



OEM Design-in Guide

Philips CosmoPolis

PHILIPS

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I. General introduction of Philips CosmoPolis systems

Product description

The CosmoPolis system consists of:

- New lamp family.
- New electronic driver platform (electronic driven only) to complement the system. It is designed to fulfil all requirements from the demanding public lighting application and ensures you a future-proof installation.
- LumiStep, sense and simplicity, stand-alone dimming solution.

Product features

- High system efficiencies: up to 120 lm/W for the lamp; up to 92% efficiency for the electronic driver.
- Unique burner design and positioning in combination with best lamp fixation.
- Compact: reduced size to 50% compared to SON/HPL systems.
- Electronic driver designed for outdoor applications.

Product benefits

- High system energy efficacy: sound TCO.
- Best optical efficacy. This allows greater spacing between luminaires (+10%) and thus lower investment.
- Compactness offers optimisation in design of optics and luminaires.
- Optimal lamp service lifetime and energy saving initially and over lifetime.
- A Green Product to minimise environmental impact and CO₂ emission.
- Attractive white light: CosmoWhite.

Naming

The name of the product family is CosmoPolis.

For the white light product the name is MASTER CosmoWhite.

The lamp types are:

Philips MASTER CosmoWhite

CPO-TW 45W / 628 PGZ12	CPO-TW 60W / 728 PGZ12
CPO-TW 90W / 728 PGZ12	CPO-TW 140W / 728 PGZ12

- TW	Single ended tubular White
- PGZ12	Lamp base
- 45W/60W/90W/140W:	Lamp power
- /728:	Indicates the colour rendering (first digit) and colour temperature (second and third digit). In the case of CosmoWhite the colour rendering CRI > 70 and the colour temperature CCT is 2800K.

The driver types are:

Philips CosmoWhite Xtreme	HID-PV Xtreme 45 /S CPO TW	HID-PV Xtreme 60 /S CPO TW
	HID-PV Xtreme 90 /S CPO TW	HID-PV Xtreme 140 /S CPO TW
	HID-DV LumiStep ¹ 60 /S CPO-TW ²	HID-DV LumiStep ¹ 140 /S CPO-TW
	HID-DV LumiStep ¹ 90 /S CPO-TW	

Xtreme	HID driver specifically designed for outdoor applications
- /S	Standard version without strain relief.

¹ Fix dim period setup to 6, 8 or 10 hours

² Dimming only to 75% of power

2. General information on Philips CosmoWhite systems



Figure 1: Philips CosmoWhite 45W/60W



Figure 2: Philips CosmoWhite 90W/140W

2.1 Introduction

CosmoWhite has optimum performance for white light in outdoor applications. Compared to the existing white light sources in outdoor lighting (HPL, CDO) the CosmoWhite system has superior performance in system efficiency (higher lamp efficacy + driver efficiency + better optical efficiency). Moreover, the lumen maintenance is strongly improved compared to existing ceramic or quartz metal halide lamps used in outdoor. The lamp is very compact: dimensions are optimised with respect to the optical performance of the lamp in the luminaire.

2.2 Lamp technology

The arc tube technology of the CosmoWhite lamp is similar to the technology used for Philips CDM-lamps:

- PCA (Poly Crystalline Alumina) discharge tube technology.
- Rare earth metal iodide technology as used in all metal halide lamps.

The CosmoWhite arc tube differs mainly from the CDM-arc tubes by its geometry that is much longer and skinnier. This geometry is optimised to obtain the best optical performance in typical road and street lighting optics.

The outer bulb of the CosmoWhite lamps is made from UV-block quartz, with outer diameter of 19mm. The lamp length and light centre length are dependent on the lamp power as shown in section 3.3.

The PGZ12 lamp base and holder are dedicated for CosmoWhite lamps. More details about the base and holder are given in section 3.6. The lamp construction is visualised. See Figures 1 and 2.

The nominal performance parameters, obtained with 100 hours seasoned CosmoWhite lamps on a nominal CosmoWhite driver (standard) are given in the table below:

	Philips CosmoWhite 45W	Philips CosmoWhite 60W	Philips CosmoWhite 90W	Philips CosmoWhite 140W
Performance 100h Horizontal burning				
Flux	4300 lm	6850 lm	10450 lm	16500 lm
V _{la}	90V	92V	91V	94V
Lamp power	45W	60W	90W	140W
Lamp efficacy	96 lm/W	114 lm/W	116 lm/W	118 lm/W
Lamp dimensions				
Diameter	19mm	19mm	19mm	19mm
Light centre length	59mm	59mm	66mm	66mm
Cap	PGZ12	PGZ12	PGZ12	PGZ12

Table I: Nominal values for Philips CosmoWhite, operating in horizontal burning position on a Philips CosmoWhite “standard” driver.

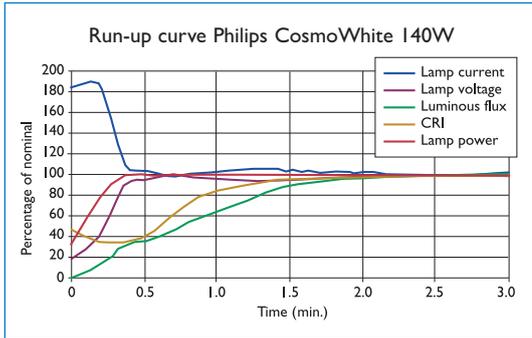


Figure 3 All values are typical values.

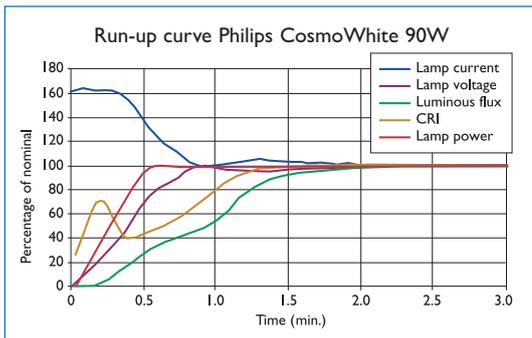


Figure 4 All values are typical values.

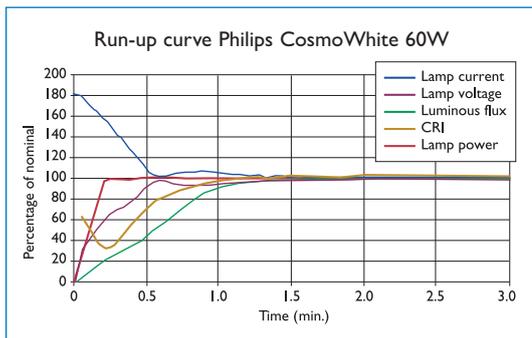


Figure 5 All values are typical values.

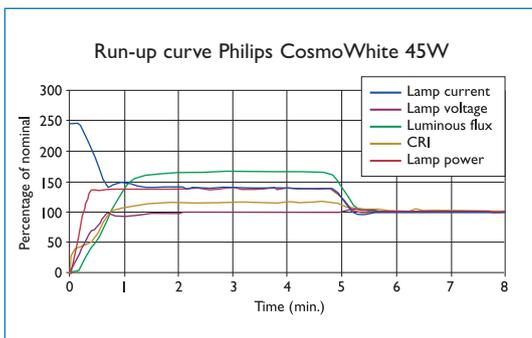


Figure 6 All values are typical values.

Note: The above lamp characteristics are measured on a calibrated HID-PV CosmoWhite driver in an Ulbricht sphere. In a compact reflector, the run-up time might be slightly shorter.

2.3 Philips CosmoWhite driver technology

The CosmoWhite lamp can only be operated by electronic drivers. It cannot be operated on conventional gear.

The driver uses a low frequent square wave to operate the CosmoWhite lamp.

Overview specs Philips CosmoWhite standard driver and Xtreme driver:

Table 2

	Standard Philips HID-PV CPO-TW	Philips HID-PV Xtreme CPO-TW
Lifetime	50k hours; 87,5% survivors	60k hours; 95% survivors
Size 140W l x w x h (mm)	150x90x40	150x65x65
Size 60W l x w x h (mm)	150x90x40	135x65x65
Max. permissible case temperature	100°C	90°C*
Tc (to obtain nominal lifetime)	90°C	80°C*
Surge protection L to N	2kV	2kV
Surge protection (L+N) to ground	HID-PV CPO 4kV	HID-PV Xt CPO-TW 10kV / 5kA
Surge protection (L or N) to ground	HID-PV Xt CPO-TW 4kV	HID-PV Xt CPO-TW 4kV
Short circuit to ground protection	No	No
Lamp cable capacitance	Max 200pF	Max 1nF
Class 2 protection	No	Yes

* See also the chapter on driver lifetime

** EN 61000-4-5

For LumiStep the same values are applicable as for the Xtreme drivers.

From now onwards only the new CosmoWhite Xtreme driver characteristics will be subject of this OEM design-in guide, as the CosmoPolis standard driver was an intermediate solution.

2.4 Philips CosmoWhite system operation

2.4.1 Starting characteristics

A resonant ignition voltage of typically 2.2 kVp is used by the CosmoWhite Xtreme driver to ignite the CosmoWhite lamp. Pulses are applied to the lamp with a certain on/off sequence (burst mode) with a total duration of maximum 20 minutes (to allow warm restart of the lamp, and at the same time prevent problems with an end of life lamp). The Xtreme drivers are not fully compatible with 24h/7 days operation. For details please contact your Philips representative.

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 visualised in the run-up curves, see Figures 3 to 6.

CosmoWhite lamps do not re-ignite instantly. Warm re-ignition time is specified to be less than 15 minutes. The 45W lamp runs on 60W during the first 5 minutes of operation. During this period the 45W driver behaves like the 60W CosmoWhite Xtreme driver.

2.4.2 Lifetime performance of Philips CosmoWhite lamps

The lifetime of the lamp is targeted at 12.000 hours, with a maximum 10% failure rate and a lumen maintenance of 80%.

