

Aromat Instruction Document: AID005  
Electronic HID Ballast Questions & Answers



*Aromat Corporation-Lighting Division*

*AID005*

*Aromat Electronic Metal Halide Ballast  
QUESTIONS & ANSWERS*

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## Electronic HID Ballast Questions & Answers

TOPIC	QUESTIONS	ANSWERS
Lamp Loads	<ol style="list-style-type: none"> <li>1. Who's lamps will Aromat ballasts operate?</li>   <li>2. Will the same ballast run M85 [ Double Ended] and M98 [ Medium base] lamps?</li>   <li>3. Do you have a ballast that will operate Osram double ended HQI Metal Halide lamp?</li>   <li>4. Will the electronic ballast give longer lamp life?</li> </ol>	<ol style="list-style-type: none"> <li>1. Our ballasts are primarily designed and intended for operation on ceramic arc tube lamps. Not all lamps are compatible with or have been tested on electronic ballasts. Please consult your lamp manufacturer for lamp approval and compatibility .</li>   <li>2. Our ballasts were designed for M98 ANSI lamp characteristics, however, M7012CK-3EU is now acceptable on Philips Double Ended Ceramic Metal Halide lamps. <b><i>(ANSI code M139)</i></b> Philips is dual listing their Double Ended Ceramic Metal Halide lamps to allow operation on either M98 or <b><i>M143</i></b> characteristic ballast. <b><i>(Philips is not recommending the M85 magnetic ballast on ceramic double-ended!)</i></b></li>   <li>3. MHR7012CK-1EU. Osram has approved startability, on its Double Ended HQI Metal Halide, but are still running a life test. The "1EU" circuit topology has the same parameters as the Japanese market ballast, which has operated Osram HQI for many years.</li>   <li>4. In our experience , Yes. This is due to operating the lamp at high power factor and to our special lamp wattage control characteristic, which does not overdrive the lamp as the lamp ages. However, Square Wave Operation must be evaluated and approved by the lamp manufacturers. <u>Please consult your lamp manufacturer.</u></li> </ol>
Enclosure (case)	<ol style="list-style-type: none"> <li>1. Is the aluminum material in our case &amp; cover copper-free?</li> </ol>	<ol style="list-style-type: none"> <li>1. Copper-free specs are .6% max; our unit has .25% max. copper</li> </ol>
Thermal Protection	<ol style="list-style-type: none"> <li>1. What temperature does the thermal protector function at?</li>   <li>2. Is it an automatic resetting device?</li>   <li>3. Is the ballast rated for recessed fixture use?</li> </ol>	<ol style="list-style-type: none"> <li>1. The existing unit has a thermal protector which will turn off the ballast when the case hot spot is approximately 90°C ± 5°C</li>   <li>2. YES, it will automatically turn back on when the ballast cools down.</li>   <li>3. YES, the ballast is UL listed "Suitable for Recessed Use" for the abnormal situation of having insulation covering the fixture &amp; ballast. [ Note: Ballasts without feet have recognized component status]</li> </ol>

