ConstantColor™ CMH Supermini

Single Ended Ceramic Metal Halide Lamps
20W and 35W

Product information

ConstantColor™ CMH lamps combine HPS technology (providing stability, efficiency & uniformity) and Metal Halide Technology (providing bright white quality light) to produce highly efficient light sources with good colour rendering and consistent colour performance through life. This is achieved by using the ceramic arc tube material from the Lucalox™ lamp, which minimises the chemical changes inside the lamp through life.

GE has now miniaturized this technology resulting in the CMH Supermini, highly efficient 20 and 35 Watt lamps with the light quality and colour stability associated with Ceramic Metal Halide, in a size comparable to tungsten halogen capsule lamps, thus offering new energy saving options to the lighting designer and end user.

Features

- Consistent colour over life
- Excellent colour uniformity lamp to lamp
- Bright light – in a very compact size
- Excellent colour rendition
- High reliability due to 3 part design
- Up to 87 Lumens per Watt (LPW) efficacy
- Long Life
- UV control
- 35W available in two colour temperatures
- Robust GU6.5 base

Application areas

- Retail
- Office
- Hospitality
- Street and Pedestrian
### General Information

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<thead>
<tr>
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* Initial rating at time of launch. Testing continues to establish final design life.

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1. Measured in horizontal orientation on T4 quartz capsule, with thermocouple attached directly above the centre of the arc tube.
2. Measured on quartz capsule pinch, immediately above the GU6.5 ceramic cap.
Dimensions

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<tr>
<td>A</td>
<td>Length</td>
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<tr>
<td>B</td>
<td>Diameter</td>
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<tr>
<td></td>
<td>Diameter</td>
</tr>
<tr>
<td>C</td>
<td>LCL</td>
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Spectral power distribution

Spectral Power Distribution curves are given in the following diagrams

**CMH20W Supermini 830**

**CMH35W Supermini 930**

**CMH35W Supermini 942**

**Distribution of luminous intensity**

The following diagrams show polar light intensity curves for lamp base-up orientation

**CMH20T/U830GU6.5**

**CMH20T/U830GU6.5**

**CMH35T/U930GU6.5**

**CMH35T/U942GU6.5**
Lamp life

Life survival graphs are shown for statistically representative batches of lamps operated under controlled nominal conditions with an 11 hours per start switching cycle. The declared lamp life is the median life, which is when 50% of the lamps from a large sample batch would have failed. Lamp life in service will be affected by a number of parameters, such as supply voltage variation, switching cycle, operating position, mechanical vibration, luminaire design and control gear. The information is intended to be a practical guide for comparison with other lamp types. The determination of lamp replacement schedules will depend upon the acceptable reduction in illuminance and the relative costs of spot and group replacement.

Note: The representative curves are taken in Vertical Base Up position. Life performance can greatly increase in Horizontal Burning position.

* Initial rating at time of launch. Testing continues to establish final design life.
**Lumen maintenance**

Lumen maintenance graphs show light output performance through life for statistically representative batches of lamps operated under controlled nominal conditions with an 11 hours per start switching cycle.

A common characteristic for all metal halide lamps is a reduction in light output and a slight increase in power consumption through life. Consequently there is an economic life at which lamp efficacy falls to a level when lamps should be replaced to restore design illumination levels. Where a quantity of lamps are installed within an area, consideration should given to a group lamp replacement programme to maintain uniform illumination levels.

Curves represent operating conditions for an 11 hours per start switching cycle, but less frequent switching will improve lumen maintenance.

Note: The representative curves are shown for Vertical Base-Up lamp orientation unless otherwise specified. Lumen maintenance performance improves when operated in the Horizontal burning position.

**Warm-up characteristics**

During the warm-up period immediately after starting, lamp temperature increases rapidly evaporating mercury and metal halide dose in the arc tube. Lamp electrical characteristics and light output stabilise in less than 4 minutes. During this period light output increases from zero to full output and colour approaches the final visual effect as each metallic element becomes vaporised.
**Dimming**

In certain cases, dimming may be acceptable, subject to further testing. Contact your GE representative for more information. Large changes in lamp power alter the thermal characteristics of the lamp resulting in lamp colour shift and possible reduction in lamp survival.

**Flicker**

Suitable electronic ballasts for ConstantColor™ CMH lamps provide squared wave operation in the 70-400 Hz range and eliminate perceptible flicker.

**Lamp end of life conditions**

The principal end-of-life failure mechanism for CMH lamps is arc tube leakage into the outer jacket. High operating temperature inside the arc tube causes metal halide dose material to gradually corrode through the ceramic arc tube wall, eventually resulting at normal end-of-life in leakage of the filling gas and dose. Arc tube leakage into the outer jacket can be observed by a sudden and significant lumen drop and a perceptible colour change (usually towards green).

The above situation can be accompanied by the so-called rectification phenomena. This occurs where a discharge is established between two mount-frame parts of different material and/or mass, causing asymmetry in the electrical characteristic of the resulting discharge current. Rectification can lead to overheating of the ballast, therefore to maintain safety use electronic ballast or system which can shut itself off if ballast overheating occurs.