2.4.3 End-of-life behaviour of Philips CosmoWhite systems

2.4.3.1 End-of-life causes

The reasons why a CosmoWhite lamp can stop functioning after its specified lifetime are similar to the mechanisms for CDM-lamps:

- Due to chemical reactions between the arc tube filling and the PCA of the tube, 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 (“non-passive failure”). However, limited containment safety testing has not shown any non-passive failures with CosmoWhite lamps.
- If the arc tube becomes leaky, the lamp stops functioning. However, in some cases the lamp continues burning for a few hundred hours with a strongly deviating colour 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 lamp voltage can rise too much to be sustained by the driver. 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 60W lamp operating on a 140W system, will speed up the occurrence of the above-mentioned failure mechanisms. We advise to replace lamps whenever possible.

2.4.3.2 System behaviour at lamp end-of-life

When the arc tube becomes leaky and the fill gas flows into the outer bulb, a glow discharge will 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 driver that switches off the circuit after 20 minutes in case of a leaky lamp. We advise to replace end-of-life lamps whenever possible.

When the lamp voltage reaches a too high value, the driver will switch off the system. This way, disturbing cycling effects (lamps switching on and off continuously) are prevented. We advise to replace end-of-life lamps whenever possible.

2.4.4 Influence of mains voltage

Contrary to lamps operating on conventional systems, an electronic driver provides an almost constant power output ($\pm 2\%$) within the specified mains voltage performance range (198-254V). This is favourable for lamp life and energy consumption (no overpower situation possible). In Figure 7, the lamp power as a function of mains voltage is visualised.

In case of mains voltage below this specified performance range of the driver (see driver specification) the driver operates the lamp on a lower power. When the mains voltage drops below 160V, the driver shuts down. When the mains voltage rise above the 320V, the driver shuts down.

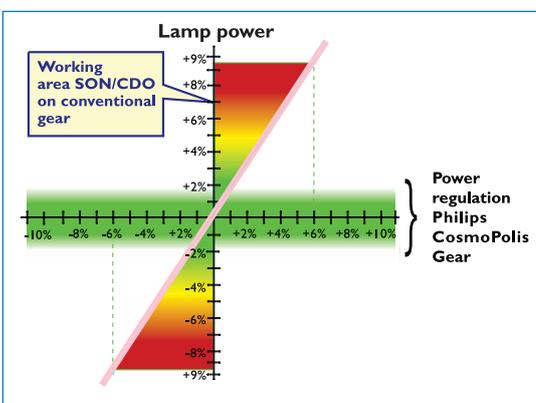


Figure 7: Lamp power as function of mains voltage

3. Luminaire design for Philips CosmoPolis systems

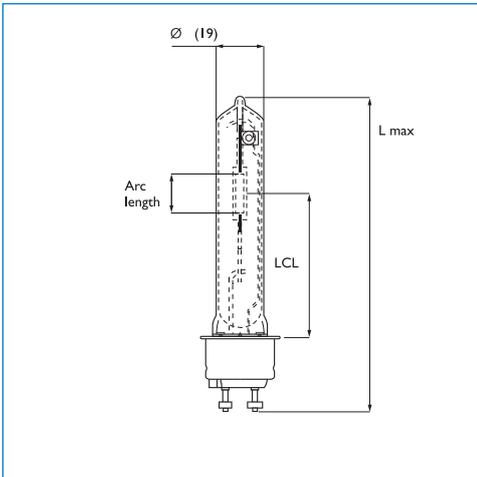


Figure 8: Philips CosmoWhite

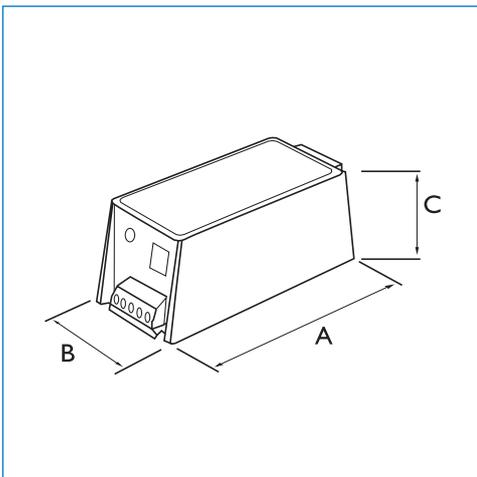


Figure 9: HID PrimaVision Xtreme

3.1 Introduction

The CosmoPolis system is designed to offer optimal light distribution, energy saving and miniaturisation. To facilitate designing luminaires for CosmoPolis systems the critical points of the lamp and driver are put down in this chapter, together with hints how to prevent problems with these points.

3.2 IEC recommendations

The general recommendations for luminaire design by IEC and the national safety regulations (ENEC, CE, ANSI etc.) are also applicable to CosmoPolis systems. Lamp related data can be found in IEC 61167. The luminaire manufacturer is advised to conform to the international standards of luminaire design (IEC 60598-Luminaires).

3.3 Dimensions lamps and driver

3.3.1 Lamp dimensions

The arc tube and lamp dimensions of the different lamp types are given in the table below. See also Figure 8.

	Philips CosmoWhite 45W	Philips CosmoWhite 60W	Philips CosmoWhite 90W	Philips CosmoWhite 140W
Light centre length (LCL) (mm)	59	59	66	66
Arc length (mm)	15	15	18	23
Total lamp length (mm)	132	132	140	147

Table 3

3.3.2 Driver dimensions (Philips PrimaVision Xtreme)

HID PrimaVision Xtreme (Figure 9)

	A	B	C
Philips HID-PV Xt 45 /S CPO-TW	135mm	65mm	65mm
Philips HID-PV Xt 60 /S CPO-TW	135mm	65mm	65mm
Philips HID-PV Xt 90 /S CPO-TW	150mm	65mm	65mm
Philips HID-PV Xt 140 /S CPO-TW	150mm	65mm	65mm
Philips HID-DV LS6/8/10 60 /S CPO-TW	135mm	65mm	65mm
Philips HID-DV LS6/8/10 90 /S CPO-TW	150mm	65mm	65mm
Philips HID-DV LS6/8/10 140 /S CPO-TW	150mm	65mm	65mm

Table 4

3.4 Maximum operating temperatures

3.4.1 Lamp temperatures

3.4.1.1 Measurement set-up for lamp temperature measurements

All lamps and measurement connections must be electrically insulated to withstand the maximum ignition pulses of 5kV max. for HID-PV CPO-TW and typically 2.2kV for the HID-PV Xtreme drivers. The lamps have to be operated on the appropriate Philips driver (see chapter 2). No sleeves have to be used around the lamps for the measurements.

3.4.1.2 Choice and fixation of thermocouples

For the measurements as referred to in this document, NiCr thermocouples are used. Lamps with thermocouples connected can be ordered in Turnhout via the Philips sales organisation.

The fixation of the thermocouples on the lamp is done by engraving a small depression in the outer bulb. The junction point of the thermocouple is located in this depression.

For a better fixation of the thermocouple, the two wires are twisted at the opposite side of the lamp and are fixed at the sides with a high temperature cement.

The critical temperatures of the lamp must be measured on a burning lamp. The critical points and the corresponding temperatures for the different lamp types are given in the next sections.

3.4.1.3 Critical temperature points and values

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 lifetime 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 lamp. 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 on the pinch at the spot where the joint is between the outer lead and the molybdenum foil (see Figure 10). This temperature is most critical in the base-up burning position.

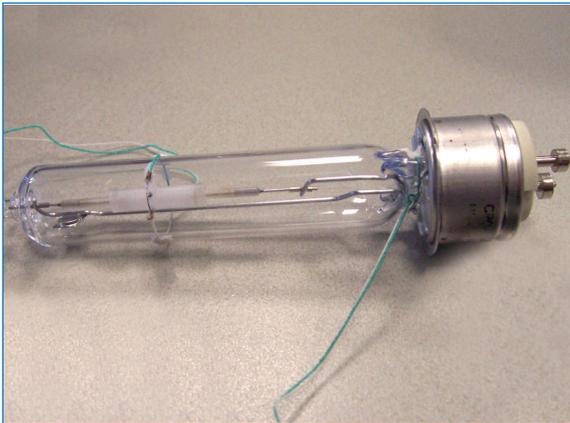


Figure 10: Thermocouple connected to bulb and pinch

Since this point is not accessible any more when the lamp base is mounted on the lamp, related temperatures are given just below the lamp base. Lamps should be stabilised for at least ten minutes prior to the measurement.

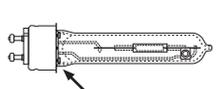
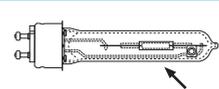
	Maximum temperature for	Philips CosmoWhite 45W	Philips CosmoWhite 60W	Philips CosmoWhite 90W	Philips CosmoWhite 140W
	Pinch (measured above lamp base)	300°C	300°C	300°C	300°C
	Bulb at LCL	380°C	400°C	470°C	550°C

Table 5

¹ In previous versions of Philips OEM guides, the cool-down method was advised for measurement of the lamp temperatures. The argument for the use of this method compared to measurement on burning lamps, was the fact that the influence of heating of the thermocouple by direct radiation by the lamp would be excluded. However, with the current thermocouples the amount of radiation captured by the small thermocouple junction surface is so small that it can be neglected.

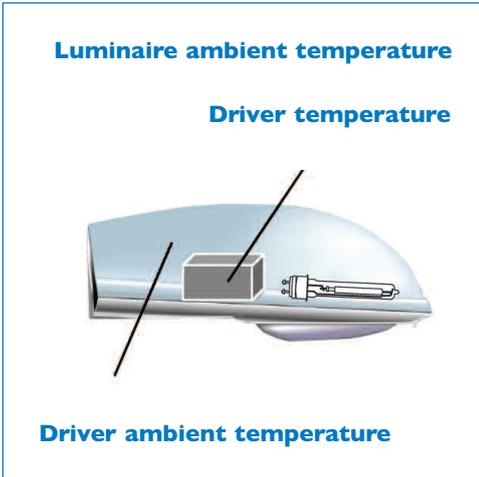


Figure 11

3.4.2 Electronic driver temperatures

The temperature of the electronics is the most important parameter for lifetime and reliability of the system. 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 driver for temperature are:

- electrolytic capacitor
- solder joints
- maximum temperatures of components

Definitions

Driver temperature: temperature measured on the Tc point of the driver.

Driver ambient temperature: temperature inside the luminaire around the driver.

