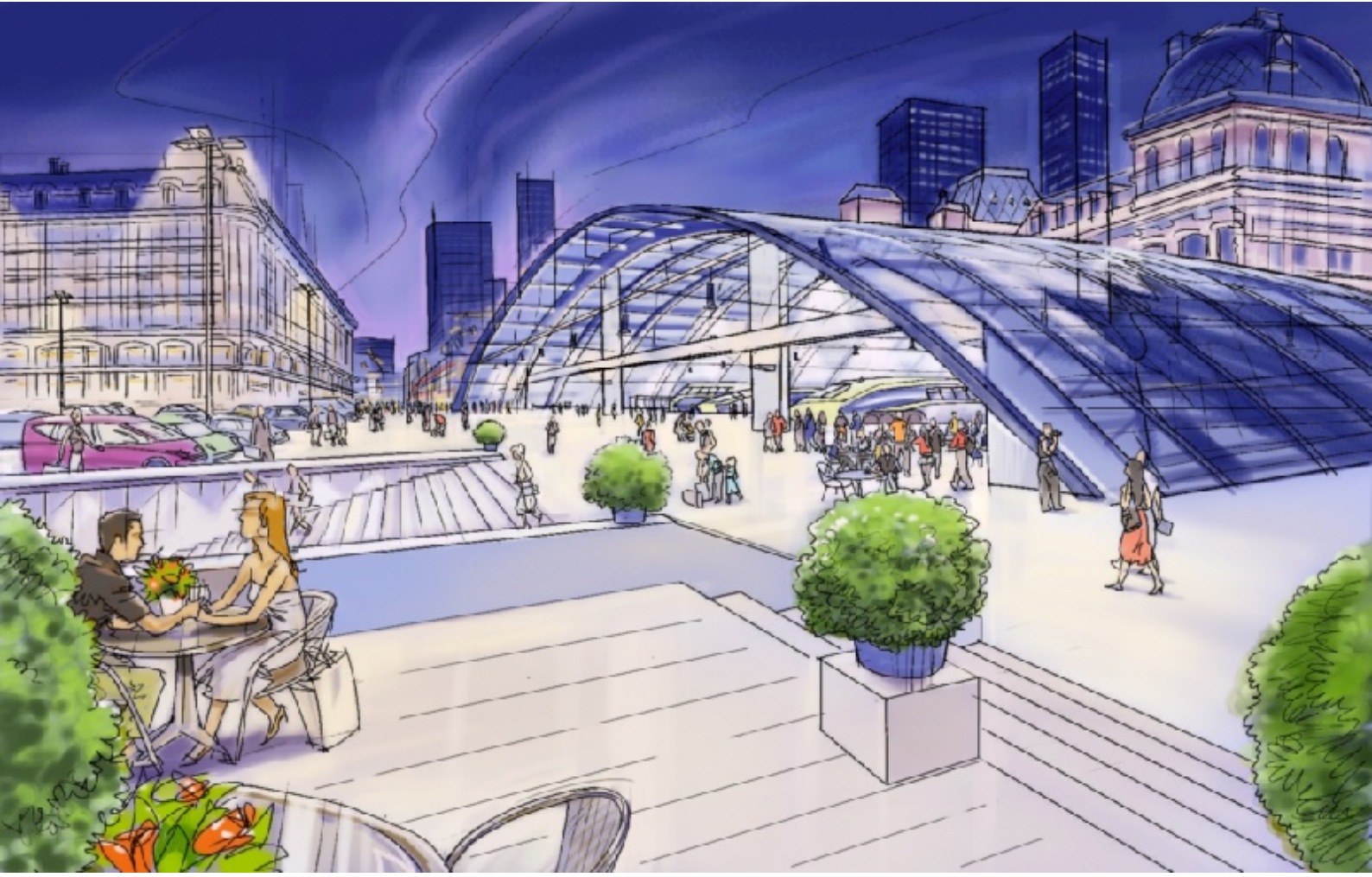

OEM Guide

Information for light luminaire manufacturers

DRAFT OEM Guide for MASTERColour CDM Elite MW lamps
24-06-2009 10:53:59

PHILIPS
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Content

1. General information

1.1. Product description

The Philips MASTERColour CDM Elite MW system offers an unrivalled level of light quality and performance. The lamp's sparkling white light creates a more natural ambience and really brings out the best in all different types of colour. This performance remains stable over the long lifetime of the lamp. In addition, the high efficiency of the lamp and driver together, result in reduced energy use and a lower cost of ownership.

Product benefits

- High efficiency of both lamp and driver means lower energy consumption and therefore reduced CO_2 emissions-without compromising on light quality.
- Longer lifespan equates to reduced maintenance and lower replacement costs.
- Excellent colour quality and consistent light output from beginning to end.
- Being 50% smaller than conventional Metal Halide lamps gives freedom in optic and luminaire design.
- Greater harmony in lighting design as CDM lamps can now be used in many new applications.
- Sparkling properties of white light create a more natural and inviting ambience.

Product features

- Crisp, white light with excellent colour rendering (Ra 90).
- Stable colour performance over entire long lifespan.
- New design makes lamp extremely compact and improves efficiency as well as light distribution.
- Electronic driver suitable for both indoor and outdoor applications.
- Complements existing CDM lamps, range now extended from 20W to 315W.

1.2. Applications

- Outdoor: floodlighting of buildings and other interesting structures. Illumination of roads and pedestrian areas, public spaces, car parks, petrol stations etc.

- Indoor: larger (high-bay) retail outlets, warehouses, manufacturing facilities etc.

1.3. Product range

Lamps

CCT	3000 K	4200 K
Type Wattage	CDM-TMW/930	CDM-TMW/942
210 W		
315 W		

Table 1.1 Product range lamps.

	Gear						
	Electronic				Electromagnetic		Dimmable
Lamp		Built in luminaire	Placed on ceiling	PCB version			
D-CDM-T 210W/930		HID-PV 210 /S CDM 220-240V 50/60Hz 					
D-CDM-T 315W/930 D-CDM-T 315W/942		HID-PV 315 /S CDM 220-240V 50/60Hz 					

Table 1.2 Product range Gears.