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Input voltage	<p>1. Will the unit run on 50 hertz also?</p> <p>2. What is the maximum allowable input voltage range?</p>	<p>1. YES, data is being generated comparing 50 to 60 Hz operation. We will need to get UL approval for 50hz.</p> <p>2. Ballast should be operated on power sources whose average daily voltage does not exceed <math>\pm 6\%</math> of rated nominal voltage. However variations of <math>\pm 10\%</math> of ballast nominal voltage are acceptable IF ballast case temperature at the indicated test point does not exceed the maximum limit stated on ballast nameplate</p>
THD	<p>1. What is the typical THD value?</p>	<p>1. Nominal values are about 6% to 8% depending upon lamp load.</p>
Input Current	<p>1. What is the maximum current draw?</p>	<p>1. Maximum current draw is at normal operation and the rated current on nameplate can be used for circuit loading calculations.</p>
Potting	<p>1. What is the potting material?</p> <p>2. Why don't we fill it to the top?</p> <p>3. Is our unit waterproof?</p> <p>4. Can our unit be used outdoors, where the fixture housing is in the elements?</p>	<p>1. MEW uses a polyurethane potting compound; not a hard epoxy, to allow for sufficient thermal expansion.</p> <p>2. Some components need expansion room and or venting capabilities.</p> <p>3. NO! The Outdoor Type 1 listing by UL states that the ballast shall be mounted in another enclosure so that weather elements are not directly seen by the ballast. Only <b><i>weatherproof</i></b> ballasts can be used outdoors with no additional enclosures.</p> <p>4. Humidity testing is now being conducted to determine worse case conditions. In any outdoor application, the ballast must be enclosed in water-proof enclosure.</p>
Output regulation	<p>1. What is the changes in output in relationship to line voltage changes?</p>	<p>1. The lamp current <b><i>&amp; lamp wattage</i></b> will change less than 2% when the line voltage changes 10%.</p>
Turn-off Feature	<p>1. What is the safety turn-off feature and why is it needed?</p>	<p>1. The ballast circuitry is always sensing the lamp voltage and has internal timing features. If the lamp voltage does not rise above a certain value in approximately <math>36 \pm 13</math> minutes; the ballast will turn itself off. Our tests indicate that if a lamp does not start by this time, it never will. By shutting off the ballast, we stop lamp flashing, pulse EMI, and high voltage stresses on sockets and wiring. Our circuitry is designed so the ballast can withstand continuous no-load operation without failures.</p>

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Energy savings	1. What is the energy savings of electronic HID vs. magnetic ballast's?	1. Our tests have indicated from 11 to 21% savings vs. magnetic ballasts depending on lamp wattage. Since HID lamps do not increase efficiency with high frequency, most of the system savings are reduced ballast losses.
Radio frequency interference	1. What specs does the MEW ballast meet for EMI/RFI?  2. Does the Square Wave operation cause excessive noise because of the nature of its shape, not consisting of smooth edges?	1. We meet FCC CFR47, Part 18, Subpart <u>C</u> for non-consumer limits. If special applications arise for consumer limits, we have the capability to meet with a custom unit. 2. Square Wave operation generate higher order harmonics due to the nature of the wave form. EMI noise is evaluated in 2 categories <ul style="list-style-type: none"> <li>• <u>Conducted</u> : These are the noise signals onto the power supply leads Conducted noise signals are reduced by appropriate design of input filters and by controlling the wave form characteristics.</li> <li>• <u>Radiated</u>: These are noise signals transmitted into the air by all components of the lighting system, including the ballast, lead wires, lamp and fixture Radiated noise is reduced by good circuit board component layout and by controlling the wave form characteristics</li> </ul> <p>THE CRITICAL DETERMINATION OF WHETHER THE UNIT GENERATES NOISE IS BY EXAMINING THE FCC REQUIREMENTS: AROMAT BALLASTS WILL MEET THE CONSUMER LIMITS WITH NON STANDARD PRODUCT. CUSTOM UNITS CAN MEET NON CONSUMER LIMITS IF REQUIRED.</p>
Flicker	1. Does our ballast reduce flicker? 2. What can cause flicker on Aromat HID Ballast?	1. YES, by running with 3 times the frequency and with less "off-time"; our unit has less flicker than magnetic ballast's. 2. Two abnormal conditions have been noted which may cause flicker: <ul style="list-style-type: none"> <li>• Mistakenly using incandescent lamps. Certain incandescent lamp wattage's can cause the lamp to flicker and the ballast to possibly over heat, thermally cycle, shut down, or over stress internal components. Shut off the power immediately and replace the lamp with the proper metal halide lamp.</li> <li>• Some line conditioners /regulators when loaded with step up transformers or variacs will exhibit a psuedo resonance condition and create an extremely distorted input voltage waveform. This is entirely a function of the regulator output characteristics and has nothing to do with DCP ballast. As before shut down the power immediately and remedy the regulator problem</li> </ul>

