GE
Lighting

WORLDWIDE PARTNER

DATA SHEET

GE ConstantColor™ CMH Ultra Precise™ MR16 35W

The next generation of CMH

GE's low watt CMH lamps have opened new possibilities for lighting design, combining the power and light quality of far larger and less efficient lamps. It is now possible to achieve lighting design that could previously only be achieved with inferior technologies.

GE's new ConstantColor™ CMH Ultra technology platform has been developed with specific focus to retail applications. GE Ultra technology offers superb overall light quality, outstanding lumen maintenance, improved efficacy, while maintaining long life and reliability. These qualities are why GE is the leader in ceramic metal halide technology.

- Premium CRI
- Drastically improved lumen maintenance
- Outstanding efficiency: 4x better than halogen
- Long life
- Robust and reliable performance
- Colour uniformity lamp to lamp
- Compact capsule

The next generation CMH lamps are the ultimate light source for retail applications where quality of light, colour and efficiency are important. Now, anyone with critical colour needs can enjoy the outstanding energy efficiency and the savings that CMH lamps provide. ConstantColor™ CMH Ultra lamps offer substantial benefits that make them the clear choice for specification into new stores, or into re-lamping existing store fixtures through regular replacement needs.

Benefits

- More usable light over life, 22% more lumen output at 10,000 hrs vs standard CMH lamps
- Long life of 12.000hrs
- Extended life and relamp cycles
- Compatible with electronic ballasts
- Universal burning position, same size as standard CMH MR16

Benefits

- Retail & accent lighting, office and hospital lighting
- General retail display
- Wherever current generation CMH 35W products are in use

New 35W retrofits directly into existing MR16 fixtures, expands new sale offerings via improved lumen maintenance and longer life.

Watts	Operating position	Length [mm]	Order code	Cap	Colour	CBCP [cd]	Rated average life Hrs.	Pack qty	Product code
35	U	54.5	CMH35/MR16/UVC/930/GX10/SP ULTRA	GX10	930	16,000	12,000*	12	76123
35	U	54.5	CMH35/MR16/UVC/930/GX10/FL ULTRA	GX10	930	5,500	12,000*	12	76124
35	U	54.5	CMH35/MR16/UVC/930/GX10/WFL ULTRA	GX10	930	3,000	12,000*	12	76125

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

GE imagination at work

General information

Product code	76123	76124	76125
Nominal wattage	35W	35W	35W
Nominal CCT	3000K	3000K	3000K
Format	MR16	MR16	MR16
Bulb type	MR16	MR16	MR16
Bulb diameter	51 mm	51 mm	51 mm
Bulb material	Borosilicate glass	Borosilicate glass	Borosilicate glass
Bulb finish	Aluminized	Aluminized	Aluminized
Arc gap	N/A	N/A	N/A
Base	GX10	GX10	GX10

Operating conditions

Burning position	Universal	Universal	Universal
Luminaire	Open	Open	Open

Electrical characteristics

Power	39 W	39 W	39 W
Voltage	92 V	92 V	92 V
Current	0.42 A	0.42 A	0.42 A
Max ignition voltage	5kV	5kV	5kV
Min ignition voltage	3kV	3kV	3kV
Extinction voltage	90%	90%	90%

Photometric characteristics

Beam angle	12° spot	25° flood	40° wide flood
CBCP	16,000	5,500	3,000
Lumens	2,200	2,200	2,200
CCx	0.441	0.441	0.441
CCy	0.400	0.400	0.400
CRI	90	90	90
Luminous efficacy	56 LPW	56 LPW	56 LPW

Starting and warm-up characteristics

Time to start @ 10°C, sec	<5	<5	<5
Time to start @ -30°C, sec	<15	<15	<15
Hot restart time, minutes	<10	<10	<10
Warm-up to time to 90% lumen output	<1.5	<1.5	<1.5