The information in this guidline is only valid for the lamp-gear combiation given in tables 1.1 & 1.2

2. Luminaire design

2.1. Introduction - IEC standards

CDM Elite MW offers a unique combination of performance features. Compared to existing white light sources, it offers superior system efficiency (high lamp efficacy + high driver efficiency + better optical efficiency), excellent lumen maintenance of 80% over its long life time of 20.000 hours and an outstanding light quality.

Item	IEC/CISPR	Description
Radio Disturbance	CISPR15	Interference relating to lighting equipment
Lamp	62035	HID safety
Lamp	61167	metal Halide lamps
Luminaire	60598	Luminaires
Cap and holder	60061	Data relative to lamp holders and caps.
Driver	61347	

Table 2.1 Related IEC standards

2.2. General guidelines

2.2.1. Temperature measurement

2.2.1.1. Lamp temperature

Introduction

CDM lamps have no special requirements regarding ambient temperature, since HID lamps are in general not sensitive to ambient temperatures.

Measurement setup

All laomps and measurement connections must be electrically insulated against the maximum ignition pulses of 4 kV. The lamps have to be operated on the appropriate Philips driver and in the PGZ 18 holder. During measurements, the lamps must be shielded against possible non passive end of life phenomena. For the measurements as referred to in this document, NiCr thermocouples are used.

The critical temperatures of the lamp must be measured on an operating lamp. Lamps should be stabilized for at least 10 minutes prior to the measurement. The lamp-driver-luminaire combination must be tested in nominal and boundary situation, both thermal & electrical, in order to measure if certain points of the system do not exceed the specified maximum temperatures.

The critical points and the corresponding temperatures are given in the next sections. Lamps with thermocouples connected can be ordered via the Philips sales organization.

Thermocouples

For the measurements as referred to in this document, K-type thermocouples are to be used. Given the need for a small measurement tip, these type thermocouples are made in Philips Bath (USA) and can be ordered via the sales organisation. With these K-type thermocouples, your own measurement lamps can be made. The fixation of the thermocouples on the lamp can be done with a high-temperature cement. In Philips we use Omega High Temperature Cement (www.Omega.com).

Important: this cement can be used everywhere on the lamp, except on the outer-bulbs at the height of the Light Centre Length (the centre of the arc tube).Another good document on fixation of thermocouples is the IEC 60682, where the fixation of thermocouples on double ended lamps is well explained. When measuring the temperature of the lamp bulb and the cap by using thermocouples, one should realise that the thermocouple itself may also be heated due to direct radiation by the lamp. In case a critical temperature is measured, this (interfering) component of the measured temperature can be separated by reading the temperatures at certain time intervals after switch-off and by plotting the results on logarithmic paper. The real temperature can be assessed by extrapolation back to the moment of switching-off.

2.2.1.2. Gear temperature

Introduction

The temperature of the electronics is the most important parameter for lifetime and reliability of the gear. In the design everything possible is done to keep the component temperature as low as possible, but the design of the luminaire and the ability to guide the heat out of the luminaire is of utmost importance.

The critical components inside the gear for temperature are:

- Electrolytic capacitor
- Solder joints
- Maximum temperatures of components

Definitions

- Gear temperature: temperature measured on the Tc point of the gear. Temperature Tc mentioned on the label is the temperature point where the lifetime and all other specifications are guaranteed.

- Gear ambient temperature: temperature inside the luminaire around the gear.
- Luminaire temperature: temperature outside the luminaire (see figure 2.1).

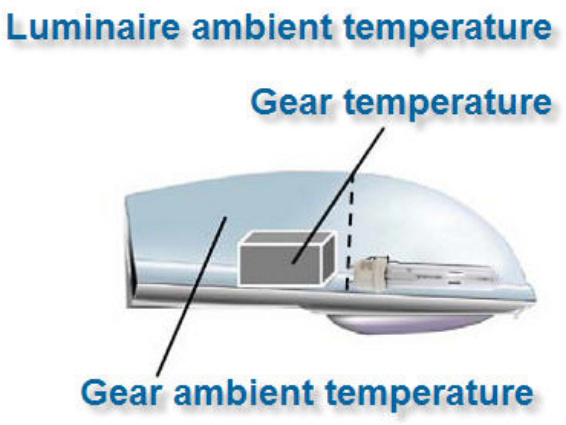


Figure 2.1 Temperature definitions

Measurement setup

To enable temperature measurements in a luminaire without measuring the individual components in the electronic gear a T-case point has been defined. This point, or the indication where this point is located can be found on the label of the electronic gear. In the definition of the T-case point a homogeneous temperature around the gear is assumed. For that reason, it is better to design the luminaire based on gear temperatures rather than gear ambient temperatures. Therefore, the T-case temperature limits mentioned on the gear label and in Gear Data chapter are leading over ambient temperature values mentioned on the gear label.

Please refer to Additional Gear information chapter for the effect of the temperature on the driver lifetime.

2.2.2. Optical design

It is advised to surface finish the reflection material to be used for the CDM Elite MW lamps either by facetted, patterned or mat reflectors. These surfaces will mix the light from the arc to a more homogeneous beam. Arc color differences exist due to deposits of the salts in the burner that will be projected in the beam, hence the reflector needs to mix the light well.

The volume of the optical system is also important. If this volume is too small, the lamp will run too hot and will experience short life. Critical temperatures as specified in Table 2.4 should be taken into account to guarantee the life specifications for the lamp and gear.

2.2.2.1. Reflection

Advice

Avoid reflection surfaces parallel to the lamp, as they will reflect the heat of the lamp back to the parts inside the lamp. The critical parts of the lamp are: the PCA burner and the "getter" disk (the square metal object with the grey round metal deposit). When this disk is thermally overloaded, the area around the disk will very soon get blackened. A tip for preventing these reflections: do not make shiny rings around the lamps as they will reflect the radiation to parts inside the lamp.