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Wattage control	1. What is it and what does it do?	The MEW paper presented to the IES in 1994 gives the detailed explanation of our wattage control mechanism. Simply, our wattage control attempts to keep the arc temperature constant throughout the life of lamp. This mandates that at high lamp voltages that occur toward the end of lamp life, our ballast will throttle back the lamp wattage. This helps to extend functional lamp life by eliminating lamp cycling or dropouts that might occur if this high voltage lamp were magnetically ballasted.
Mis-wiring problems	1. What does your 120v unit do if wired to 220, 240 or 277 volts?  2. Is your fuse replaceable?  3. Can the screwshell of the lampholder be grounded? (connected to white same as magnetic)	1. Typically, <b><i>the MOV surge suppressor will short and</i></b> the input fuse will open and the ballast is permanently inoperative.  2. No, the fuse is not replaceable.  3. Most electronic HID ballast's <b><u>DO NOT</u></b> have an isolated output; therefore <b>NEITHER</b> lamp lead can be connected to the neutral conductor. If a lead is grounded, the ballast will be damaged.
Field Experience	1. What problems have your ballast seen during the 10 years of experience in Japan?	1. Due to many lamp life cycles in Japan, most of the abnormal end-of-life lamp characteristics such as rectification, asymmetric operation, transition mode hang-ups, open circuit operation and lamp glow modes have been seen. Our design team has incorporated the sensing of all of these abnormal situations into the ballast for a long, reliable ballast life..
Lamp starting	1. What is the typical warm-up time?  2. What is hot restrike time?	1. Our tests have found that most lamps are at 80% light output by 2 minutes.  2. The restrike time is dependent on the fixture application as to how long it takes the lamp to cool down to the point of restarting. This could be anywhere from 5 minutes to 20 minutes or so.
Remote Mounting	1. What is the maximum allowable distance from the ballast to the lamp?	1. The maximum distance in most applications is 15 feet?
Lead Lengths	1. What is the length of the wire leads?	1. 250mm [ +50mm, <b><u>-30mm</u></b> ] with a 10mm strip.
Mounting Orientation	2. Is there any special mounting orientation of the ballast?	1. It is recommended that in outdoor fixture applications, the ballast be mounted with the lead exiting side towards the bottom of the fixture. This prevents moisture from condensing and dripping down leads into the case through the grommets.

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Temperature code	<p>1. What is the UL temperature class code for Aromat Electronic Metal Halide Ballast ?</p> <p>What are the various insulation classes?</p> <p>What is class "P" ?</p>	<p>Per UL Standard UL1029, Core &amp; coil ballasts can have a code marking on the labels to allow substitution from one manufacturer to another as long as the fixture is listed for the <u>equal</u> or higher code.</p> <p>For example, a 180C insulation system ballast may have a 1029"F" code which basically states that the ballast operating under "bench top " conditions will have a coil temperature of 115 to 120C. If the fixture is coded to be an "F" temperature fixture then any ballast coded from A to F is acceptable in this fixture.</p> <p>NOTE that the UL coding is for "coil temperatures" only and it does NOT apply to Fluorescent -can type ballast's; whether they are magnetic or electronic.</p> <p>As a point of reference, all electronic ballast's we have seen use class A, 105C insulation materials. The typical core &amp; core magnetic ballast's use a class H, 180C insulation system materials. There is a simple reason why the magnetic ballast's use 180C material; <b>THE FIXTURES RUN VERY HOT!!!!</b></p> <p>Insulation System: These insulation system classes are alphabetical and start with Class A at 105C and go up to 250C. This specifies the maximum temperature of the "materials used" to achieve a typical 10 year life.</p> <p>"Class P" is a UL designated thermal protection system for fluorescent ballasts ONLY. UL has not agreed to use this on HID ballasts yet. Our ballasts are "thermally protected"; NOT Class P thermally protected.</p> <p>The acceptance of our ballast is the case hot spot temperature not coil temperature so this coding does not apply to our ballast. Also, our ballasts are thermally protected, most class H magnetic ballasts are not. Therefore, if used in similar applications, our ballast's thermal protector will function.</p> <p>The bottom line is the OEM must test <u>our ballast</u> in each of his intended fixture and probably separately submit to UL for listing. He will not be able to use the 1029 temperature coding system.</p>
Dimming	<p>1. Can the Aromat Ballast be used in applications with a dimming system?</p>	<p>1. No, our ballast cannot be used, and will not be warranted, with any dimming device. We are planning on dimming products in the future</p>

