protected lamp version?

A3: Not at this time. A protected lamp version may be available sometime in the future.

Philips Lighting Company
200 Franklin Square Drive
P.O. Box 6800
Somerset, NJ 08875-6800
1-800-555-0050
A Division of Philips Electronics North America Corporation

Philips Lighting
281 Hillmount Road
Markham, Ontario
Canada L6C 2S3
1-800-555-0050
A Division of Philips Electronics Ltd.

www.philips.com



10275 West Higgins Road
Rosemont, IL 60018-5603
1-800-322-2086
A Division of Philips Electronics North America Corporation
www.advancetransformer.com



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