GE Consumer & Industrial
Lighting

GE ConstantColor CMH™
CMH Precise™ 20W MR16

LAMP TECHNOLOGY

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 CMHTM Precise™ MR16, a highly efficient 20 Watt lamp with the light quality and colour stability associated with Ceramic Metal Halide, in a size comparable to tungsten halogen reflector 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 ceramic design
- 50 beam Lumens per Watt (LPW) efficacy
- Long Life
- UV control
- Colour temperature 3000K
- Robust GX10 base

APPLICATION AREAS

- Retail
- Offices
- Outdoor Lighting
- Display Cabinet
- Hotels

Watts	Operating position	Length mm	Order Code	Cap	CCT K	CRI Ra	CBCP (cd)	Rated Average Life V	Rated Average Life H	Pack Qty	Product Code
20	U	54.5	CMH20/MR16/UVC/830/GX10/SP	GX10	3000	80+	9000	9000*	9000*	12	40400
20	U	54.5	CMH20/MR16/UVC/830/GX10/FL	GX10	3000	80+	2900	9000*	9000*	12	40401
20	U	54.5	CMH20/MR16/UVC/830/GX10/WFL	GX10	3000	80+	1500	9000*	9000*	12	42691

* Preliminary data – rating to be determined – designed for 12,000 hours.

GE imagination at work

Operating Conditions

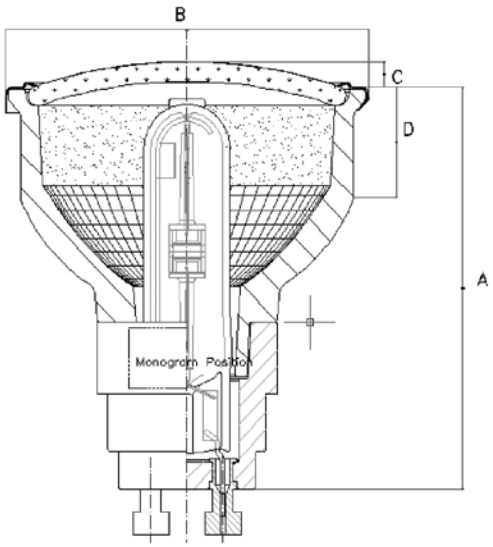
Burning Pos'n	Universal
Luminaire	Open

Electrical Characteristics

power	20W
voltage	95V
current	0.21A
Max ignition voltage	4kV
Extinction voltage	80%

Photometric characteristics

Beam Angle	12° Spot, 25° Flood, 40° Wide Flood
CBCP	9000cd Spot, 2900cd Flood, 1500cd Wide Flood
lumens	1000lm
CCT	3000 K
CCx	0.431
CCy	0.403
CRI	80+
Luminous efficacy	50 LPW



Starting and Warm-up Characteristics

Time to start @ 10°C	<5 sec.
Time to start @ -30°C	<15 sec
Hot restart time	<4 min.
Warm-up to time to 90% lumen output	<1.5 min.