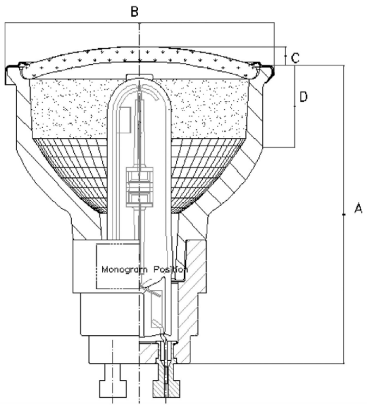
Maximum operating condition

Max bulb temperature[1]	300°C	300°C	300°C
Max base temperature[2]	300°C	300°C	300°C

[1] Measured at centre of MR16 lens, in vertical base-up position.
[2] Measured on 25mm GX10 ceramic cap rim, at transition to 23mm diameter.

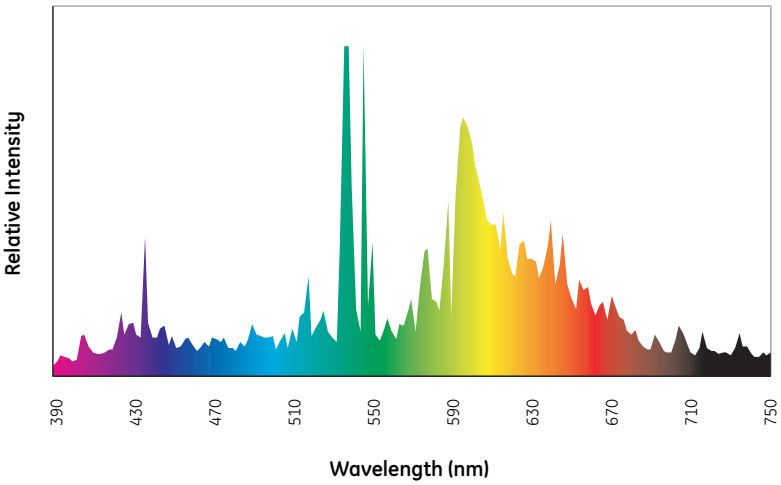
Dimensions

	76123	76124	76125
A (max.), mm	54.5	54.5	54.5
B (max.), mm	51	51	51
C (max.), mm	3.5	3.5	3.5
D (max.), mm	14	14	14



Spectral power distribution

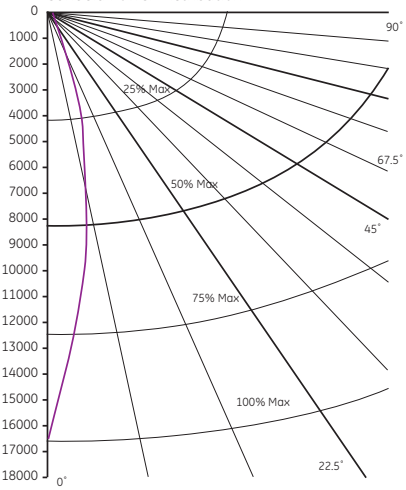
Spectral power distribution curves are given in the following diagram



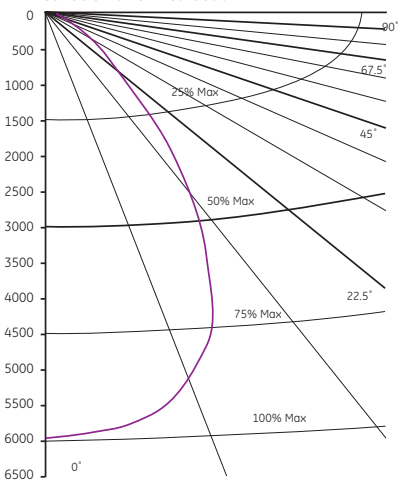
Distribution of luminous intensity

The following diagrams show polar light intensity curves and beam diagrams for vertical base-up orientation.