2.2.2.2. Anti glare

Advice

Avoid glare: Due to the extremely high lumen output of CDM lamps, additional measures may be necessary to avoid glare in e.g. down lighting applications. Especially the flood optics may have to be recessed with respect to the front ring of a down light (=> anti-glare baffle). Details of the construction will depend on application and design of the luminaire.

2.2.3. Safety

Containment safety

As for all CDM lamps, the chance for non-passive failure of the CDM Elite MW burners at end-of-life cannot be excluded. When the burner shatters, this can lead to cracks or rupture of the outer bulb. Therefore, we prescribe that unprotected CDM Elite MW lamps must be operated in fully enclosed luminaires, able to contain all the broken hot parts of the lamp. These particles can have temperature up to 1000°C. Under no circumstances, including during testing, the lamps should be operated, unless an approved barrier is used to contain and protect the environment against particles coming from a ruptured arc tube.

Protected CDM Elite MW lamps are expected to become available in the future. These protected lamps can be used in open luminaires. In order to prevent lamp installation and replacement failures, such open-rated luminaires will be equiped with PGZX18 lamp holder.

The critical temperatures of the lamp must be measured on a burning lamp in the application/luminaire. The critical points and the corresponding temperatures for the different lamp types are given in Table 2.4

Temperature safety

For CDM Elite MW lamps, it has been found that the lamp voltage does not increase significantly, as long as the reflector/housing is not too compact. As such, the lamp voltage is not a good measure to assess whether a luminaire is critical with respect to lamp temperature or not. Even if there would be a minimal lamp voltage rise, the lamp power does stay constant (consequence of the use of an electronic driver). Therefore, light technical properties like luminous flux, colour rendering, and colour coordinates remain practically unchanged in a luminaire.

The lamp-gear-luminaire combination must be tested in the most unfavourable situation in order to measure if certain points of the lamp, gear or luminaire do not exceed the given limit temperatures. In case of questions, please contact your Philips representative for support.

Electrical safety

All CDM Elite MW lamps have to be operated in fully enclosed luminaires.

For optimal lightning protection of the system make sure that the lightning strike protection works as intended, the following guidelines for the luminaire have to be obeyed:

- The distance from the lamp contacts to any metal part connected to the earth terminal of the gear must >8mm, and preferably >10mm.

- The lamp wires must have the classifiction 'double insulated' or 'reinforced insulation'.

Make sure that the wiring inside the luminaire follows the guidelines, described in chapter 4.

2.2.4. End of life behaviour

At end of life, different phenomena can be observed with lamp and gear. The table 2.2 gives a short overview of these phenomena.

	Lamp	
Failure mode	**Lamp cause**	**Recommendations**
Rise of V lamp cycling and extinguishing	Wearing out of the electrodes; increase of the electrode distance	Replace lamp
Colour change of the light (green/ blue/pink)	Change in chemical composition of filling of the discharge tube	Good temperature design of the luminaire
Extinguishing lamp (broken arc tube)	Leaking arc tube can be caused by a chemical reaction between the arc tube filling and the PCA over life	Replace lamp

Table 2.2

The failure mechanisms of a CDM Elite MW lamp, after its specified lifetime, are similar to other CDM lamps:

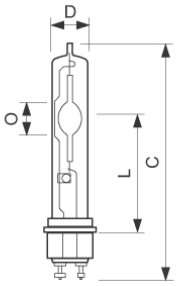
- Due to chemical reactions between the arc tube filling and the PCA, the tube will become leaky. The hot gases will flow through this leak into the outer bulb, noticeable as a weak discharge in the outer bulb. In principle, it cannot be excluded that the PCA will break and hot PCA parts may cause a rupture of the outer bulb (in case of unprotected lamps)
- If the arc tube becomes leaky, eventually the lamp stops functioning. In some cases the lamp continues burning for a few hundred hours with a strongly deviating colour performance, before it eventually stops completely. Conversely, when a lamp operates with strongly deviating colour, this might be an indication of the arc tube being leaky. The gear has EOL protection circuit to detect this situation and switch off the system.

- When the arc tube becomes leaky and the fill gas flows into the outer bulb, a glow discharge can appear around the metal parts in the outer bulb. In the arc tube itself no discharge is present anymore. The glow discharge is NOT detrimental for any part of the system. Additionally, the glow effects are limited in time by a timing function in the electronic gear that switches off the circuit after 20 minutes.
- The lamp voltage can rise too much to be sustained by the ballast. This voltage rise can be caused by a change in the chemical composition during lifetime or by electrodes wearing out. In case of a too high lamp voltage, the lamp extinguishes. An overload situation, e.g. a 210W lamp operating on a 315W system, will speed up the above-mentioned failure mechanism.
- When the lamp voltage reaches a too high value, the gear will switch off automatically. In this way, disturbing cycling effects (lamps switching on and off continuously) are prevented. We advise to replace end-of-life lamps as soon as possible.

2.3. Lamps

2.3.1. CDM-Elite MW

2.3.1.1. Information



	Unit	D-CDM-T 210W/930	D-CDM-T 315W/930	D-CDM-T 315W/942
Product Dimensions				
Overall Length-C max.	mm	188	188	188
Diameter-D max.	mm	29	29	29
Light Center Length-L nom.	mm	90	90	90
Arc Length-O nom.	mm	12.1	16	14
Electrical Characteristics				
Lamp Wattage Rated nom.	W	210	315	315
Lamp Wattage EL nom.	W	210	315	315
Lamp Voltage nom.	V	100	100	100
Lamp Current EL nom.	A	2.1	3.15	3.15
Lamp Current Run-Up nom.	A	3.2	4.7	4.7
Ignition Supply Voltage min.	V	3000	3000	3000
General Characteristics				
Cap type		PGZ18	PGZ18	PGZ18
Burning position nom.		any	any	any
Nett Weight Product nom.	gr	115	124	124
50% survival rate EL nom.	hr	20000	20000	20000
5% survival rate EL nom	hr	8000	8000	8000
10% survival rate EL nom.	hr	12000	12000	12000
Light Technical Characteristics				
Luminous Flux Lamp EL nom.	Lm	24200	37800	36200
Chromaticity Coordinate X nom.		0.433	0.433	0.373
Chromaticity Coordinate Y nom.		0.399	0.399	0.371
Luminous Efficacy Lamp EL nom.	Lm/W	115	120	115
Color Rendering Index nom	Ra8	90	90	90
Color T nom.	K	3000	3000	4200
Lumen Maintenance 2000h nom.	%	97	97	96
Lumen Maintenance 5000h nom	%	94	94	93
Lumen Maintenance 12000h nom.	%	87	87	87
UV-related Characteristics				
Damage Factor D/fc (h.klx) nom.		0.15	0.13	0.242
UV C nom.		0.06	0.03	0.06
UV A nom.		5.7	3.45	7.76
UV B nom.		0.03	0.01	0.01
Name PET (NIOSH)		115	141	49.7