Maximum Operating Condition

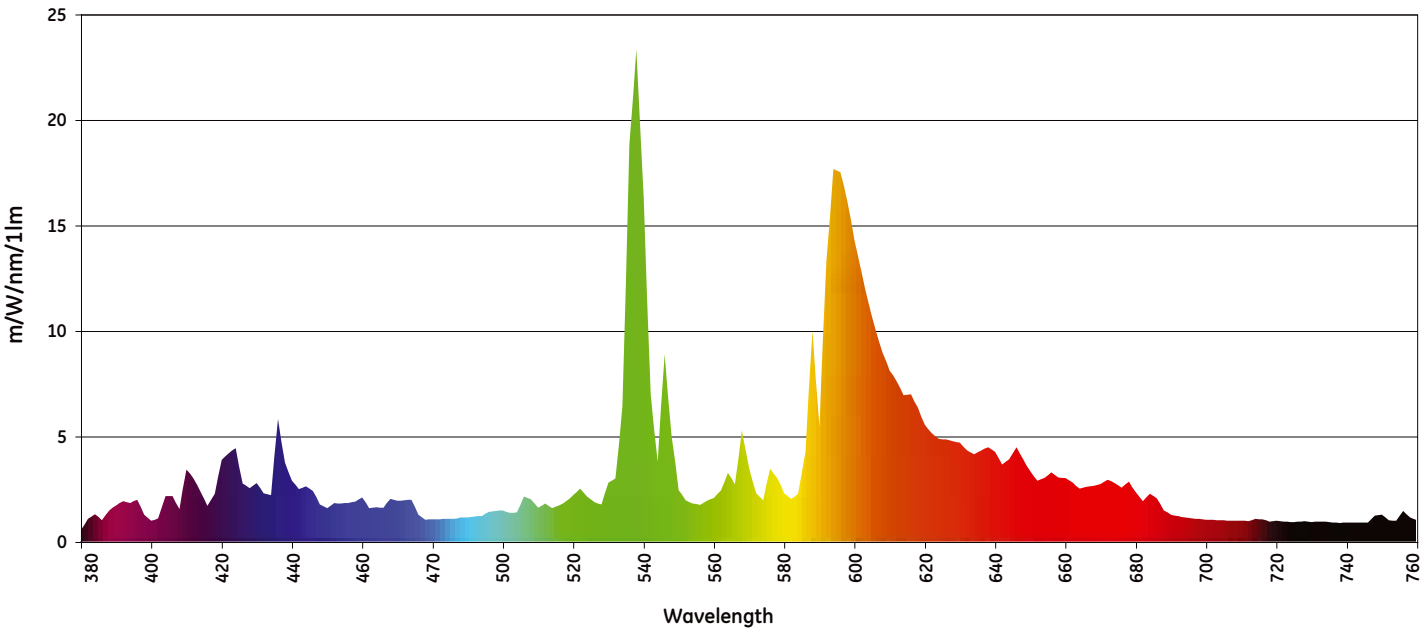
Max allowed bulb	200°C
Max base temperature	200°C

Dimensions

A	54.5 mm
B	51 mm
C	3.5 mm
D	14 mm

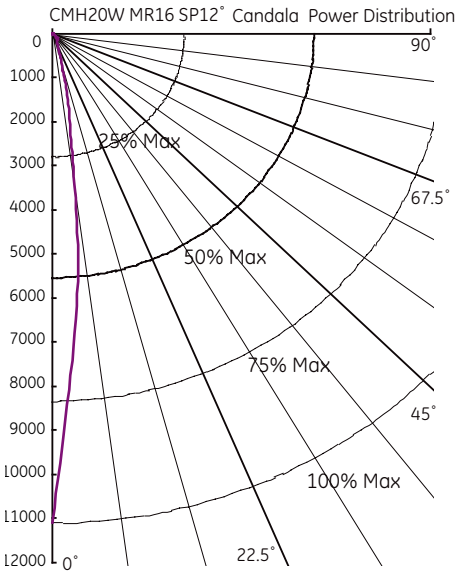
Spectral Power Distribution

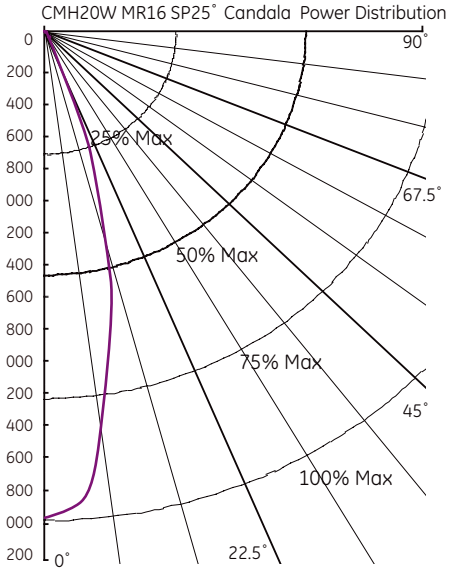
Spectral Power Distribution curve is given in the following diagram