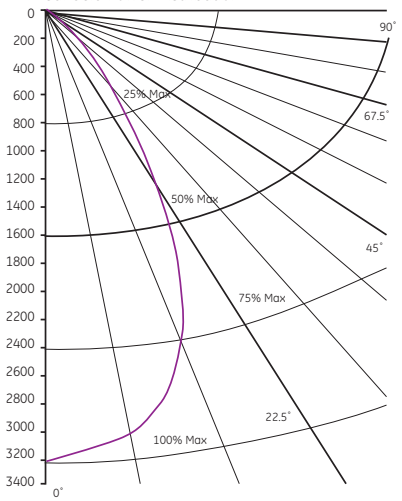
CMH 35 W/MR16/930/SP
Candela Power Distribution



CMH 35 W/MR16/930/FL
Candela Power Distribution

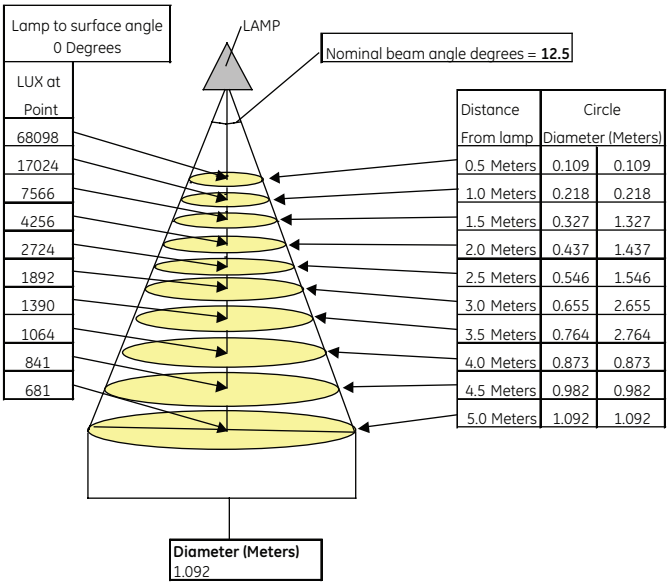


CMH 35 W/MR16/930/WFL
Candela Power Distribution



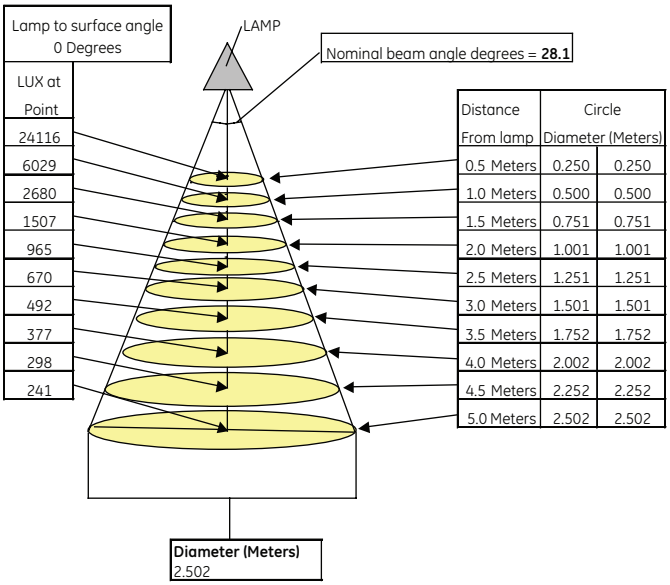
Beam diagrams

CMH35/MR16/UVC/930/GX10/SP



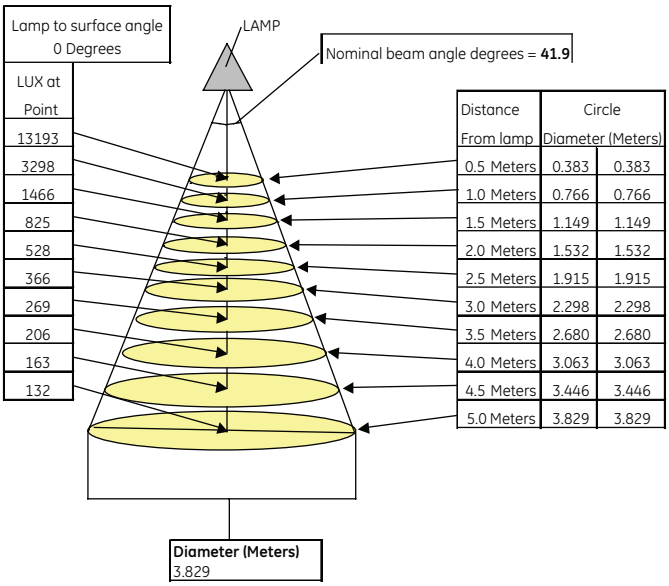
Distance From lamp	Circle Diameter (Meters)	
0.5 Meters	0.109	0.109
1.0 Meters	0.218	0.218
1.5 Meters	0.327	1.327
2.0 Meters	0.437	1.437
2.5 Meters	0.546	1.546
3.0 Meters	0.655	2.655
3.5 Meters	0.764	2.764
4.0 Meters	0.873	0.873
4.5 Meters	0.982	0.982
5.0 Meters	1.092	1.092

CMH35/MR16/UVC/930/GX10/FL



Distance From lamp	Circle Diameter (Meters)	
0.5 Meters	0.250	0.250
1.0 Meters	0.500	0.500
1.5 Meters	0.751	0.751
2.0 Meters	1.001	1.001
2.5 Meters	1.251	1.251
3.0 Meters	1.501	1.501
3.5 Meters	1.752	1.752
4.0 Meters	2.002	2.002
4.5 Meters	2.252	2.252