Table 2.3 Lamp Characteristics

2.3.1.2. Critical points

The temperatures of the bulb and the pinch are most critical.

The temperature of the bulb is important for the operating temperatures inside the lamp (arc tube temperature). If this temperature is too high, the lamp properties and especially the life properties can be altered. The critical point is just above the light centre, at the upper side of the lamp, when the lamp burns horizontally.

The temperature of the pinch has to be limited to prevent the oxidation of the molybdenum foils in the pinch of the lamps. On the place where the electrodes leave the outer bulb, the molybdenum foil is in contact with the air. If the temperature exceeds the specification, oxidation might be accelerated and life might be shortened . To measure the temperature of the pinch, the thermocouple should be fixed near the pinch at the spot where the joint is between the outer lead and the molybdenum foil. This temperature is most critical in base-up burning position.

Figure	Max temperature for	CDM Elite MW 210W	CDM Elite MW 315W
	bulb (at LCL right above the center of the arc tube)	650°C	700°C
	pinch (base-up burning)	320°C	320°C

Table 2.4 Critical points

2.3.1.3. Lamp base and holder

The following table gives some specific elements with regards to the lamp base and holder.

Element	Explanation
Type holder	PGZ18 lamp base and holder
Orientation in luminaire	By the shape of the pins and holder, the lamps/holder can be mounted in a unique position in the optics (preferably with the long frame wire at the top if burning horizontally).
Positioning	The PGZ18 is a "pre-focused" lamp base, which means that the burner is aligned with the reference plane of the base before fixing the bulb in the lamp base. Additionally, the specific fit of the base in the holder guarantees minimal tolerance of the position of the lamp with respect to the reflector. Both these elements allow a better positioning of the arc tube in the reflector and hence lead to a more reliable and reproducible light output/ distribution compared to other lamp base/holder types such as E-base or G12 base.
Fixation	The twist and lock concept guarantees an optimal fixation of the lamp in the luminaire, also in high vibration applications.

Table 2.5 lamp base and holder.

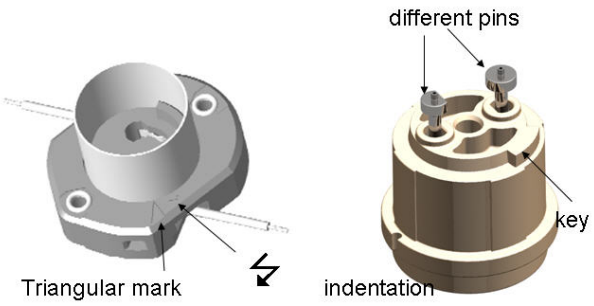


Figure 2.3 PGZ18 lamp base and holder

CDM Elite MW is designed on a PGZ18 lamp holder (see Figure 2.3). In case of an open rated luminaire, a protected version of CDM Elite MW need to be used, in combination with the PGZX18 lamp holder. Currently, one supplier is available: Bender & Wirth (http://www.bender-wirth.com). The lampholder is available with a pillar terminal (Pillar terminal 0.75 - 1.5mm^2). This lamp-holder combination is designed for the CDM Elite MW system with the following properties:

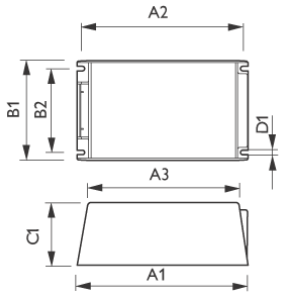
- The lamp base has pins with different shapes and diameters (see Figure 2.3), such that it can only be inserted in the lamp holder in one unique way. This implies that:
  - The ignition pulse is always applied on the short pole of the lamp. The ⚡ symbol, on the lamp holder and gear contacts, indicates how to connect the wires properly.
  - The lamps can always be mounted in the same position and orientation in the optics. Preferred orientation for horizontal burning is with the long frame wire on top. This means that holders should be mounted in the luminaire with the pointed side of the holder facing downwards.
- The specific fit of the lamp base in the holder guarantees minimal tolerance of the position of the lamp with respect to the reflector. This allows a better positioning of the arc tube in the reflector and hence lead to a more reliable and reproducible light output/distribution compared to other lamp base/holder types.
- The twist-and-lock concept guarantees an optimal fixation of the lamp in the luminaire, also in high vibration applications.
- The lamp-holder combination has a built-in "key" function to prevent wrong lamp installation and replacement. This ensures that open-rated luminaires that are equipped with a PGZX18 holder for protected lamps cannot be equipped with unprotected CDM Elite MW lamps. Enclosed luminaires, that are designed for use with unprotected lamps, can be equipped with both protected and unprotected CDM Elite MW lamps. The key does not prevent mixing-up the different wattages, i.e. a 210W lamp can be connected to a 315W gear and vice versa. When such misapplication happens, the light technical properties will be outside specification and lifetime behavior will be negatively affected.