**End of life cycling**

A possible condition can exist at end-of-life whereby lamp voltage rises to a value exceeding the voltage supplied by the control gear. In such a case the lamp extinguishes and on cooling restarts when the required ignition voltage falls to the actual pulse voltage provided by the gear. During subsequent warm-up the lamp voltage will again increase, causing extinction. This condition is known as end-of-life cycling. With electronic ballasts, cycling is unlikely.

Normally cycling is an indication that lamp end-of-life has been reached, but it can also occur when lamps are operated above their recommended temperature. Lamp voltage at 100 hours life should not increase by more than 5V when operating in the luminaire, when compared to the same lamp operating in free-air. A good luminaire design will limit lamp voltage rise to 3V.

It is good practice to replace lamps that have reached end-of-life as soon as possible after failure, to minimise electrical and thermal stress on control gear components.

**UV and damage to sensitive materials**

The wall of the bulb, which is produced with specially developed ‘UV Control’ material, absorbs potentially harmful high energy UV radiation emitted by the ceramic arc tube.

The use of UV control material together with an optically neutral front glass cover allows the lamp to significantly reduce the risk of discolouration or fading of products. When illuminating light-sensitive materials or at high light levels, additional UV filtration is recommended. Luminaires should not be used if the front glass is broken or missing.

It is recommended that a safety interlock switch is incorporated into the luminaire to prevent operation when the luminaire is opened.

Although PET determines limits of human exposure to lamp UV, the risk of fading of merchandise due to UV can be quantified by a Damage Factor and a Risk of Fading. The risk of fading is simply the numerical product of the illuminance, exposure time and damage factor due to the light source.

Finally the selection of luminaire materials should take into consideration the UV emission. Current UV reduction types on the market are optimised for UV safety of human eye and skin exposure. However, luminaire materials may have different wavelength dependent response functions. Designers must take account of emission in each of the UV-A, UV-B and UV-C spectral ranges as well as material temperatures when designing luminaires.

Typical values for UV-A, UV-B and UV-C range radiation can be found in the table next page.
UV and damage to sensitive materials

UV PET performance

1. Data from bare lamp

<table>
<thead>
<tr>
<th></th>
<th>UV-C 1</th>
<th>UV-B 1</th>
<th>UV-A 1</th>
<th>UVC/UVA</th>
<th>UVB/UVA</th>
<th>Eeff 2</th>
<th>PET (h)</th>
<th>Risk Group</th>
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<tr>
<td>CMH 20W 830</td>
<td>0.053</td>
<td>0.091</td>
<td>11.46</td>
<td>0.005</td>
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<tr>
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<td>0.031</td>
<td>6.05</td>
<td>0.003</td>
<td>0.005</td>
<td>0.58</td>
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<tr>
<td>CMH 35W 942</td>
<td>0.039</td>
<td>0.062</td>
<td>16.26</td>
<td>0.002</td>
<td>0.004</td>
<td>1.23</td>
<td>14</td>
<td>Exempt</td>
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2. Data from lamp operated in typical glass-fronted luminaire

<table>
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<tr>
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<tbody>
<tr>
<td>CMH 20W 830</td>
<td>0.0010</td>
<td>0.0012</td>
<td>2.41</td>
<td>0.0004</td>
<td>0.0005</td>
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<tr>
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<td>0.0000</td>
<td>0.02</td>
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1 μW / (cm²) / 500 Lux
2 mW / km

Information for luminaire design

CMH 20W and CMH 35W have optimum performance on electronic gear.* This provides many advantages:

- Flicker free light output
- Well controlled electronic ignition process
- Simple wiring for fixtures due to elimination of ignitor and PFC capacitor
- Reduces fixture weight
- Automatic sensing of failed lamps and shutdown
- Lower overall system power consumption

* For details of approved electronic ballasts for ConstantColor™ CMH lamps please consult your GE representative. CMH 20W is designed only for operation on electronic gear.

Control gear and accessories

Electronic ballasts

A range of GE electronic ballasts have been introduced to complement the ConstantColor™ Ceramic Metal Halide lamps. Power controlled electronic ballasts suitable for operation of Ceramic Metal Halide lamps are available from various gear manufacturers.

Advantages are:

- Good regulation against supply voltage variation
- Improved lamp colour consistency
- Elimination of lamp flicker
- Reduced weight of control gear
- Reduced electrical power losses
- Ballast noise reduced/eliminated
- Single piece compact unit
- Reduced wiring complexity in the luminaire
Safety warnings

The use of these products requires awareness of the following safety issues:

Warning

• Risk of electric shock – isolate from power supply before changing lamp
• Strong magnetic fields may impair lamp performance and worst case can lead to lamps shattering

Use only in ENCLOSED FIXTURES to avoid the following:

• Risk of fire
• A damaged lamp emits UV radiation which may cause eye/skin injury, remove and dispose of broken lamp
• Unexpected lamp shattering may cause injury, fire, or property damage, use in luminaire with front cover made of glass

Caution

• Risk of burn, allow lamp to cool before handling
• Lamp may shatter and cause injury if broken
• Arc tube fill gas contains Kr-85

Always follow the supplied lamp operation and handling instructions.