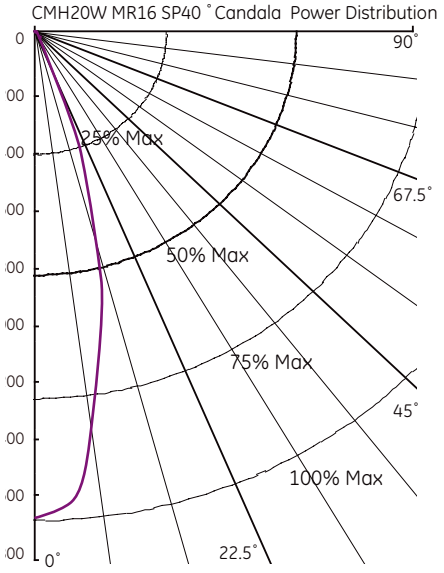


Distribution of lumionous intensity

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

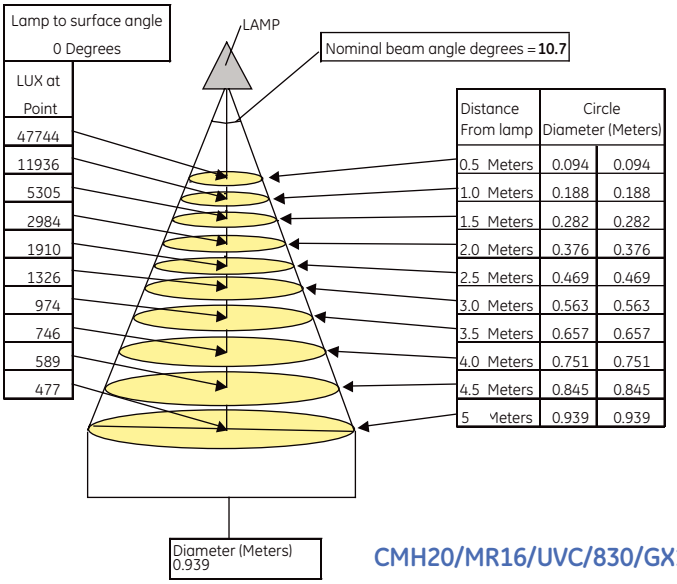




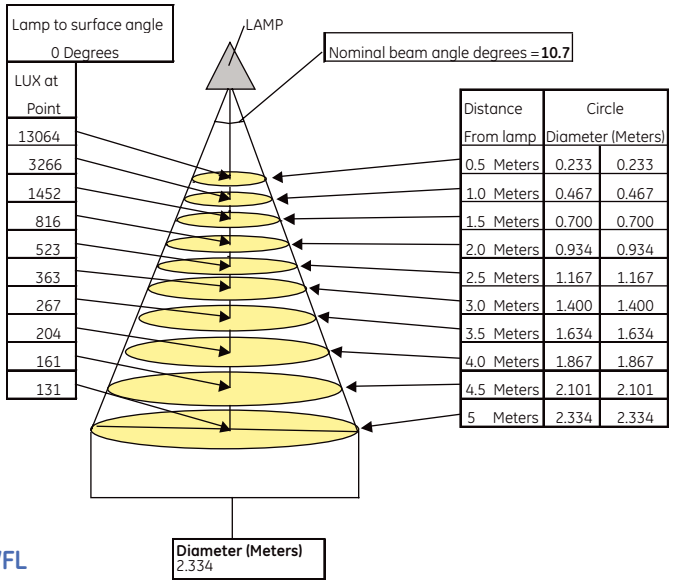


Beam diagrams

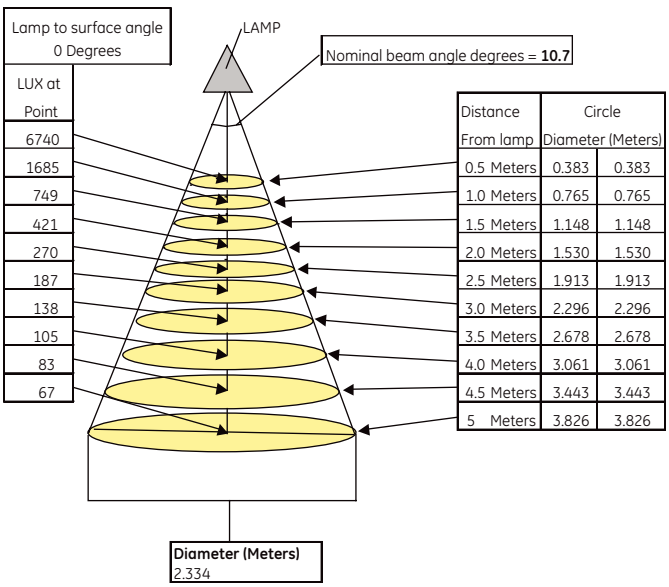
CMH20/MR16/UVC/830/GX10/SP



CMH20/MR16/UVC/830/GX10/FL



CMH20/MR16/UVC/830/GX10/WFL

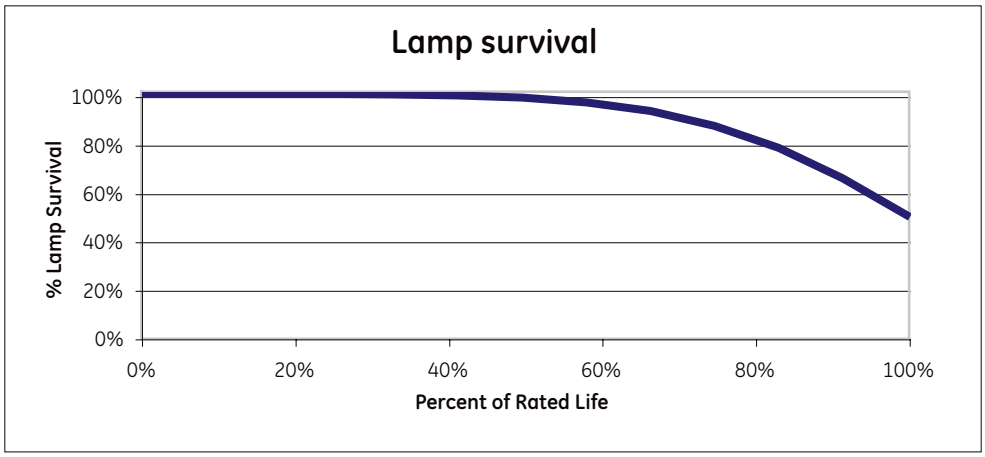


Lamp life

Life survival graphs are shown for statistically representative batches of lamps operated under controlled nominal conditions with a 11 hours per start switching cycle. Declared lamp life is the median value, i.e. when 50% of lamps from a large sample batch would have failed. Lamp life in service is affected by a number of parameters, including supply voltage variation, switching cycle, operating position, ballast impedance tolerance, luminaire design and mechanical vibration.

The information provided is intended to be a practical guide for comparison with other lamp types. 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. Life performance increases in the Horizontal burning position.