- The lamp-holder combination gives a snap-in sensation to confirm proper insertion of the lamp. For proper insertion of the lamp: first align the indentation in the cap with the triangular mark on the holder. Then insert the lamp and twist 45° in clockwise direction. During this operation, the lamp can be held by the quartz sleeve or by the upper part of the ceramic base. Proper care should always be taken when handling fragile objects like lamps. Especially in hard to reach places, it may be more difficult to feel the snap-in sensation. In such situation, one should take extra care not to apply excessive force, especially when holding the lamp by its quartz sleeve.

2.4. Gear data

2.4.1. CDM-Elite MW

2.4.1.1. Information



	Unit	HID-PV 210 /S CDM 220-240V 50/60Hz	HID-PV 315 /S CDM 220-240V 50/60Hz
Product Dimensions			
Length A1 nom	mm	215.0	215.0
Fixing Hole Distance Length A2 nom	mm	204.5	204.5
Width B1 nom	mm	128.5	128.5
Fixing Hole Distance Width B2 nom	mm	111.5	111.5
Height C1 nom	mm	60.0	60.0
Fixing Hole Diameter D1 nom	mm	4.2	4.2
General Characteristics			
Line Voltage	V	220-240	220-240
Line Frequency	Hz	50/60	50/60
Rated Ballast-Lamp Wattage		210	315
Life time (max.10% failures)	hr	50000	50000
Operating Characteristics			
PowerFactor 100% output power min		0.95	0.95
PowerFactor 100% output power nom		0.95	0.95
Power losses gear nom	W	N.A.	N.A.
Ignition Voltage max	kV	4.0	4.0
Inrush current Peak max	A	12	12
Inrush current Width nom	ms	3	3
Earth leakage current max	mA	0.5	0.5
Maximum ballast number on MCB nom	x	4	4
Temperature Characteristics			
T-ambient max	C	65	55
T-ambient min	C	-20	-20
T-case life nom	C	80	80
Wiring Characteristics			
Cable-Cap outputwires mutual nom	pF	1000	1000
Max. cable length Device/Lamp nom	m	3	3

Table 2.6 Gear characteristics

2.4.1.2. Circuitry

3. Additional lamp information

3.1. Starting characteristics

A resonant ignition voltage between 2.5 and 4 kV is used to ignite the CDM Elite MW lamp. Pulses are applied to the lamp with a certain on/off sequence (burst mode) with a total duration of maximum 30 minutes (to allow warm restart of the lamp). As for all discharge lamps, the resistance of the gas in the discharge tube is related to the gas pressure of the different elements in the tube. Immediately after ignition the lamp voltage is lower and the current is higher. After about 1.5 to 2 minutes the gas pressure has been built up and nominal lamp performance is reached. This is visualized in the run-up curves, see figures 3.1 till 3.3

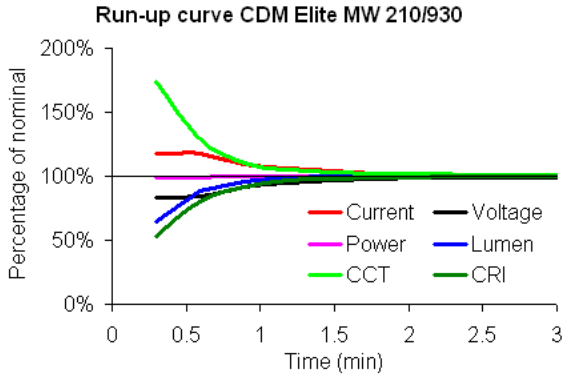


Figure 3.1

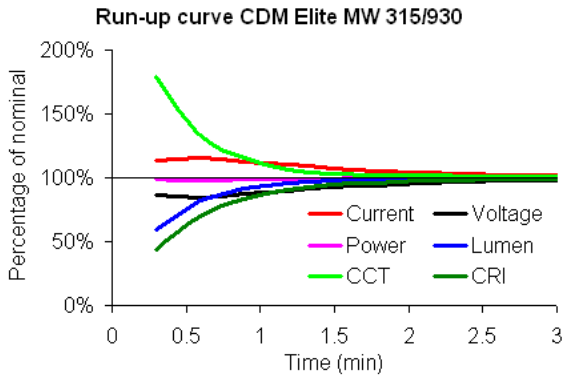


Figure 3.2

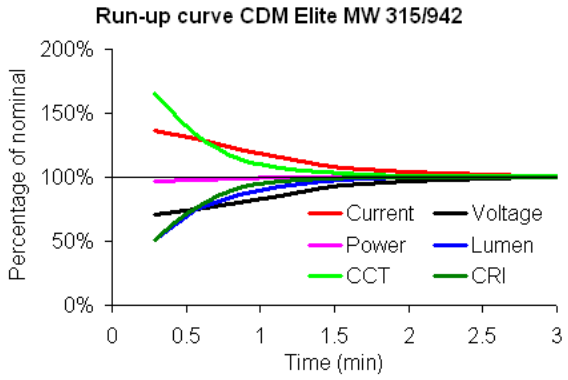


Figure 3.3

CDM Elite MW lamps do not re-ignite instantly. Warm re-ignition time is specified to be less than 15 minutes, typically around 10 minutes.

3.2. Luminous intensity distribution

Set-up

CDM Elite MW lamps

In figures 3.4 through 3.9 the ligth distributions are shown for the CDM Elite 210W and CDM Elite 315W lamps in vertical burning position. They shown the light emitting surface is fully rotational symmetric along the axis (see for example figure 3.4). There is only a slight shadow of the field wire.

The shaddowing effect of the field wire is also shown by the red line in the other cross section (see for example figure 3.5). The dip in intensity at the top part of these figures is due to the lamp base that blocks the light in upward direction. On the bottom side, the peculiar shape in the light distribution is due to shielding by the metal parts in the lamp and lens action of the shaped quartz body of the lamp (see for example figure 3.5).