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Color Shift	1. What features do Aromat Electronic Metal Halide Ballast have over a magnetic to reduce the amount of Metal Halide Color Shift	<p>1. There are two ways to look at color shift.</p> <ul style="list-style-type: none"> <li>• A] Color Shift caused by the ballast operating the lamp at varying power levels, typically due to changing input voltages</li> <li>• B] Color Shift caused by the lamp being driven at higher wattage due to the rising nature of the lamp voltage during life</li> </ul> <p>In both cases we are stating a regulation characteristic. In "A": input voltage regulation and "B" :output wattage regulation.</p> <ul style="list-style-type: none"> <li>• <u>Input voltage regulation: <math>\pm 0.5\%</math></u> change for <math>\pm 10\%</math> change in input voltage</li> <li>• <u>Output wattage regulation: <math>\pm 3\%</math></u> change in watts over the extended lamp voltage range</li> </ul> <p>By driving the lamp with constant power , the color shift is minimized and color uniformity maximized.</p>
Acoustical Resonance	Besides Acoustical Resonance, are there advantages of low frequency square wave that <u>should be stressed</u> to the customer.	<p>1. It is felt that Aromat Electronic Metal Halide Ballast design characteristics are superior to magnetic in the following area's.</p> <ul style="list-style-type: none"> <li>• Reduces the rate of lamp voltage rise: extending life</li> <li>• Drives lamp with a very low crest factor: extending life</li> <li>• Runs lamp at close to unity power factor: Stable no flicker operation</li> <li>• By using low frequency we do not have acoustical resonance problems with all lamp manufacturers' products</li> <li>• Our tight output regulation achieves good color uniformity from lamp to lamp, fixture to fixture.</li> </ul>
Input Spikes	What input spikes, surges, or line variations can the NAIS electronic HID ballast withstand?	Our unit can withstands 7KV surges, 20Kv electrostatic charge, and the UL dielectric hipot test of 1500AC from leads to case. Also short term excursion to 140VAC & 320Vac on (120V & 277V units respectively) are acceptable without the internal fuse blowing.
External Fusing	<p>1. Can an external fuse be added to the ballast input power leads to protect the ballast from wrong voltage miswiring?</p> <p>2. If an OEM want to use a fuse holder as a switch, what value fuse should be used?</p>	<p>1. It is difficult to find an external fuse that will protect the ballast if, for example a 120V unit is wired to 277V power. This basically becomes a horse race of which will blow first, the external or our internal fuse. The external cannot be sized to be more sensitive than our internal one because it must not blow due to the peak inrush current. Only a very fast acting electronic "fuse" circuit would solve this problem. This of course would have to be developed by the OEM.</p> <p>2. 35 &amp; 70W units: 3AMP fuse</p>
Inrush Currents	1. What are the inrush current values on the NAIS electronic Ballasts	We have a NTC varistor in our unit which decreases the inrush current during "cold" starts. The maximum values are: 120v 35 & 70w" 19A; 277V 35 & 70W: 5.5A.

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OEM Encapsulation	Are there any restrictions on the potting encapsulation materials that an OEM might used to “pot” our ballast as currently being done in outdoor fixtures?	<b><i>Any potting of ballast must be pre-approved by Aromat engineering.</i></b> The primary issue in that no foreign potting material shall enter our ballast due to potential solvent effects on components and/or thermal expansion issues. It is also our specification that the compound on top the case be no thicker than ¼ inch to avoid shrinkage effects from buckling our cover and decreasing critical internal dimensions. Our ballast warranty is voided if the above restrictions are not followed.
Packaging	How are the ballasts packaged?	The ballast shall be packaged with twenty (20) units per carton; carton weight is 30#; carton size approximately 14”X12”X9”.
Outdoor Applications	Can the HID ballast be used in outdoor and/or landscaping applications?	Due to the high humidity in outdoor applications; the following guidelines have been established: 1. Standard products can be used indoors and in under-eaves type applications where the FIXTURE is not exposed to the weather. 2. The new “C” suffix models are designed with higher humidity resistance and therefore, must be used in all non-standard applications. 3. In outdoor “above-ground” applications the “C” model can be used in weatherproof fixtures without further encapsulation by the OEM. Where possible, the ballast shall be oriented so the leads-exit-end is towards the bottom of the fixture. This prevents moisture from condensing and dripping down leads into the case through the grommets. 4. In outdoor “in ground” applications, please refer to AID003 specification for latest approved recommendations.
Auxiliary Lighting	Can auxiliary lighting be used on the Aromat HID ballasts?	Background: In recessed downlight fixtures, OEMs offer an “auxiliary light” option that adds a typical 100W halogen lamp as back-up illumination when the HID drops out due to line dips, etc. Since the HID lamp must cool down for several minutes before it restrikes, this back-up lamp provides light during this hot restrike period. Typically, a special current relay is connected in series with the HID lamp which senses when lamp current is not flowing and the relay contacts are connected to 120V and to the halogen back-up lamp to turn it on. - <b>ISSUE #1.</b> Auxiliary light sensing relays <b>MUST</b> be compatible with our ballast as this device is adding a component in series with the lamp. Aromat must approve any device that is connected to the ballast. At the present time we have <b>NOT</b> approved any auxiliary devices. - <b>ISSUE #2:</b> Our 277V ballast does not have a 120V tap that is present on the dual-voltage magnetic ballast. Therefore, no 120V exists to drive the 120V halogen back-up lamp. We are now investigating the possibility of developing an electronic “stepdown transformer” to sell to OEMs who desire backup lighting with the 277V electronic ballast. Presently, the only viable options for a 277V fixture with auxiliary backup lighting are to use a magnetic stepdown transformer or to use the conventional dual-voltage magnetic ballast.