Luminaire ambient temperature: temperature outside the luminaire. (see Figure 11)

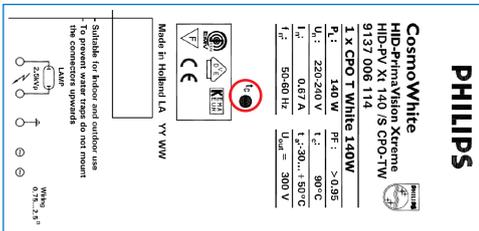


Figure 12

Temperature

To enable temperature measurement in a luminaire without measuring the individual components in the electronic driver a Tc point has been defined (see Figure 12). This point, or the indication where this point is located can be found on the label of the electronic driver. The specified temperature of this point is related to temperatures of components and solder joints inside the electronic driver.

How this point is related to the component and solder joint temperatures is schematically shown in Figure 13.

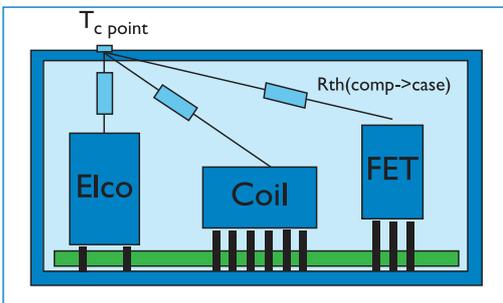


Figure 13

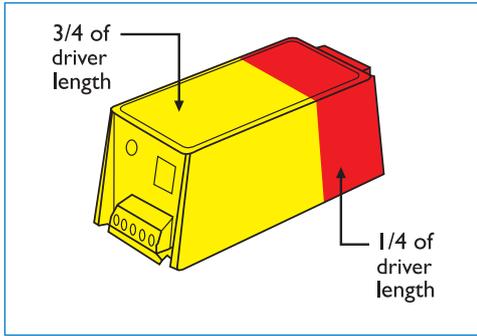


Figure 14

The Tc point specification of the CosmoPolis Xtreme driver has a lower temperature value than the Tc point spec of the former range of electronic outdoor products. This is related to the fact that the Xtreme driver has less power losses and that the Tc point is at a different location in the Xtreme products. These two points together ensure a longer lifetime.

In the definition of the Tc point a homogeneous temperature around the driver is assumed. In luminaires, especially compact versions, the temperature around the driver is not always homogeneous due to the heat from the lamp. If the temperature around the driver is not homogeneous it is advised to also measure the following points, indicated in Figure 14 to the left.

Any point in the yellow part of the driver: $< T_c$ (for required lifetime).
 Any point in the red part of the driver: $< T_c$ (for required lifetime) -5°C .

The temperatures as stated above are only valid for a situation where the driver is only cooled via the bottom surface. If additional cooling measures are used, please contact your Philips for advise.

Example:

If in the application the Tc point is 80°C ($=T_c$ at which the lifetime spec of 60.000 hours with 95% survivors is reached for CosmoWhite Xtreme driver) any point in the yellow part must be 80°C or lower and any point in the red part must be 75°C or lower to achieve the specified lifetime at $T_c=80^\circ\text{C}$.

Tc temperature and value on the Xtreme driver

Tc is specified at 80°C on the lable of the CosmoPolis Xtreme drivers. At this temperature the lifetime of 60.000 hours with 95% survivors is reached. At 90°C the thermal protection will switch off the driver. The driver will start trying to reignite the lamp as the driver has cooled down to 80°C .

Operating or even storing the driver at temperatures above 80°C will shorten the lifetime of the product, so we strongly advise take all the measures to avoid this possibility. When operating the driver at temperatures well below 80°C the lifetime expectancy of the product can slightly increase with a few 10.000 hours with the same failure rate. This is however a statistical calculations and only the real application.

Advise to obtain maximum lifetime possible:

- Ensure good thermal contact between driver and coldest spot of luminaire CosmoPolis Xtreme driver is designed to comply with all requirements for Class I and Class 2 applications hence direct contact with the metal parts of the luminaire are allowed.
- The CosmoPolis Xtreme driver has heat producing components both in the upper and lower part of the driver. Therefore cooling via the bottom only may not give the optimal result. For optimal result it is advised to also cool the sides of the driver, including the upper part of the sides. Be aware that for proper verification of driver temperature in this case a driver with thermocouples supplied by Philips is needed ask your Philips representative for advise.
- Shield the heat of the lamp and reflector. The best is a two chamber solution, or special measures to transport heat via air flow away from the driver.

NB: The Tc temperature limits mentioned here and on the driver label are leading over maximum AMBIENT temperature values mentioned on the driver label!

Ignition is possible from -20°C upwards. At very low temperatures it can take a bit more time to ignite the lamp.

3.5 Influence of ambient temperature on the lamp

In general, HID-lamps are not sensitive to ambient temperatures as for example fluorescent lamps can be, where the ambient temperature influences the cold spot temperature and by that the free availability of the mercury in the lamp.

3.6 Lamp base and lamp holder

CosmoPolis is equipped with a PGZ12 lamp base and holder. A list of the lamp holder suppliers and the most important technical data is given in the appendix of this guide.

This lamp-holder combination is designed for the CosmoPolis system with the following properties:

- The cap is polarised, which means it has pins with different diameters (see Figure 15), such that it can only be inserted in the lamp holder in one unique way. This implies that:
- For the HID-PV 140/S CPO-TW and HID-PV 60/S CPO-TW the ignition impulse is always applied on the short pole of the lamp. The symbol on the lamp holder and driver contacts indicates how to connect the wires properly. The lamp output of Xtreme driver is not polarity sensitive in respect to the lamp. The ignition pulse has a symmetrical character.
- The lamps can always be mounted in the same position in the optics (i.e. with the long frame wire at the bottom if burning horizontally). The holder is equipped with a special feature to define its orientation in the luminaire (marked with arrow in Figure 16)
- Good electrical interface between lamp cap and lamp holder needs to be according IEC60838-1 (miscellaneous lamps holders - Part I general requirements and tests, Section 15: Endurance), realised by proper material choices



Figure 15



Figure 16

- The PGZ12 is a “pre-focused” lamp base, which means that the burner is aligned with the reference plane of the cap before fixing the bulb in the cap. Additionally, the specific fit of the cap in the holder (reference plane of cap is pulled against upper rim of 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-caps or G12 caps. This ensures an optimised optimal efficiency in road/street lighting optics as described before
- The twist and lock concept guarantees an optimal fixation of the lamp in the luminaire, also in high vibration applications

Note 1: All CosmoPolis lamps use the same PGZ12 lamp cap and holder, without any key to prevent a misconnection. A misconnection of lamp and driver (for example a CosmoWhite 45W lamp on a CosmoWhite 140W driver) can cause lamp or very rarely driver failure. In Table 6 below, the effects that occur in all possible combinations of the different CosmoPolis lamps and drivers are listed. No safety issues are encountered in any of these situations.

Note 2: Lamp should be held by the quartz bulb, not by the metal lamp base, while inserting the lamp.

	Philips CosmoWhite 45W driver	Philips CosmoWhite 60W driver	Philips CosmoWhite 90W driver	Philips CosmoWhite 140W driver
Philips CosmoWhite 45W lamp	Ok	Stable lamp operation at 60W (overpower!). Lifetime of lamp will be reduced.	Stable lamp operation at 90W (overpower!). Lifetime of lamp will be reduced.	Stable lamp operation at 140W. Lifetime of lamp will be reduced drastically. Extinguishing is possible.
Philips CosmoWhite 60W lamp	Stable lamp operation at 45W.	Ok	Stable lamp operation at 90W (overpower!). Lifetime of lamp will be reduced.	Stable lamp operation at 140W. Lifetime of lamp will be reduced drastically. Extinguishing is possible
Philips CosmoWhite 90W lamp	Stable lamp operation at 45W, but greenish colour appearance (too low power). Lamp extinguishing is possible.	Stable lamp operation at 60W.	Ok	Stable lamp operation at 140W (overpower!). Lifetime of lamp will be reduced.
Philips CosmoWhite 140W lamp	Stable lamp operation at 45W, but greenish colour appearance (too low power). Lamp extinguishing is possible.	Stable lamp operation at 60W, but greenish colour appearance (too low power). Lamp extinguishing is possible.	Stable lamp operation at 90W.	Ok

Table 6: The effects that occur in all possible combinations of the different Philips CosmoWhite lamps and drivers.

3.7 Guidelines to comply with norms

3.7.1 Lamp handling

Fingerprints on metal halide lamps in a quartz outer bulb (including Philips CosmoPolis lamps).

When low wattage quartz metal halide lamps were introduced it was stated that the lamp should be cleaned with alcohol if it was touched by bare fingers. This was based on the story that for halogen lamps, where the quartz wall temperature is much higher during the burning of the lamps: the grease and acids of the fingerprints are burning into the quartz at these temperatures. This has an influence on the light distribution of the lamp and can result in a possible short life as the quartz is weakened.

However, the maximum temperature of the outer-bulb of metal halide lamps in quartz bulb is much lower (e.g. max < 550°C for a 140W CosmoWhite lamp). In life tests it appeared that after a few hundred hours all fingerprints were gone. For this reason, the phrase in the instructions for use ('wipe-off the lamp with alcohol in case of fingerprints') was removed from the instructions for use for CDM and CosmoPolis lamps.

Information as stated in the lamp instruction leaflet can be found in appendix 2.

3.7.2 UV-related data

The CosmoPolis lamps are equipped with a UV-block quartz outer bulb, thus drastically reducing the UV-output of the lamps. It must be clear that UV-block lamps have a reduced UV-output and that the UV is not completely eliminated.

The UV-block of the outer bulb is not done by a special filter or layer on the quartz but by adding a dope of some metals in the component mix that is used for the manufacturing of the quartz in the furnace.

The amount of UV that is emitted by the CosmoPolis lamps, can be expressed using two related quantities, i.e.

- The Permissible Exposure Time (PET), that indicates the maximal time a human being can be exposed to the light source without risk for harming skin or eyes. From the spectral power distribution of the light source and an assumed luminance level of 1000 lux, the PET value can be calculated
- For the CosmoPolis lamps, the PET values are far above 24 hrs/klux (actually > 1000 hrs/klux) and therefore no restrictions on the front glass are required with respect to UV-filtering
- The damage factor, that gives an indication for the risk of fading of the illuminated goods by the emitted UV-light. The damage factor for all CosmoPolis lamps is smaller than 0.3

All UV-data are summarised in Table 7. Complete UV-spectra can be obtained on request.