5.0 Meters	2.502	2.502

CMH35/MR16/UVC/930/GX10/WFL



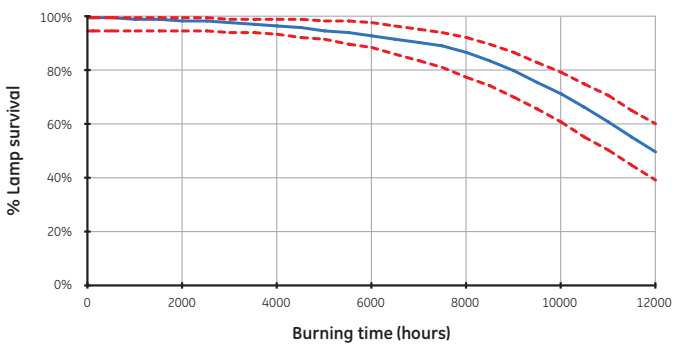
Distance From lamp	Circle Diameter (Meters)	
0.5 Meters	0.383	0.383
1.0 Meters	0.766	0.766
1.5 Meters	1.149	1.149
2.0 Meters	1.532	1.532
2.5 Meters	1.915	1.915
3.0 Meters	2.298	2.298
3.5 Meters	2.680	2.680
4.0 Meters	3.063	3.063
4.5 Meters	3.446	3.446
5.0 Meters	3.829	3.829

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 relative costs of spot or group replacement and acceptable reduction in lighting levels.

Note: representative curves are shown for vertical base-up lamp orientation unless otherwise specified.

Lamp survival CMH 35W Ultra



Lumen maintenance

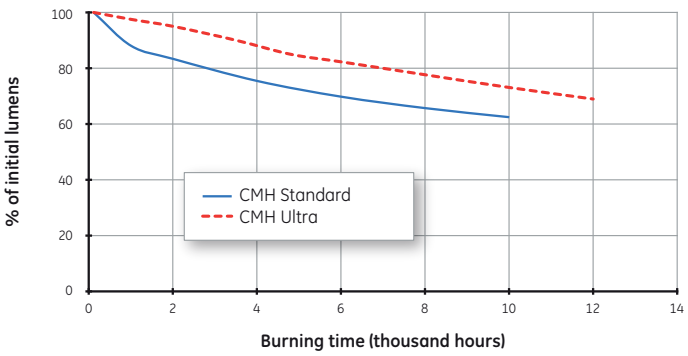
Lumen maintenance graphs show light output performance through life for statistically representative batches of lamps operated under controlled nominal conditions with an 11 hours per start switching cycle.