Polar intensity diagram

CDM-Elite MW 210W/930

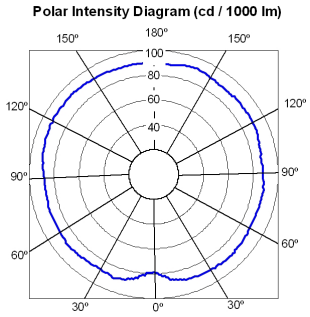


Figure 3.4

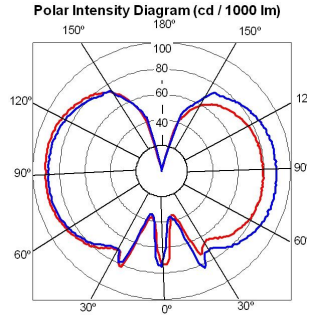


Figure 3.5

CDM-Elite MW 315W/930

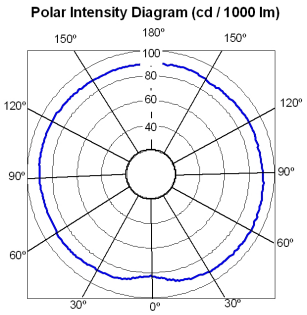


Figure 3.6

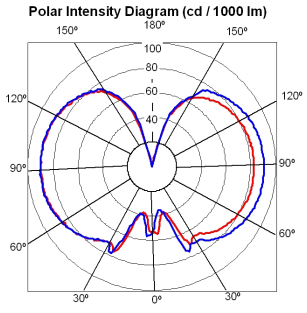


Figure 3.7

CDM-Elite MW 315/942

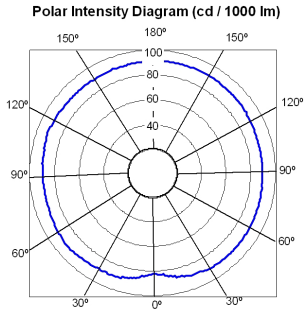


Figure 3.8

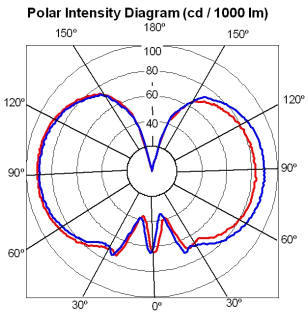


Figure 3.9

3.3. Spectral power distribution

For the spectral power distributions of CDM Elite MW lamp see Figure 3.10 till 3.12

CDM Elite MW 210W-930

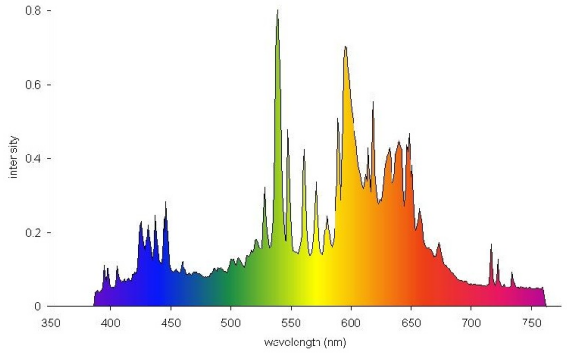


Figure 3.10

CDM Elite MW 315W-930

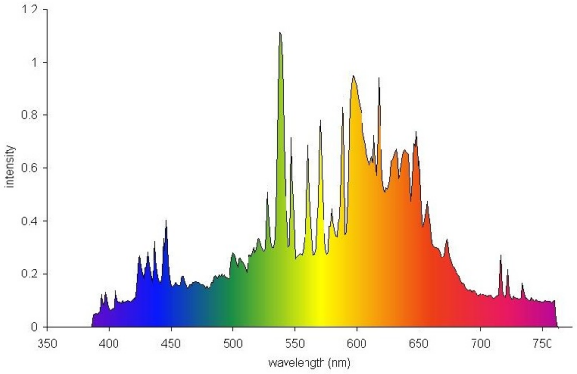


Figure 3.11

CDM Elite MW 315W-942

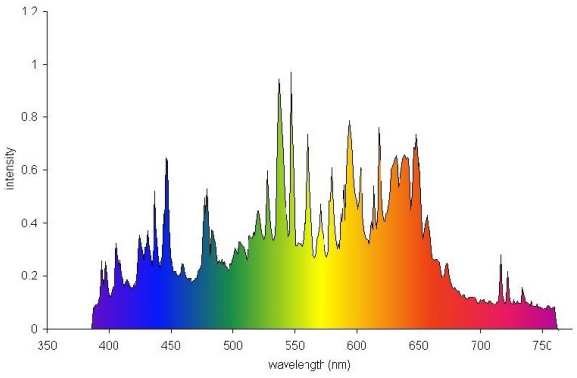


Figure 3.12

4. Additional gear information

4.1. Gear selection

50Hz conventional system: generally accepted for most CDM lamps although in visually demanding applications or when used in general lighting, lamp flicker can be a problem.

Electronic gear operating with low frequencies (50-400Hz) and a block current wave, referred to as Low Frequency Square Wave (LFSW) are in general suitable.

4.2. Electronic gear

Indoor versus Outdoor

	Indoor Products	Outdoor Products (Xtreme)
IP luminaire classification	Advised luminaire classification > IP 54	Advised luminaire classification > IP 23
Air contaminations	Not protected	Protected
EMC-V_surge	EN61547 2kV L/N - Ground 1kV L-N	EN61547 4kV L/N - Ground (Xtreme 10kV) 2kV L-N
Vibrations	IEC-68-2-6-Fc Frequency range 10-150 Hz. Acceleration/amplitude 2G/0.15 mm peak	IEC-68-2-29 Eb Frequency range 10-150 Hz. Acceleration/amplitude 5G/0.15 mm peak
Lifetime	50.000 hours with 10% failures	60.000 hours with 5% failures
Mains voltage (operating)	220-240V -6%..+6%	220-240V -10%..+15% (Xtreme)
Mains voltage (safety)	220-240V -10%..+10%	220-240V -20%..+20% (Xtreme)
EMC	CISSPR 15 ed 7.1	CISSPR 15 ed 7.1
Temperatures	0 - 50°C	-20 - 50°C (ignition -30° C)
Housing	Class 1	Class 2

Table 4.1

Lifetime

To enable temperature measurements in a luminaire without measuring the individual components in the electronic gear a Tc point has been defined. This point, or the indication where this point is located can be found on the label of the electronic gear. The specified temperature of this point is related to temperatures of components and solder joints inside the electronic gear. How this point is related to the component and solder joint temperatures is schematically shown in Figure 4.1. The picture is a generic picture and does not specifically display Elite MW gear.