Philips CosmoWhite UV data					
Lamp	Damage factor	PET (h/klux)	UVA_1m_cpi $\mu\text{W}/\text{cm}^2$	UVB_1m_cpi $\mu\text{W}/\text{cm}^2$	UVC_1m_cpi $\mu\text{W}/\text{cm}^2$
Philips CPO-TW 45W/628	0.10	1200	4	0	0
Philips CPO-TW 60W/728	0.18	800	11	0	0
Philips CPO-TW 90W/728	0.18	800	17	0	0
Philips CPO-TW 140W/728	0.17	1050	23	0	0

Table 7: Nominal measured UV-data

For the not dimmed LumiStep systems, the same values as for the CPO-TW lamps are valid.

3.7.3 EMC Philips CosmoWhite

The CosmoWhite Xtreme driver operates the lamp on a low frequent square wave. When designing in the driver in to the luminaire the guidelines below can be useful to optimise the EMI performance.

1. Keep the mains cables (L and N) close together
2. Route the mains cables immediately away from the driver.
Preferably do not route the cables along or on top of the driver.
3. Keep the lamp cables close together and as short as possible
4. Do not put the lamp cables close to the mains cables

This is schematically shown in Figure 17.

5. Always connect the functional earth to metal parts of the luminaire - independent of Class I or Class 2 application - to ensure best EMC behaviour and ensure maximal lightning protection. Connection cable should be as short as possible.

3.7.4 Remote lamp operation

Remote operation is a name for all applications in outdoor lighting where the driver is not incorporated in the luminaire.

Two technical aspects are determining whether a remote application is possible or not.

First of all the ignition voltage peak is influenced by the cable properties. This means the peak voltage is flattened by the cable capacity. Depending on the insulation material some part of the ignition energy can even be absorbed by the cable. In general the cable capacity is leading. The CosmoPolis Xtreme driver is capable of driving a cable capacity up to 1000 pF. For an average cable type with a capacity of 100 pF/m this means remote lamp operation with 10 meters of lamp cable are feasible.

On the other hand the system has to be compliant with the EMI regulations. The assembly of the luminaire, the lamp cabling, the pole and the driver are influencing the EMI behaviour. In general the closer the two lamp conductors are placed together the lower the EMI radiation. So it is advised to use a cable instead of two separate wires. A second point of attention is the stray capacity of the lamp conductors to the environment. Composite or wooden poles have the advantage of a low spreading capacity. Aluminium or steel poles are picking up more noise from the lamp cables. This disturbance has to be redirected to the driver by a short connection of the metal pole to the functional earth terminal on the driver. However if the level of disturbance picked up by the pole is too high, the application will not be compliant with the EMI regulations. For the same reason screened lamp cables are dissuaded. Conclusion: Remote operation can be possible but is not advised. EMI of the complete system has always to be checked.

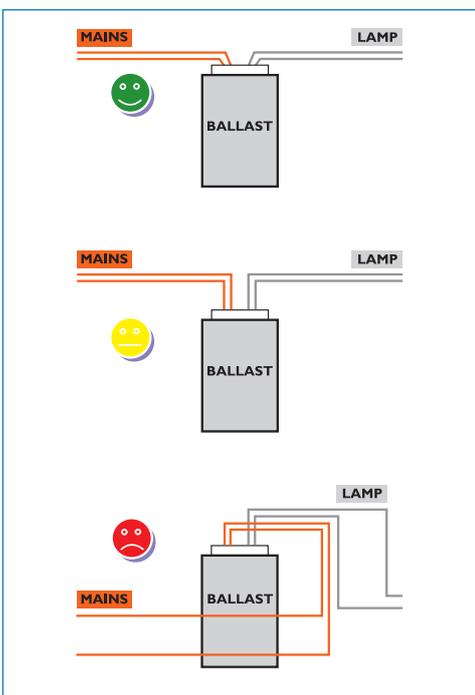


Figure 17: Ballast wiring in luminaire

Remark: In case of pole mounting the driver should always be mounted with the connectors in the downward direction. This prevents moisture from entering the connector block.

3.7.5 Lightning stroke protection

The CosmoWhite Xtreme driver is provided with a lightning stroke protection circuit at its mains entrance. This protection is enabled only when large metal parts of the luminaire, like the bottom plate, is connected to the functional earth contact of the driver, independent on Class I or 2. The protection is capable of absorbing at least ten times a common mode surge of 10kV/5kA (defined in EN61000-4-5 as a bi-wave surge). The protection gives a substantial improvement in the survival rate after a lightning stroke. Absorption of the current will limit the surge voltage in amplitude and duration and is therefore very essential for the robustness of the product.

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 driver must be >8mm, and preferably >10mm
- The lamp wires must have the classification 'double insulated' or 'reinforced insulation'

This is the case for both Class I and Class 2 luminaires. If no 'double insulated' or 'reinforced insulation' lamp wire is used an additional insulation sleeve has to be used to provide sufficient insulation.

The surge caused by the lightning stroke will raise the whole system, mains supply, driver, wiring and lamp in voltage. During this high voltage surge the level can reach values up to 8kV. Before the protection will bypass this surge to the ground terminal of the driver, no component of the system is allowed to breakdown. Otherwise this breakdown can lead to permanent damage. Therefore the distances of minimum 8mm are required.

The protection circuit will bypass the surge current to the functional ground terminal of the driver. In a Class I application this contact is not only connected to metal structures of the pole/luminaire but also to safety earth. It is important that this current can flow as direct as possible back to ground. For that reason, the ground contact of the driver must be connected to large metal parts of the luminaire and if possible also to the metal pole.

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

In Figures 18 to 26, luminaires with metal, wooden and concrete poles are shown and it is indicated how the wiring should be done in those different cases.