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Painting	Can our unit be painted?	<p>Our unit can be painted by the OEM or end-user only if the following conditions are met:</p> <ol style="list-style-type: none"> <li>1. Paint must be non-conductive(so no particles can cause problems if some get into the case)</li> <li>2. Paint must be solvent free(so no damage to insulation inside ballast)</li> <li>3.CANNOT use electrostatic system which uses very high voltage to attract the paint to the part</li> <li>4.Due to surface texture and color effects on ballast operating temperature; a before and after painting thermal test must be conducted by Aromat to check for thermal changes due to painting.</li> </ol>						
Hipotting or Dielectric Withstand testing	What are Aromat's recommendations for hipot testing?	<ol style="list-style-type: none"> <li>1. HIPOT AC Voltage:               <ol style="list-style-type: none"> <li>a) For normal production fixture testing:1200 to 1500VAC.</li> <li>b) To assure sufficient dielectric withstand to ground, it is recommended that an audit test be conducted periodically on the fixture lampholder wiring to ground (<b>without the ballast</b>). The hipot voltage should be increased to breakdown or 5000VAC. This will assure that the 4000v ballast ignition pulse will not cause problems arcing to ground, etc.</li> </ol> </li> <li>2. HIPOT current trip point for normal production: Approximately 3 ma.</li> <li>3. Test time duration: (1) second minimum, (3) seconds maximum</li> <li>4. Connections: All ballast (fixture) input &amp; output connections must be connected together. The hipot potential must be applied between the common connection and to the fixture housing.</li> <li>5. Equipment vendors researched:               <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">-Associated Research, Inc.</td> <td style="width: 33%;">-Slaughter</td> <td style="width: 33%;">-Quad Tech</td> </tr> <tr> <td>-Biddle</td> <td>-Compliance West</td> <td></td> </tr> </table> </li> <li>6. Recommendation: We would recommend pursuing the Associated Research "Hypot II or the Quad Tech "Series 10" hipot test instruments. From the attached catalog information these appear to meet the test requirements above. Reps for each of these should be contacted and they should confirm that these are the proper instruments for the job requirements.</li> </ol>	-Associated Research, Inc.	-Slaughter	-Quad Tech	-Biddle	-Compliance West	
-Associated Research, Inc.	-Slaughter	-Quad Tech						
-Biddle	-Compliance West							
Static electricity discharges/anti-static surfaces	Will static electricity harm the NAIS ballast?	<p>Our ballast is designed to withstand electrostatic discharges up to 20KV. OEM assembly operations should take special caution not to use work station materials that allow or generate static charges. It is recommended that work surfaces use a material similar to the 3M "Velostat" anti-static material.</p>						

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### Appendix 1: Aromat NAI<sup>S</sup> DCP™ Ballast Case Tolerances:

Parameter	Maximum Dimension				
	EU	EU-F	EU-J (Note 1)	EU-N (Note 2)	EU-S (Note 3)
Model Configuration	EU	EU-F	EU-J (Note 1)	EU-N (Note 2)	EU-S (Note 3)
Wattage	39, 70, 100W	39, 70, 100W	39, 70, 100W	100W	39, 70W
Case Style	C-cut & Flat Tabs only, No cover screws	C-cut & Flat Cover screws + tabs	C-cut & Flat Cover screws + tabs	Flat Cover screws + tabs	C-cut & Flat Cover screws + tabs
Overall Case length including mounting feet		140mm±1.0mm= <b>141mm/ 5.55 inches</b>			140mm±1.0mm= <b>141mm/ 5.55 inches</b>
Case body length including cover ends & screws (if provided)	122mm±1.0mm+1.5mm (ground screw head) = <b>124.5mm/ 4.90 inches</b>	122mm±1.0mm+ 6mm (cover screw heads)= <b>129mm/ 5.08 inches</b>	122mm±1.0mm+ 6mm (cover screw heads)= <b>129mm/ 5.08 inches</b>	122mm±1.0mm+ 6mm (cover screw heads)= <b>129mm/ 5.08 inches</b>	122mm±1.0mm+ 6mm (cover screw heads)= <b>129mm/ 5.08 inches</b>
Overall case width including cover sides	92±1.0mm= <b>93mm/ 3.66 inches</b>	92±1.0mm= <b>93mm/ 3.66 inches</b>	92±1.0mm= <b>93mm/ 3.66 inches</b>	90mm±0.3mm= <b>90.3mm/ 3.56</b>	92±1.0mm= <b>93mm/ 3.66 inches</b>
Overall case height	39.7mm±1.0mm= <b>40.7mm/ 1.60 inches</b>	39.7mm±1.0mm= <b>40.7mm/ 1.60 inches</b>	39.7mm±1.0mm= <b>40.7mm/ 1.60 inches</b>	39.7mm±1.0mm= <b>40.7mm/ 1.60 inches</b>	39.7mm±1.0mm= <b>40.7mm/ 1.60 inches</b>
Lead lengths: Minimum Maximum	220mm= 8.66 inches 300mm= 11.81 inches	220mm= 8.66 inches 300mm= 11.81 inches	220mm= 8.66 inches 300mm=11.81 inches	220mm= 8.66 inches 300mm=11.81 inches	220mm= 8.66 inches 300mm=11.81 inches

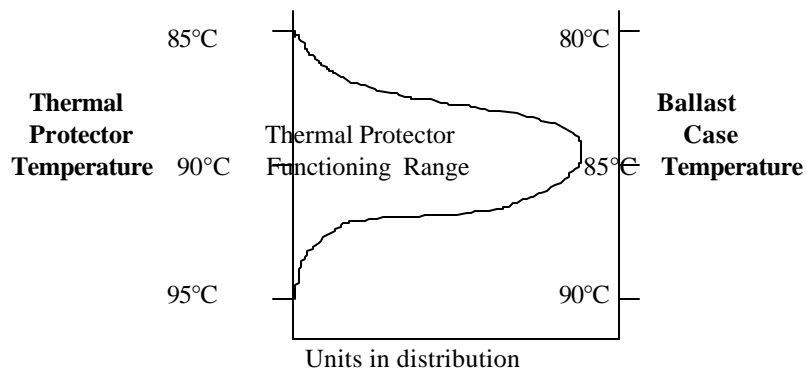
- Notes:
1. Initial "J-box units had short lead lengths(6-7 inches); 120V models were changed in September production & 277V ballasts will be changed in November. Must be careful of old inventory if the customer requires the longer lead lengths.
  2. The "N" model is a 100V EU model with the sides of the cover removed to reduce the overall width of the unit and screws added to the cover for greater stability without the cover side rails.
  3. The "S" model is an "F" configuration with the addition of the green grounding lead.