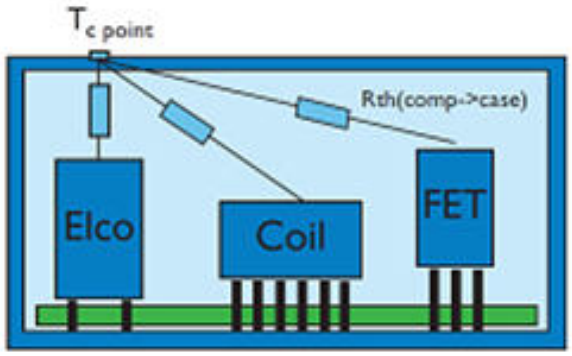


Figure 4.1

In the definition of the T-case point a homogeneous temperature around the gear is assumed. In luminaires, especially compact versions, the temperature around the gear is not always homogeneous due to the heat from the lamp and lack of space for convection. For that reason, it is better to design the luminaire based on gear temperatures rather than gear ambient temperatures. Therefore, the T-case temperature limits mentioned here and on the gear label are leading over ambient temperature values mentioned on the gear label.

The T-case point temperature at which the nominal lifetime is reached is marked on the label . If the gear will be constantly driven at T-case switch-off temperature (10°C above temperature marked on the label) the failure rate will almost double. Simillary, if the T-case point temperature of the gear is lower than the temperature at which the nominal lifetime is reached, the lifetime of the gear will increase (see below table 4.2 for reference).

T-case point temperature

Tcase	Max failure rate / 1000h	Survivors 50 khr
90	0.4%	80%
80	0.2%	90%
70	0.1%	95%

Table 4.2

Housing

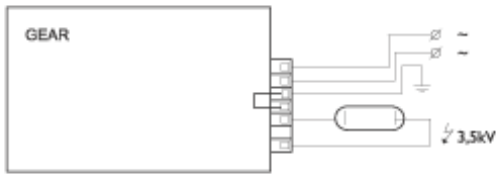


Figure 4.2 Wiring diagram gear

Installing cabling/EMC

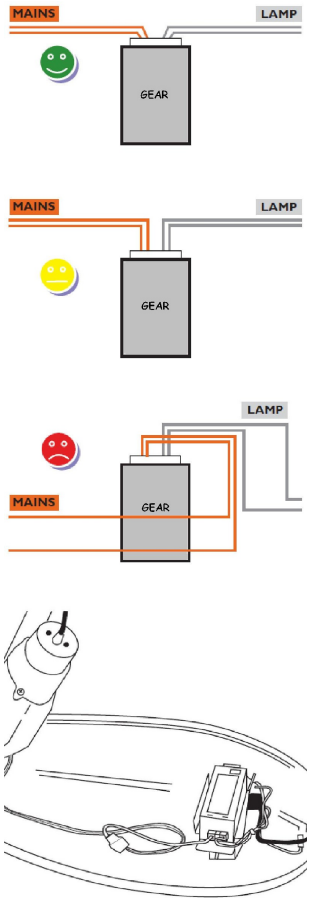


Figure 4.3

The Elite MW gears operate the lamps using a low frequency square wave (LFSW) waveform with frequencies around 110 kHz. This affects the EMI behavior of the system. To achieve the lowest possible level of interference, the following guidelines have to be obeyed (see also Figure 4.3):

- Keep the mains wires (L and N) to the gear close together.
- Route the mains wires immediately away from the gear. Do not route the wires along or on top of the gear.
- Keep the lamp wires close together and as short as possible.
- Do not put the lamp wires close to the mains wires.

For EMI performance it is recommended to connect the ground terminal of the gear to the large metal parts of the luminaire. Note that for proper Lightning Stroke Protection the earth terminal must be connected when metal parts are present in the luminaire. It is preferred to connect the ground terminal of the gear to the metal luminaire fixation point, when the luminaire is mounted on a metal structure.

Please note that for optimal EMI behavior the large metal parts of the luminaire (e.g. bottom plate) must always be connected to the earth contact of the gear, independent on Class 1 or 2. Connection of the earth terminal to the metal parts of the luminaire should be kept as short as possible (2 cm or less if possible).

Independent use and remote gear

HID-PrimaVision 210/S CDM and HID-PrimaVision 315/S CDM are not yet released for independent use. The gear has always to be build in a luminaire or a gear tray.

When the driver is going to be installed at a distance more than 50cm from the lamp (remote gearing) it is recommended that a EMI and ignition test is conducted in the final application set-up. Please refer to Gear Data chapter for max cable capacity.

Electrical protection

The luminaire-driver-lamp system must be immune to

- Electrostatic discharge (ESD)
- Voltage dips and interruptions
- Electromagnetic and magnetic fields
- Bursts (electrical fast transients)
- Surges (pulses with high energy)

To make sure that the lightning stroke protection works as intended, the following guidelines for the luminaire have to be obeyed:

- The distance from the lamp contacts to any metal part connected to the earth terminal of the gear must be > 8 mm and preferably >10 mm.
- The lamp wires must have the classification “double insulated” or “reinforced insulation”.

This is the case for both Class 1 and Class 2 luminaires. If in a Class 1 luminaire no “double insulated” or “reinforced insulation” lamp wire is used an additional insulation sleeve has to be used to provide sufficient insulation.