Metal pole

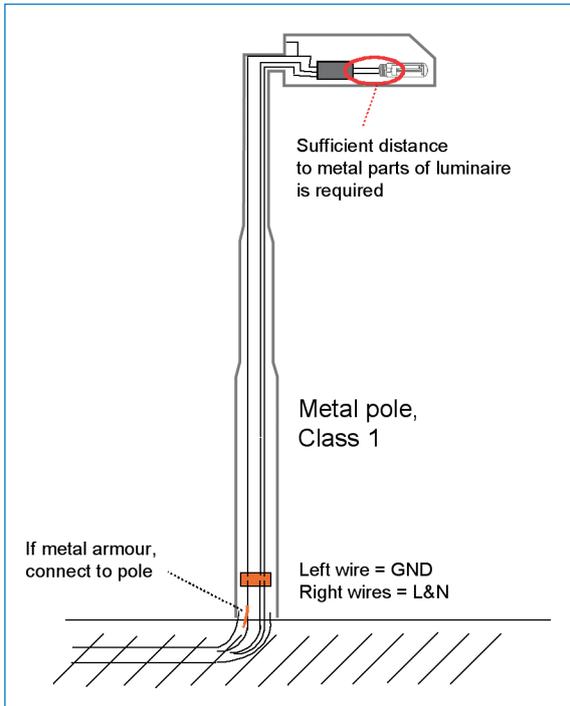


Figure 18

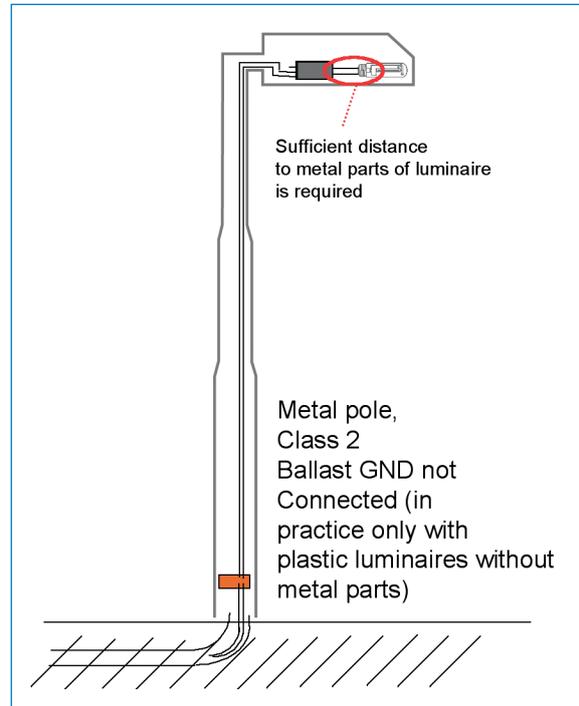


Figure 19

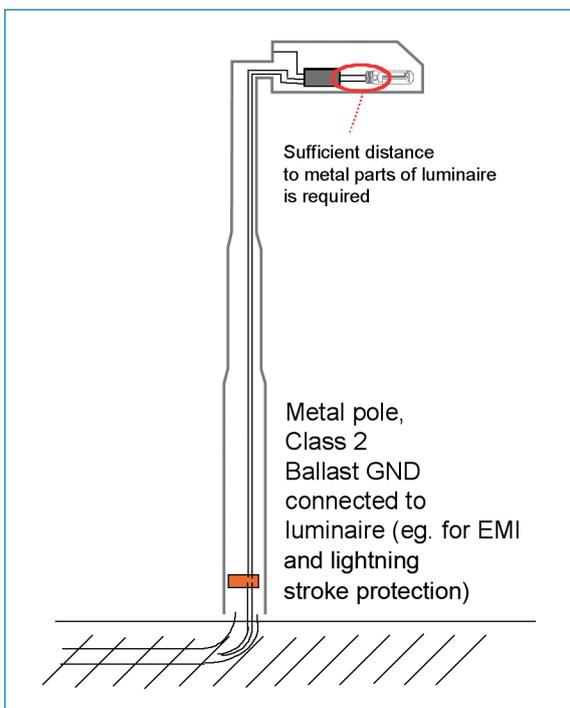


Figure 20

Wooden pole

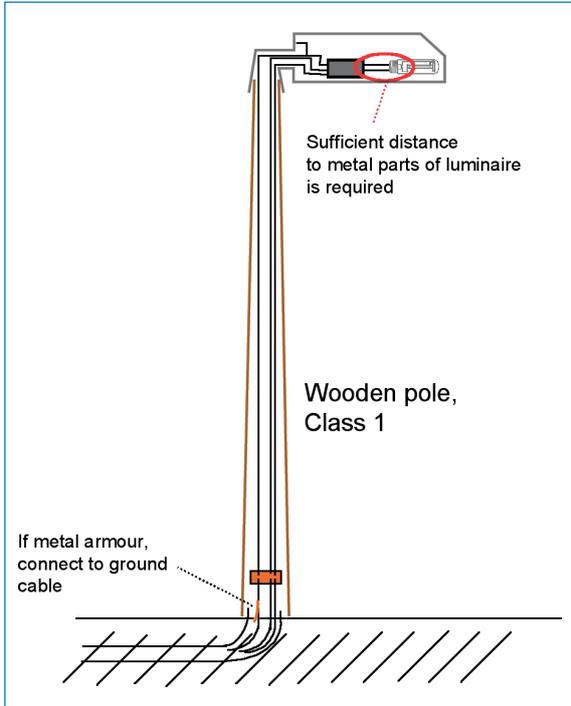


Figure 21

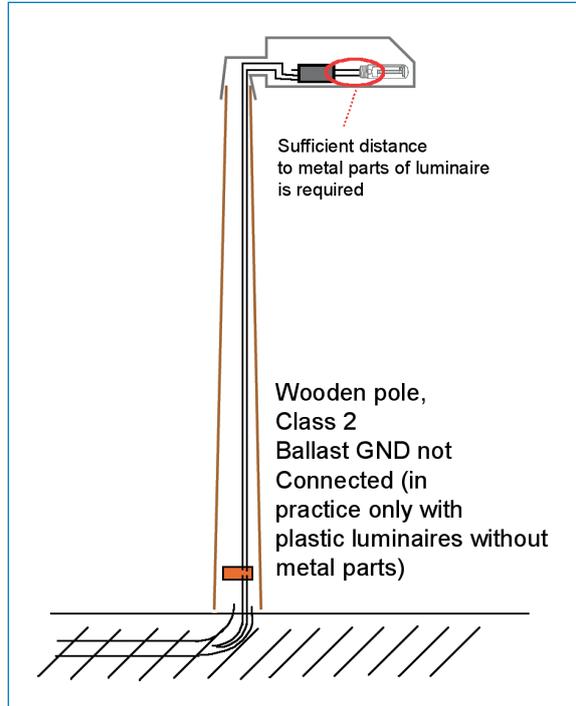


Figure 22

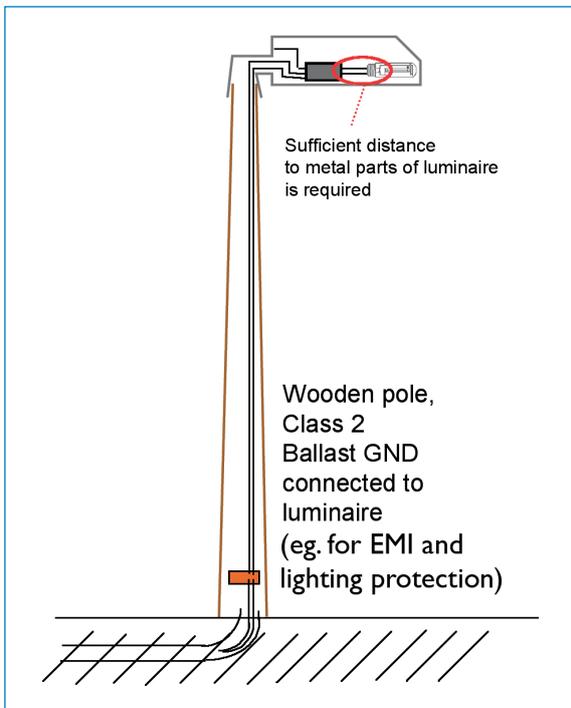


Figure 23

Concrete pole

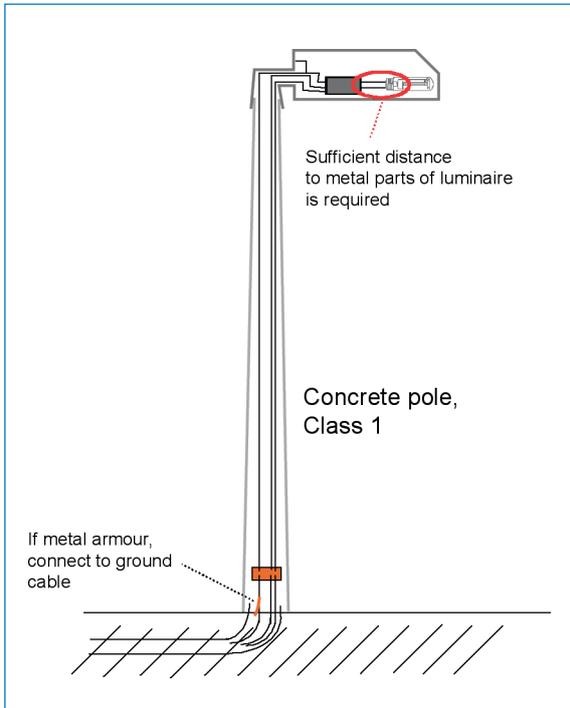


Figure 24

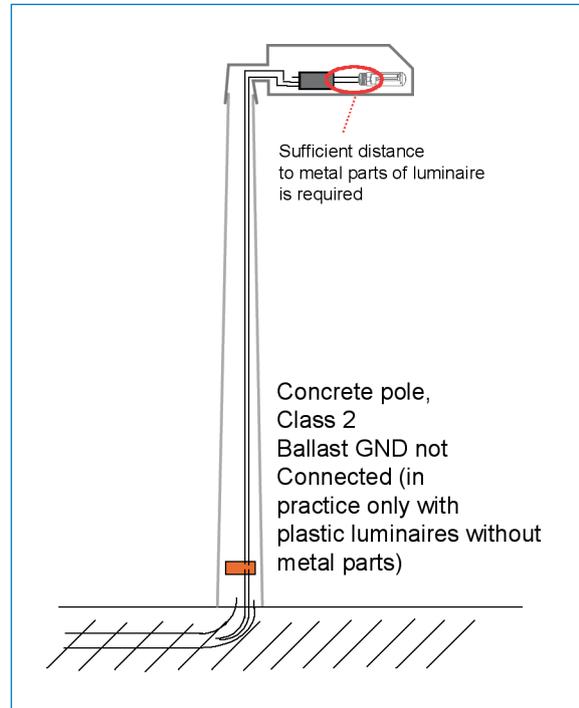


Figure 25

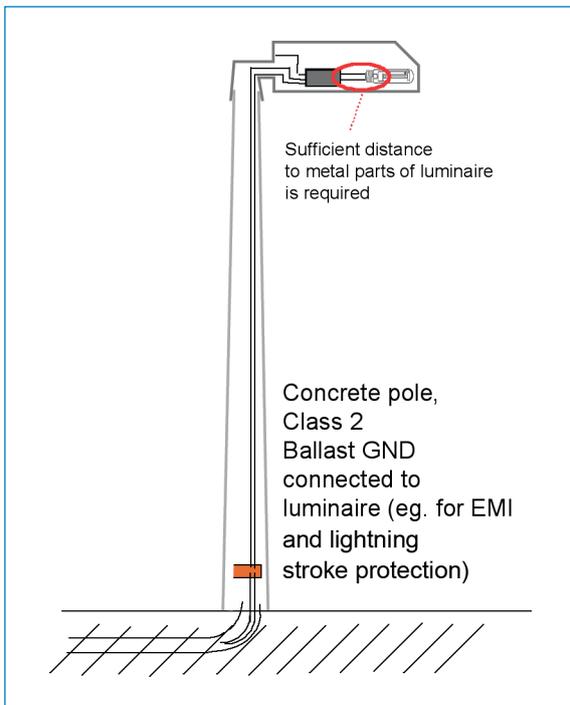


Figure 26

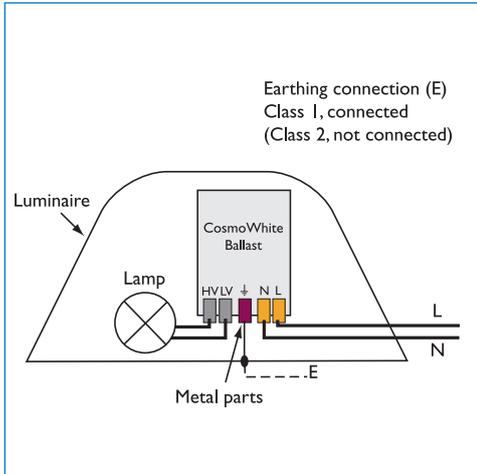


Figure 27

3.8 Class I and Class 2 applications

The CosmoPolis Xtreme driver is designed to comply with Class I and Class II applications. In the two next paragraphs, you will find more information about the design-in.

Looking from the mains side, the differences between Class I and Class II are as follows:

In a Class I application the mains always has a safety earth conductor. The safety of the system is guaranteed by connecting all touchable metal parts to safety ground.

In a Class II application no safety earth conductor is present. The safety of the system is guaranteed by preventing touchable metal parts to become live. Reinforced or double insulation will do this.

3.8.1 Class I

In Class I applications all touchable metal parts are connected to safety ground. This prevents the parts to become live in case of a failure. First of all the voltage is limited to a low, safe level. After a short time, the fuse protecting the mains will blow or the MCB will trip. The functional ground terminal has to be connected to the metal structure for EMC and surge voltage protection reasons. By doing so, the functional ground of the driver is connected to safety earth. But the connector on the driver still has only a functional purpose and is not safety related.

3.8.2 Class 2

In Class II applications no safety earth is present. Hence a singular fault can never cause touchable metal parts to become live. The circuitry inside the driver provides an insulation value to meet Class II specifications. Connecting the functional ground terminal to the metal structure for EMC and surge voltage protection reasons will not violate Class II regulations. The ground terminal of the driver has only a functional ground purpose.

The housing of the CosmoXtreme driver is also meeting the Class II specifications, except for the mechanical/electrical connection of wires. OEM is responsible for strip length and connection of wires.

Important notice:

By following the advice below, the system will comply to Class I or II regulations and will have maximum performance on EMC and surge voltage protection.