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. In areas where multiple lamps are installed, consideration should be 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.

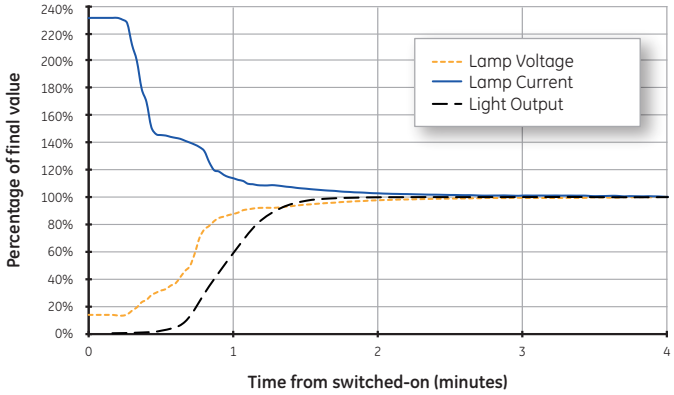
Lumen maintenance CMH Ultra vs. Standard



Warm-up characteristics

During the warm-up period immediately after starting, lamp temperature increases rapidly evaporating the 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.

Warm-up curve



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 practise 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 below.

UV and damage to sensitive materials

UV PET performance data from bare lamp

	UV-C [1]	UV-B [1]	UV-A [1]	UVC/UVB	UVB/UVA	Eeff [2]	PET (h)	Risk group
	200-280 nm	280-315 nm	315-400 nm					
CMH35MR16/930/Ultra	0.0004	0.0001	4.008	3.378	0.0000	0.009	1859	Exempt

[1] µ W / (cm²) / 500 Lux
[2] mW / klm

Information for luminaire design

Electronic ballast operation

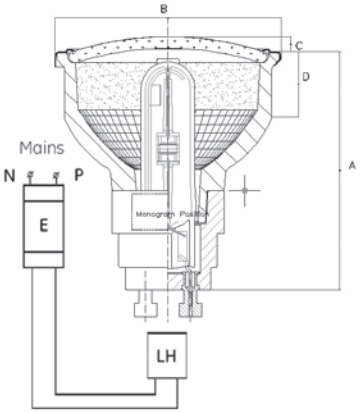
CMH 35W Ultra lamps have optimum performance on electronic gear.* This provides many advantages:

- 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.

Circuit diagram

Electronic ballast
LH: Lamp holder
E: Electronic gear



Containment requirement

ConstantColor™ CMH Precise™ MR16 lamps may be used in open fixtures.

Control gear and accessories

Electronic Ballasts

GE's range of electronic HID ballasts are designed to allow optimal performance of our range of ConstantColor™ CMH lamps, offering reduced power consumption, regulated power through life, simplified circuitry and more stable lamp operation compared to electromagnetic systems.

GE has upgraded its range which now includes a miniature range of 20-35 Watt ballasts in integral and remote versions to be compatible with all types of CMH 20-35 Watt lamps. 5 year warranties are available for all models. Please consult GE for up to date details of approved ballast types for CMH 35W Ultra.

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 in the worst case could lead to lamp shattering.

Use in enclosed fixtures to avoid the following:

- Risk of fire
- A damaged lamp emits UV radiation which may cause eye/skin injury
- Unexpected lamp shattering may cause injury, fire or property damage

Caution

- Risk of burn when handling hot lamp
- Lamp may shatter and cause injury if broken
- Arc tube fill gas contains Kr-85

Always follow the supplied lamp operation and handling instructions.