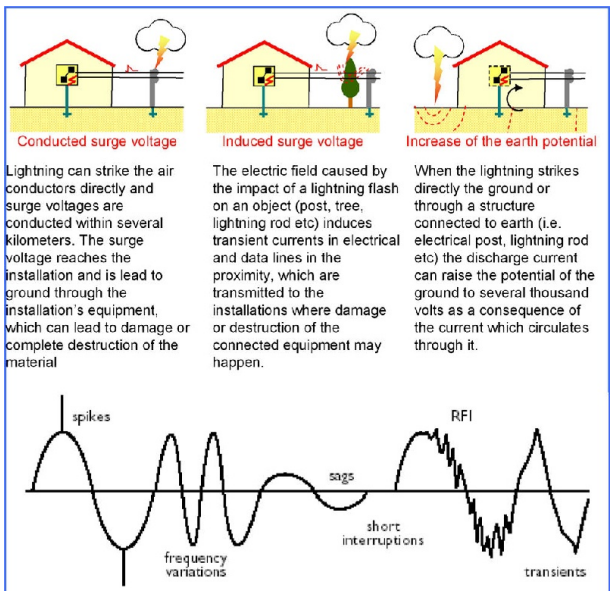


Figure 4.4

The protection circuit will bypass the surge current to the ground connector terminal on the gear. It is important that this current can flow as direct as possible back to ground. For that reason, the ground contact of the gear must be connected to large metal parts of the luminaire and if possible also to the metal pole.

Please note that large metal parts of the luminaire, like the bottom plate, must always be connected to the ground contact of the gear, independent on Class 1 or 2. This is needed for EMI and optimal lightning strike protection.

NB: the Elite MW gears have a protection against peaks on the mains up to 4 kV, but are not able to direct high amounts of energy to ground.

Information for installer: in case an earth cable with a metal armor is used the lightning protection can be improved by connecting this armor to the metal pole.

Class 1 and Class 2

Elite MW gears are suitable for Class 1 luminaires. In a Class 1 luminaire a safety earth connection is present and touchable non-insulated metal parts are allowed, since their safety is guaranteed by thesafety earth connection.

In a Class 2 luminaire no safety earth connection is present. Here metal parts that can be touched have to be safe without the help of a safety earth connection.

Class 1

In Class 1 fixtures the metal in the luminaire is connected to ground via a safety earth wire. The ground connection of the gear must be connected to the ground in the luminaire for EMI and lightning strike protection. In case there are no metal parts at all present in the luminaire, the mains ground is directly connected to the ground connection of the gear.

For the Elite MW gears, the FE has to be connected to PE for EMC reasons.

Class 2

In Class 2 fixtures there is no safety earth conneted to the luminaire.

To comply to the insulation Class 2 criteria, not only the gear must be compliant, but also in the luminaire precautions for the lamp cables must be taken.

Important notice: to comply to insulation Class 1 and 2, and to have maximum protection against lightning strike surges, it is strongly recommended the below guidelines are followed:

- The distance from the lamp contacts to any metal part connected to the earth terminal of the gear must be >11 mm for Class 2 protection.
- The lamp wires must have the classification “double-insulated” or “reinforced insulation”. Putting a sleeve around the two wires will reduce EMI and improve the lightning stroke robustness.

The dashed line in Figure 4.5 illustrates the difference between insulation Class 1 and 2.

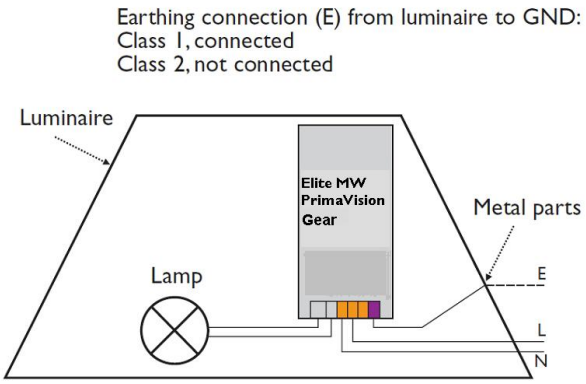


Figure 4.5

Operating in abnormal conditions

Thermo-switch behavior

If the Elite MW gears are used at too high temperatures a so-called thermo-switch will protect the gear against damaging. The gear will be switched off by this thermo-switch. For the Elite MW gears, the thermo-switch is activated at (or above) Tc=Tswitch-off=90°C.

Input voltage

The voltage are designed to operate within an input tolerance of ±10%. In this range, the lamp power is regulated within ±3% of its nominal power.

Because the gear 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.

Low voltage

The gears have limited protection against low voltages. At mains voltages below 150V, the gear will switch off until the input voltage goes back up above 170V. Under these circumstances lifetime can be adversely affected.

Over voltage

The gears have a limited protection against over voltages. Elite MW 210W/315 W gears will switch off at mains voltage above 300V; this will however negatively influence the lifetime and reliability. It is advised to prevent higher mains voltages than +10%. The gear will attempt to reignite the lamp once input voltage goes back down below 280V.

Over current

The Elite MW gears have protection against lightning surges in combination with the ability to direct high currents to ground for a short period. This decreases the number of failed products on a mains line in case of a lightning stroke. For design-in recommendation see previous chapters.

NB: the Elite MW gears have a protection against peaks on the main up to 4 kV, but are not able to direct high currents to ground.

In case of a damaged lamp wire severe arcing in the lamp wire can occur. This melts the wire insulation and causes severe problems. Lamp wires must therefore be undamaged and installed in the luminaire in such a way that cracks cannot occur over lifetime.

In this respect also lamp wire connection at the gear connector must be properly inserted and the lamp wire must be fixed in such a way that slowly releasing of the wire from the connector due to excessive vibrations of the lamp wire is prevented. Also at the lamp holder side, the lamp wire must be fixed such that excessive vibrations of the lamp wire are not possible.

The luminaire manufacturer remains responsible for the quality and performance of the total system in the market. He needs to assure that all components in the luminaire are used within specified boundaries, with special attention to, but not limited to, potential safety issues and negative interactions between components in a specified environment.

This OEM guide describes only some recommendations for an optimal functioning of lamp and gear in the luminaire. As Philips has not the control over the design, manufacturing and application of the luminaire, Philips shall not be held liable for the functioning of the system, meaning lamp and gear in the total luminaire solution.Due to continuous improvements and innovations, specifications may change without notice.