- The distance of bare parts of the mains conductors to any metal part should be at least 8 mm, preferably 10 mm.
- The distance from bare parts of the lamp circuit to any metal part should be at least 8 mm, preferably 10 mm.
- All wiring should be of the double or reinforced insulation type
- All metal parts of the luminaire should be connected to the functional earth terminal of the driver regardless Class I or Class II applications.
- Putting a sleeve around the lamp wires can provide extra insulation in case of surge voltages and keeps the conductors together for EMC at the same time.

The dotted line (see Figure 27) shows the difference between Class I and Class II.

3.9 Containment safety

As for CDM-lamps, the chance for non-passive failure of the CosmoWhite burners at end-of-life (by e.g. wrong driver choice or short circuit situation) cannot be excluded. When the burner shatters, this can lead to cracks or even shattering of the outer bulb. Therefore, we prescribe that CosmoWhite lamps must be operated in fully enclosed luminaires, able to contain all the broken hot parts of the lamp.

However, it must be noted that the occurrence of non-passive failures is very unlikely (not observed yet).

3.10 Optical design

The surface finishing of the reflection material to be used for the CosmoPolis lamps should be faceted, patterned or mat. These surfaces will mix the light from the arc to a more homogeneous beam. Arc colour differences exist due to the different molecular weights of the metals and deposits of the metals in the bottom of the burner that will be projected in the beam, so the reflector needs to mix the light well.

The volume of the optical system is also important. If this volume is too small, both lamp and driver will run too hot and will experience short life. Critical temperatures as specified in section 3.4 should be taken into account to guarantee the life specifications for lamp and driver.

Reflection surfaces parallel to the lamp are not allowed, as they will reflect the heat of the lamp back to the parts inside the lamp. The critical parts are: the whole 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.

The burner is sensitive to any extra heat load at both ends. This might overload the seals, causing a crack in the ceramic or leaky glass seal. The body cannot have an extra thermal load as it will accelerate certain chemical processes inside, leading to shorter life of the lamp.

The question is: "How to ensure that no design mistakes are made?"

First measure the lamp temperatures as explained in the beginning of this chapter. However, this gives only temperatures on the outer bulb, not inside the lamp.

As an extra check on the optical system, a cool-down curve of the lamp temperature can be made in the following way:
The temperature after switch off of the lamp should be recorded for about 20 seconds. In some cases a strong discontinuity in this curve after 1 to 3 seconds after switch-off can be found. This might be an indication of extreme heating of the thermocouple and hence the lamp surface by reflection from the optical system, which should be avoided.

For HID-lamps, often a comparative measurement of the lamp voltage inside and outside the luminaire is used to check whether the burner is not too hot. As the lamp is surrounded by a narrow reflector and/or housing, a lamp voltage rise can occur. For lamps operating on conventional electromagnetic driver, an increase of the lamp voltage in the luminaire results in a lamp power increase that leads to a further temperature increase of the arc tube and an even higher lamp voltage increase. For lamps operated on electronic driver such as CosmoPolis lamps, the lamp power is stabilised by the gear such that the voltage rise is much smaller.

For CosmoWhite lamps, it has been found that the lamp voltage does not increase significantly, as long as the reflector/housing is not too tiny, i.e. for bulb temperatures not exceeding the values in Table 5 (see section 3.4).

As such, for CosmoWhite lamps 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.

3.1 I Summary: Attention points for luminaire design

- All CosmoPolis lamps have to be operated in fully closed luminaires
- The lamp-luminaire combination must be tested in the most unfavourable situation in order to measure if certain points of the lamp (or luminaire) do not exceed the given limit temperatures
- Lifetime of the lamp will be shortened when a CosmoPolis lamp is burnt in an optic that is too small in volume or that is not well designed
- The CosmoPolis lamps are designed for universal operation, but the light-technical properties (e.g. colour temperature) are optimised for horizontal burning position. Therefore, light-technical properties in vertical burning position can slightly differ from the specified values
- For the optical system, the use of surface finishing mixing the light (e.g. faceted reflectors) is recommended
- For optimal lightning protection of the system make sure there is sufficient distance between parts in the luminaire connected to the lamp output on the driver and parts connected to the ground connection of the driver
- Make sure that the wiring inside the luminaire is as much as possible in line with the description in this guide

4. Philips CosmoWhite lamp specification and application information

4.1 Mechanical, electrical and application information

Range: The CosmoWhite lamps are available in 45W, 60W, 90W and 140W, with colour temperature 2800K.

System: Until now The CosmoWhite lamp is released for operation on the HID-PV Xt 45/S CPO-TW, HID-PV Xt 60/S CPO-TW, HID-PV 60/S CPO White, HID-PV Xt 90/S CPO-TW, HID-PV 140/S CPO White, HID-PV 140/S CPO-TW, HID-DV LS6/8/10 60 /S CPO-TW.

Values at 100h, horizontal burning	Unit	Philips CosmoWhite 60W (9280 885 05100)			Philips CosmoWhite 140W (9280 888 05100)		
		Nominal	Min	Max	Nominal	Min	Max
Bulb		UV Block quartz			UV Block quartz		
Base		PGZ12			PGZ12		
No of lamps per box		12			12		
Dimensions							
Bulb diameter max.	mm	19	20		19		20
Bulb length max.	mm	132	135	135	147		150
Light centre length LCL	mm	59			66		
Arc length	mm	15			23		
Light Technical Data							
Luminous flux (hor.)	Lumen	6850			16500		
Lumen maintenance 12000h(1)	%	80			80		
Colour temperature	K	2730			2860		
Chromaticity coordinates x/y	X/Y	0.453/0.402			0.444/0.401		
CRI		66			66		
Lamp efficacy	Lm/W	114			118		
UV output (PET)	h/klux		24			24	
Damage factor (Fd)				0.3			0.3
Electrical Characteristics							
Lamp power	W	60			140		
Lamp voltage (hor.)	V	92	85	99	94	88	100
Lamp current	A	0.652			1.490		
Ignition voltage	kV			5			5
Other Characteristics							
Ignition time	Sec			30			30
Run-up time(2)	Minutes			5			5
Re-ignition time	Minutes			15			15
Burning position		Universal(3)			Universal(3)		
Max. permissible bulb temperature	°C			400			550

Table 8: The specifications for the CosmoWhite 60W and 140W lamps

Philips CosmoWhite 60W (9280 885 05100)					Philips CosmoWhite 140W (9280 888 05100)		
System Characteristics	Unit	Nominal	Min	Max	Nominal	Min	Max
Net lamp weight	g	34			40		
Life Characteristics							
Service lifetime	h	12000			12000		
Lamp survival rate 12.000 h		90%			90%		

Table 8: The specifications for the Philips CosmoWhite 60W and 140W lamps

(1) Target data

(2) Time to reach 90% of rated lumen value

(3) Lamps can be operated in all positions, but with slightly deviating colour properties and lamp lifetime: When rotating the lamp from the horizontal towards the vertical position, the colour temperature will drop around 200K for the 60W and 300K for the 140W lamps compared to the horizontal data

Philips CosmoWhite 45W (9280 934 05100)					Philips CosmoWhite 90W (9280 935 05100)		
Values at 100h, horizontal burning	Unit	Nominal	Min	Max	Nominal	Min	Max
Bulb		UV Block quartz			UV Block quartz		
Base		PGZ12			PGZ12		
No of lamps per box		12			12		
Dimensions							
Bulb diameter	mm	19		20	19		20
Total lamp length	mm	132		135	140		143
Light centre length LCL	mm	59			66		
Arc length	mm	15			18		
Light Technical Data							
Luminous flux (hor.)	Lumen	4300			10450		
Lumen maintenance 12000h ⁽¹⁾	%	80			80		
Colour temperature	K	2720			2880		
Chromaticity coordinates x/y	X/Y	0.458/0.409			0.444/0.403		
CRI		60			66		
Lamp efficacy	Lm/W	96			116		
UV output (PET)	h/klux		24			24	
Damage factor (Fd)				0.3			0.3
Electrical Characteristics							
Lamp power	W	45			90		
Lamp voltage (hor.)	V	90	83	97	92	84	100
Lamp current	A	0.500			0.970		
Ignition voltage	kV			5			5
Other Characteristics							
Ignition time	Sec			30			30
Run-up time ⁽²⁾	Minutes			5			5
Re-ignition time	Minutes			15			15
Burning position		Universal ⁽³⁾			Universal ⁽³⁾		
Max. permissible bulb temperature	°C			380			470
Net lamp weight	g	34			37		
Life Characteristics							
Service lifetime	h	12000			12000		
Lamp survival rate 12.000 h ⁽¹⁾		90%			90%		

Table 9: The specifications for the Philips CosmoWhite 45W and 90W lamps

(1) Target data

(2) Time to reach 90% of rated lumen value

(3) Lamps can be operated in all positions, but with slightly deviating colour properties and lamp lifetime: When rotating the lamp from the horizontal towards the vertical position, the colour temperature will drop around 200K for the 45W and 250K for the 90W lamps compared to the horizontal data.

4.2. Luminous intensity distribution

Figures 28 to 35 show the light distribution for the CosmoWhite 45, 60, 90 and 140W in horizontal burning position.

G90 plane (horizontal plane, perpendicular to lamp axis)

C90 plane (vertical plane, perpendicular to lamp axis)

Goniophotometric measurement of the different CosmoWhite lamps. Lamp is burning horizontally, with the long stem directed to the lower side.