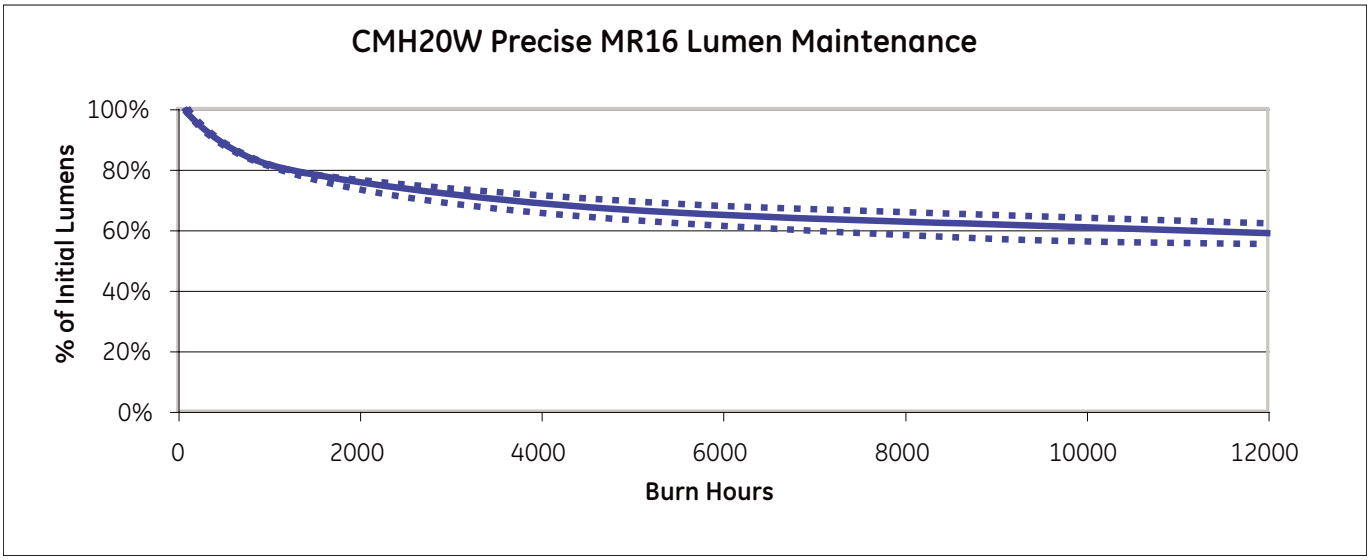
Lumen maintenance

Lumen maintenance graphs show light output performance through life for statistically representative batches of lamps operated under controlled nominal conditions with a 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.

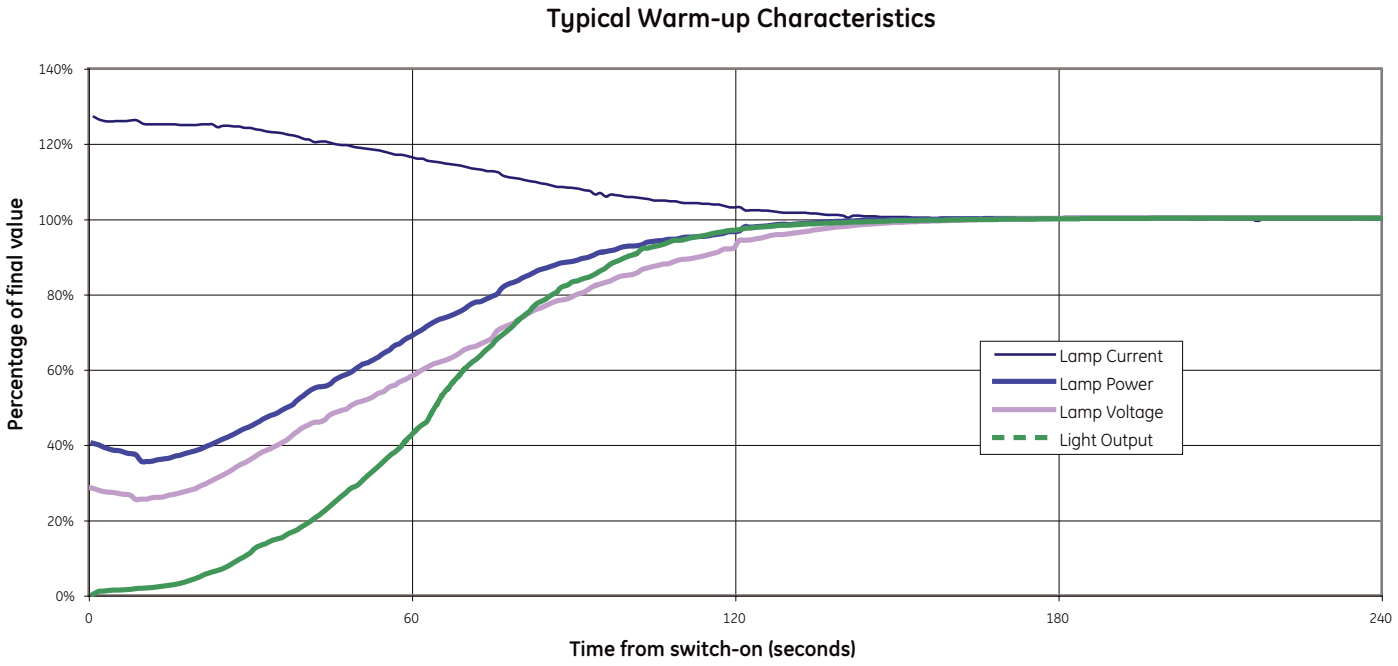
Curves represent operating conditions for a 11 hours per start switching cycle, but less frequent switching will improve lumen maintenance.