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**Appendix 2: Part A:**

***Aromat 39&70Watt DCP™ Electronic MH Ballast  
Case Hot Spot Temperature Limits & Issues***

WARRANTY	NUISANCE CYCLING	LIFE
<ul style="list-style-type: none"> <li>Aromat warranty states Aromat warranty is voided if the ballast case test point exceeds 80°C!</li> </ul>	<ul style="list-style-type: none"> <li>The 39 &amp; 70W ballasts have a thermal protector (TP) rating of 90°C +/- 5°C.</li> <li>The temperature gradient between the TP &amp; the case test point is 4-5°C.</li> <li>Conclusion: Operating the ballast at case test point temperatures &gt;80°C could possibly lead to the ballast thermal protector functioning which results in cycling the lamp on &amp; off in the fixture.</li> </ul>	<ul style="list-style-type: none"> <li>Our product “Design Life” is approximately 40,000 hours (10years @ 4000 hours per year) at a maximum case temperature of 80°C!</li> <li>“MEW design life” is the life of the ballast before the wear-out mode starts; meaning still very few failures have occurred. Note this is <b>not the 50%</b> mortality point that other ballast companies use.</li> <li>Each 10°C increase in case temperature decreases life potential by 50%.!</li> </ul>



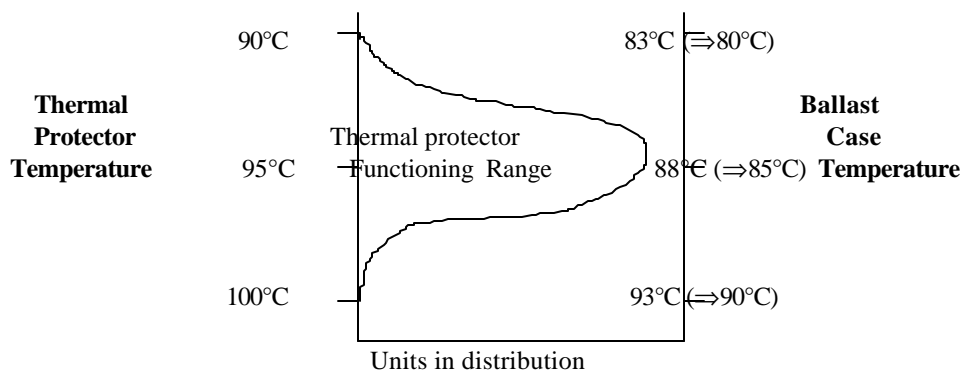
**NOTE: Case Temperatures >80°C will result in the Thermal Protector temperature being in its functioning range.**

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**Appendix 2 Part B:**

***Aromat 100W DCP™ Electronic MH Ballast***  
***Case Hot Spot Temperature Limits & Issues***

WARRANTY	NUISANCE CYCLING	LIFE
<ul style="list-style-type: none"> <li>Aromat warranty states Aromat warranty is voided if the ballast case test point exceeds 80°C!</li> </ul>	<ul style="list-style-type: none"> <li>The 100W ballast has a thermal protector (TP) rating of 95°C +/- 5°C .</li> <li>The temperature gradient between the TP &amp; the case test point is 5-7°C depending on the fixture.</li> <li>Due to its slightly higher losses the 100W ballast runs 2-3°C hotter in the same fixture as the 70W.</li> <li>Conclusion: Operating the ballast at case test point temperature &gt;80°C could result in the ballast thermal protector functioning, which cause the lamp to cycle on &amp; off in the fixture.</li> </ul>	<ul style="list-style-type: none"> <li>Our product “Design Life” is approximately 40,000 hours (10years @ 4000 hours per year) at a maximum case temperature of 80°C!</li> <li>“MEW design life” is the life of the ballast before the wear-out mode starts; meaning still very few failures have occurred. Note this is <b>not the 50%</b> mortality point that other ballast companies use.</li> <li>Each 10°C increase in case temperature decreases life potential by 50%.!</li> </ul>



**NOTE: Case Temperatures >80°C will result in the Thermal Protector temperature being in its functioning range.**

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Appendix 3

*Aromat DCP<sup>TM</sup> Electronic MH Ballasts  
 Temperature Summary*

MODEL	Ballast Hot Spot Test Point Temperature	
	Bench Top Temperature (correlated to °40C)	UL ALCOVE Test@25°C
M3912CK-3EU-"X"	57°C	—
M3927CK-3EU-"X"	58°C	—
M7012CK-3EU-"X"	67°C	57°C
M7027CK-3EU-"X"	68°C	—
M10012CK-3EU-"X"	70°C	63°C
M10027CK-3EU-"X"	72°C	65°C