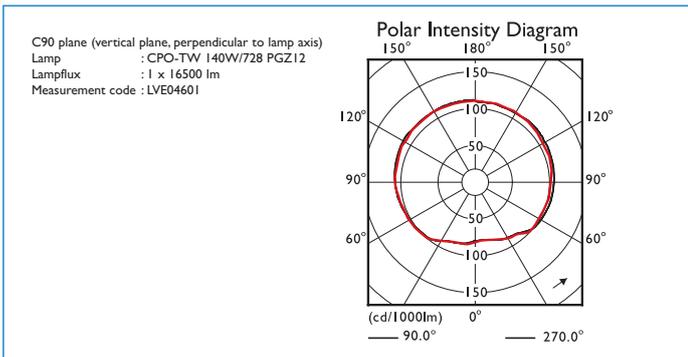


Figure 28

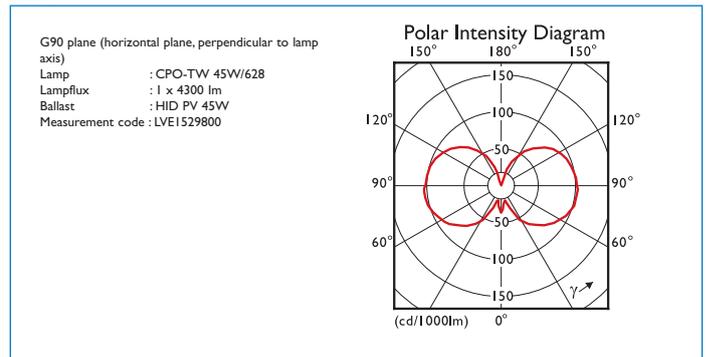


Figure 29

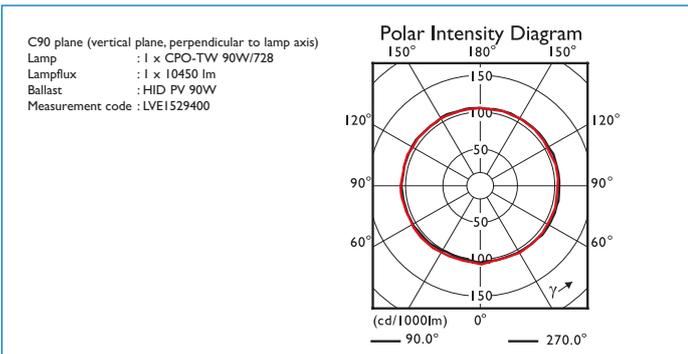


Figure 30

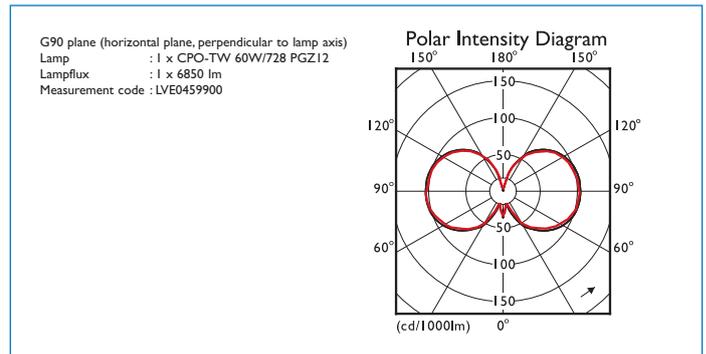


Figure 31

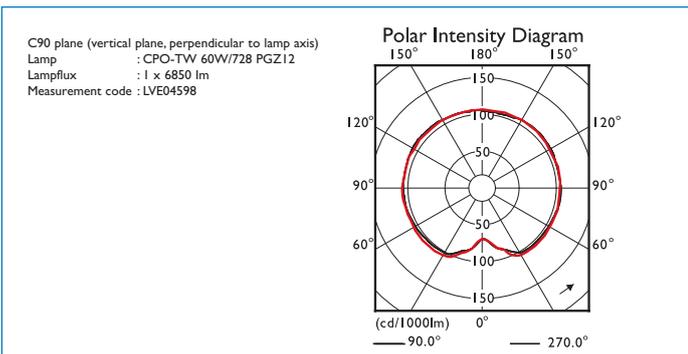


Figure 32

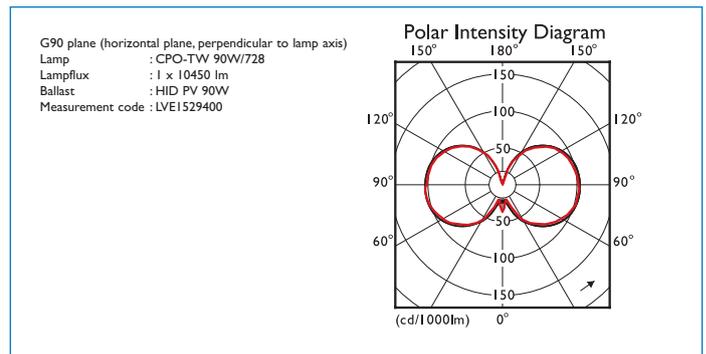


Figure 33

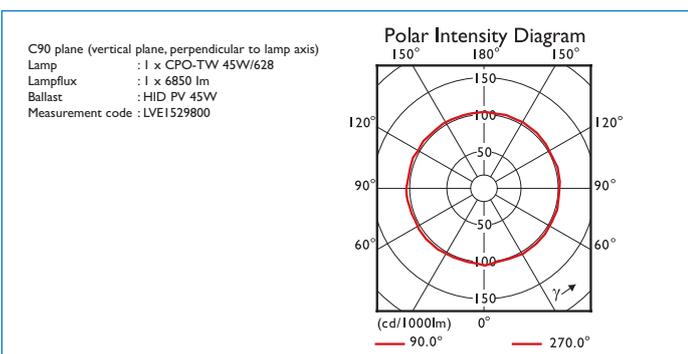


Figure 34

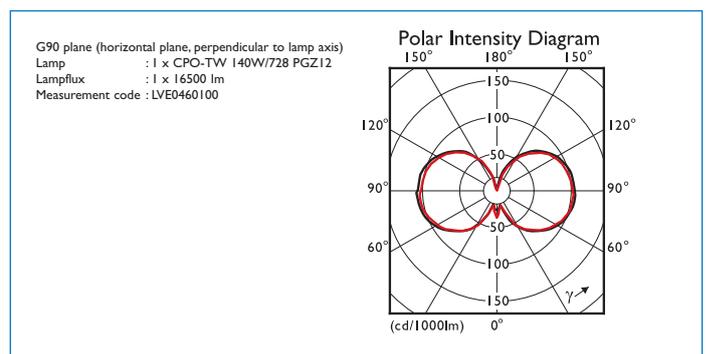


Figure 35

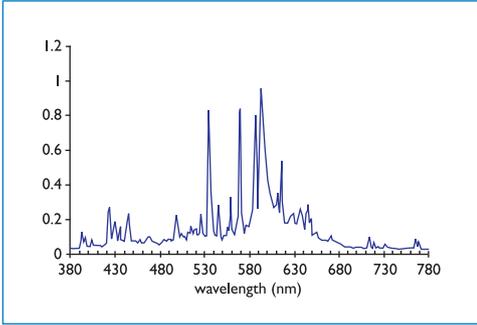


Figure 36: spectral power distribution CPO-TW White 140W

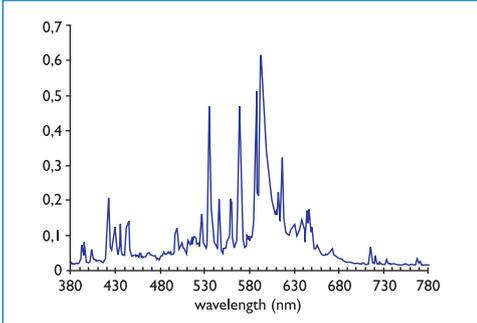


Figure 39: spectral power distribution CPO-TW White 90W

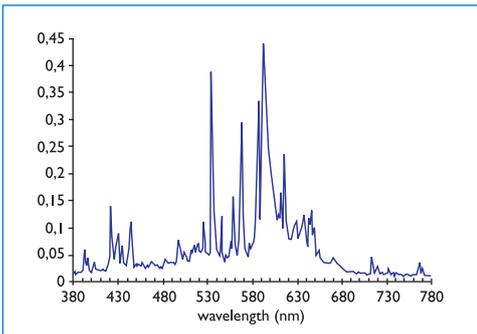


Figure 37: spectral power distribution CPO-TW White 60W

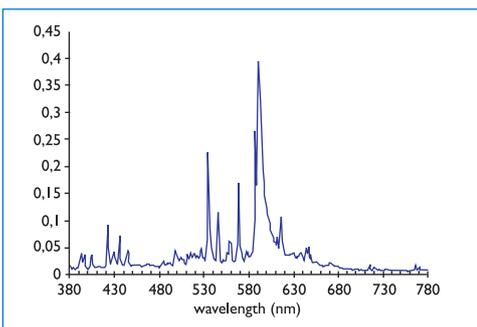


Figure 38: spectral power distribution CPO-TW White 45W

4.3. Spectral power distribution

For the spectral power distributions of CosmoWhite 41 40, 90, 60 and 45W see Figures 36 to 39.

4.4. Burning positions of the lamp

The CosmoWhite lamps are “universal burning”, which means that they can be operated in both horizontal and vertical applications. However, the light-technical properties are slightly different in vertical burning position compared to the horizontal position. When rotating the lamp from the horizontal towards the vertical position, the colour temperature, CRI, luminous efficacy and lamp lifetime drop compared to the horizontal data.

5. Driver specification and application

5.1 Class I and Class 2

The CosmoPolis Xtreme driver is designed specially Class II applications. The ground terminal on the driver is not a safety ground. This means this terminal is double isolated. It can be connected to any touchable metal part of the luminaire without violating safety regulations in Class II applications. The housing of this driver is providing double insulation. So it can be mounted directly on a metal surface of a Class II luminaire.

The ground terminal of the CosmoPolis Xtreme driver is a functional ground. It must be connected for EMI reasons to metal parts of the luminaire if there are any. This has to be done by a short conductor to make this measure effective.

The functional ground connector is also part of the lightning stroke protection of the driver. To prevent uncontrolled flash over from metal parts to the electronic system this terminal has to be used for full performance.

For information on design of the luminaire regarding this subject see Chapter 3.

5.2 Lightning stroke protection

The CosmoPolis Xtreme driver has a protection against 10 kV surges in combination with the ability to direct high currents with a short duration to ground. This decreases the number of failed products on a mains line in case of a lightning stroke.

The CosmoPolis Xtreme driver is capable of withstanding surges of 10 kV on the line and neutral in respect to ground. The driver is capable to handle this surge 10 times with a maximum of 5 kA and a pulse form of 8/20 microseconds. (EN 61000-4-5)

For information on design of the luminaire regarding this subject see Chapter 3.



Figure 41

5.3 Connector

- Lamp:
 - Grey connectors (Left hand side, Lamp hot, connection indicated on label)
- Mains:
 - Orange connectors (not polarity sensitive)
- Metal parts of luminaire:
 - Purple connector

Connector of the Xtreme gear is suitable for wires of 0.5 to 2.5mm² or AWG 20 to 12. Insulation must be stripped from the wire for 10 to 11mm.