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

The dimming of 20 Watt ConstantColorCMH™ lamps is not normally recommended. Large changes in lamp power alter the thermal characteristics of the lamp resulting in lamp colour shift and possible reduction in lamp through life survival.

Flicker

Suitable electronic ballasts for ConstantColor CMH™ lamps provide switched dc operation in the 70-200 Hz range and eliminate perceptible flicker.

Lamp end-of-lie 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 below.

UV and damage to sensitive materials

(UV PET performance µ W/(cm^2)/500 Lux)
Data from bare lamp

UV-C	UV-B	UV-A	UVC/UVA	UVB/UVA	E_{eff}	PET (h)	Risk Group
200-280 nm	**280-315 nm**	**315-400 nm**					
0.001	0.001	6.934	0.00020	0.00007	0.00094	900	**Exempt**

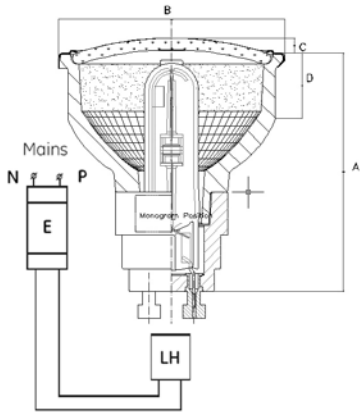
Information for luminaire design

Electronic ballast operation

CMH 20W is designed only for operation from 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™ lam



Circuit diagram
electronic ballast
LH: Lamp Holder
E: Electronic Gear

CONTROL GEAR AND ACCESSORIES

Electronic Ballasts

A range of GE electronic ballasts have been introduced to complement the 20W ConstantColor Ceramic ™ Metal Halide lamps

Power controlled electronic ballasts suitable for operation of Ceramic Metal Halide lamps are available from various gear manufacturers. Please consult GE for up to date details of approved ballast types.

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

Product code	Description		Length	Dimension width	Height (mm)	Power factor
13032	BLS/E/20W/CMH	Integral	123	72	32.5	>0.95
13034	BLS/E/20W/CMH/R	Remote	177	90	40	>0.95
42387	BLS/E/20W/CMH SMP 220-240V	Compact	95	38	30	0.55

Safety warnings

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

- 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
- Risk of fire
- A damaged lamp emits UV radiation which may cause eye/skin injury

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 lamp operation and handling instructions supplied.