Solid wires can be pushed in directly. Release the wire by pushing the release button and pulling the wire.

Stranded wires should be pushed in using the release button. Release the wire by using the release button and pulling the wire.

5.4 Operating in abnormal conditions

Temperature switch-off behaviour

If the CosmoPolis Xtreme gear is used at too high temperatures a so-called thermal protection will protect the driver against damaging. The driver will be switched off by this thermal protection.

The thermal protection becomes active at a driver T_c point temperature of 90°C. This is the minimum value it can be activated. There is a spread on the activation temperature. The minimum activation temperature must be used to determine at which luminaire ambient temperature the driver will switch off. The driver will switch on again once it has cooled down and reached T_c 80°C.

Over voltage

The Xtreme gear can withstand 320V for 48 hours.

Note that high mains voltages adversely affect driver lifetime. The Xtreme gear switches off in case the mains voltage exceeds 320V.

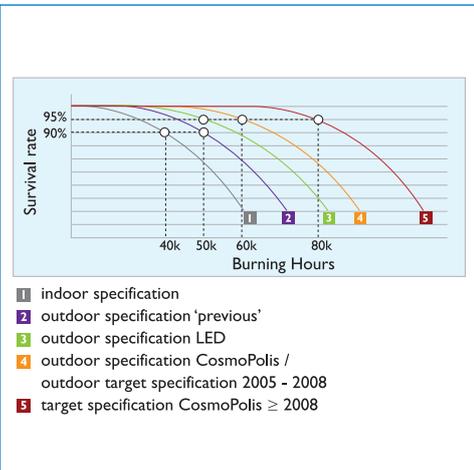


Figure 40

5.5 Differences in indoor and outdoor specifications

Type	Indoor products (in outdoor application)	Outdoor Xtreme products (in outdoor application)
IP luminaire classification	Advised luminaire classification > IP 54	Advised luminaire classification > IP 23
Aggressive air contaminations	Sensitive	Not sensitive
EMC-V_surge	IEC 1000-4-5	IEC 1000-4-5
	Installation Class 33	Installation Class 4
	1kV L to N	2kV L to N
	2kV L to Ground / N to Ground	4kV L to Ground / N to Ground
Vibrations	IEC-68-2-6-Fc	IEC-68-2-6-Fc
	Frequency range 10-150Hz	Frequency range 10-150Hz
	Acceleration/amplitude	Acceleration/amplitude
	2G/0.15mm peak	5G/0.15mm peak
Lifetime	50000 hours with 12.5% failures	60000 hours with 5% failures
EMC	EN 55015	EN 55015 adm 7.1
	EN 55022 (wish)	EMC @ T _{c_max}
		EMC with Class 2
Temperatures	0 - +50°C	-20 - +50°C
Housing	Class 1 Material: Aluminium, plastic	Class 2 Material: Plastic

Table 10: Differences in indoor and outdoor specifications.

The outdoor drivers withstand vibrations, humidity, mains transients and bugs and dust better than indoor drivers.

5.6 Installing cabling

Care should be taken when connecting the electronic driver. Be sure not to reverse lamp wiring and mains wiring. Avoid short circuit of the lamp circuit to ground during operation. Both failures will damage the product permanently.

Warning: Performing a combined (simultaneous) functional test and insulation test of the driver with reversed lamps and mains cabling can cause a severe safety risk.

5.7 Electronic driver specifications

5.7.1 Philips CosmoWhite Xtreme driver 140W, 90W, 60W and 45W

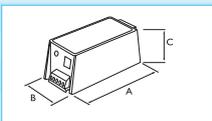
Philips CosmoWhite 140W Xtreme driver. Electrical and lighting datasheet for OEM						
Ordering and Packing Data	Unit	Nominal	Nominal	Nominal	Nominal	Nominal
PRID		HID-PV Xt 140 / S CPO-TW	HID-PV Xt 90 / S CPO-TW	HID-PV Xt 60 / S CPO-TW	HID-DV LS6/8/10 60 / S CPO-TW	HID-PV Xt 45 / S CPO-TW
No of drivers per box		12	12	12	12	12
Dimensions box						
Length	cm	27.5	27.5	40.1	40.1	40.1
Width	cm	17.1	17.1	15.6	15.6	15.6
Height	cm	22.8	22.8	16	16	16
Volume box	m ³	0.0107	0.0107	0.01	0.01	0.01
Weight box	kg	10.8	10.8	9.5	9.5	9.5
Dimensions						
A	mm	150	150	135	135	135
B	mm	65	65	65	65	65
C	mm	65	65	65	65	65
						
Electrical Specifications						
For lamp type		CPO-TW 140W	CPO-TW 90W	CPO-TW 60W	CPO-TW 60W	CPO-TW 45W
Nominal system power	W	152.5	99	67	67	51
Nominal lamp power	W	140	90	60	60	45
Powerloss	W	12.5	9	7	7	6
Mains Operation						
Nominal mains Voltage	V	220 - 240	220 - 240	220 - 240	220 - 240	220 - 240
With tolerances for performance	V	198 - 254	198 - 254	198 - 254	198 - 254	198 - 254
With tolerances for operation	V	160 - 264	160 - 264	160 - 264	160 - 264	160 - 264
Mains frequency	Hz	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60
Mains current at 230V	A	0.66	0.32	0.29	0.29	0.22
Power factor (nominal power)		0.95	0.95	0.95	0.95	0.95
Earth leakage current (per driver)	mA	0.204	0.204	0.23	0.23	0.23
Inrush Current						
Max. quantity of drivers per MCB, type B 16 A		5	5	8	8	8
Inrush current peak	A	56	56	29	29	29
Inrush current 1/2 value time	usec	420	420	500	500	500
Lamp Operation						
Lamp operation frequency	Hz	400	400	400	400	400
Ignition voltage	kV	1.9		2.2	2.2	2.2
Re-ignition timer	Minutes	20	20	20	20	20
End of lamp life protected?		Yes	Yes	Yes	Yes	Yes
Cable capacity	pF	1000	1000	1000	1000	1000
Wiring Parameters						
Wiring diameter on the mains side	mm ²	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5
Wiring diameter on the lamp side	mm ²	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5	0.5 - 2.5
Strip length	mm	10-11	10-11	10-11	10-11	10-11
Thermal Parameters						
Max. permissible case temperature	°C	90	90	90	90	90
Nominal max case temperature	°C	80	80	80	80	80
Ambient temperature range	°C	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-20 to +50
Failure rate at nominal case temp.	%/1000h	0.08	0.08	0.08	.08	0.08
Lifetime at nominal case temp. (Max. 5% failures)	hours	60000	60000	60000	60000	60000

Table 11

More information about the content of this paragraph can be found on the internet: <http://www.prismaecat.lighting.philips.com/ecat/>.

6. Dimming of CosmoWhite lamps

CosmoWhite lamps can be dimmed on its CosmoWhite Xtreme driver with LumiStep technology (see chapter 6). The lifetime and maintenance of the lamps do not change if the lamps are dimmed on these drivers.

Dimming level

CosmoWhite lamps are dimmable to 60% of the lamp power. If dimmed to 60% of the lamp power, the light level decreases to slightly less than 50% of the full power light level.

The 60W lamp is currently dimmable to 75% of its nominal power and is now available. Further dimming to 60% of the lamp power is targeted by mid 2009. The CosmoWhite 45W lamp is not dimmable.

Lamp	Nominal lamp power	Dimmed lamp power
CPO-TW 140W	140W	84W
CPO-TW 90W	90W	54W
CPO-TW 60W	60W	45W/36W

Performance

The nominal performance of the lamp at full power and dimmed is given in the table below. These values are obtained with 100 hours seasoned CosmoWhite lamps on a nominal CosmoWhite LumiStep driver.

"Values at 100h Horizontal burning"	Unit	60W		90W		140W	
		Nominal operation	Dimmed operation	Nominal operation	Dimmed operation	Nominal operation	Dimmed operation
Driver losses	W	6W	6.7W	8W	5.5W	11.5W	7.5W
Lamp Power	W	60W	45W	90W	54W	140W	84W
Luminous Flux	Lm	6850	4300	10450	4650	16500	7470
Lamp efficacy	Lm/w	114	96	116	86	118	89
Chromaticity coordinates x/y	X/Y	0.453/0.402	0.458/0.409	0.444/0.403	~0.444/0.403	0.444/0.401	~0.444/0.401
CRI		66	59	66	~57	66	~57
Colour temperature	K	2730	2720	2880	~2880	2880	~2880

Appendix 1: Suppliers of PGZ12 lamp holders

Manufacturer	Website
BJB	www.bjb.de
Bender and Wirth	http://www.bender-wirth.de/

Table 1.5: Suppliers of PGZ12 lamp holders

Appendix 2: Text lamp instruction leaflet

Instructions for installer/user

- Only use lamp in combination with appropriate electronic gear with end of life protection
- Only use lamp in combination with appropriate lamp holder (PGZ12)
- Before changing the lamp, switch off the mains power supply and let the lamp cool down
- When disposing of the old lamp, local regulations should be observed.
- When disposing an end of life CosmoWhite lamp, care should be taken that the outer bulb does not break since oxidation of metallic components could result in generation of sparks
- When inserting a new lamp, twist the lamp 45° clock-wise in the holder to ensure proper electrical and mechanical connection
- Lamp should be held by the quartz bulb, not by the metal lamp base, while inserting the lamp
- For safety's sake, remove the lamp immediately if the outer bulb is broken
- Because of the possibility of a burning lamp breaking, the lamp may only be used in completely closed fixture, even during testing
- In the highly unlikely event of lamp breakage by incorrect use, vandalism or end of life effects, the luminaire housing should be able to contain heated glass ceramic particles
- Scratches or damage to the lamp glass should be avoided. The lamp should be protected against contact with cold objects or water during burning
- It is recommended that the lamps be stored in cool, dry conditions in order to prevent the oxidation of the exterior metal parts
- The manufacturer accepts no liability for injury or damage resulting from incorrect use of lamp or from use of the lamp in combination with inappropriate equipment
- Consult your dealer if you have any questions

Notes



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