OEM GUIDE

Information for light fixture manufactures

CosmoPolis - CosmoWhite

Highly efficient - long lasting

OEM GUIDE for the use and application of Philips Cosmopolis-MASTER Cosmo White
02-03-2012 11:11:30

PHILIPS
sense and simplicity

Content

1. General information

1.1. 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 - DALI - Primavision.

Product features

• High system efficiencies: up to 120 lm/W for the lamp; up to 90% 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 optimization in design of optics and luminaires.

• Xtra long lamp service lifetime. Energy saving initially and over lifetime.

• A Green product to minimise environmental impact and CO_2 emission.

• Attractive white light.

1.2. Applications

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.

1.3. Product range

Table 1.1 Product range Lamps

CCT	K	
Type Wattage	CPO-T White/728	CPO-T White/840
45 W		
60 W		
90 W		
140 W		

Table 1.2 Product range Gears

	Gear						
	Electronic				Electromagnetic		Dimmable
Lamp		Built in luminaire	Placed on ceiling	PCB version			
CPO-TW 140W/728 CPO-TW 140W/840		HID-PV sXt 140 / S CPO 208-277V 50/60Hz 					HID-DV DALI Xt 140 /S CPO 208-277V 
CPO-TW 45W/728		HID-PV sXt 45 /S CPO 208-277V 50/60Hz 					HID-DV DALI Xt 45 /S CPO 208-277V 
CPO-TW 60W/728 CPO-TW 60W/840		HID-PV sXt 60 /S CPO 208-277V 50/60Hz 					HID-DV DALI Xt 60 /S CPO 208-277V 
CPO-TW 90W/728 CPO-TW 90W/840		HID-PV sXt 90 /S CPO 208-277V 50/60Hz 					HID-DV DALI Xt 90 /S CPO 208-277V 

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

2. Luminaire design

2.1. Introduction - IEC standards

The CosmoPolis system is designed to offer optimal light distribution, energy saving and miniaturisation. Lamp and gear should be used according to the following IEC norms.

Table 2.1 Related IEC standards.

Item	IEC/CISPR	Description
Radio Disturbance	CISPR15	Interference relating to lighting equipment
Lamp	61167	Metal Halide lamps
Luminaire	60598	Luminaires
Cap and holder	60838-1	PGZ12

2.2. General guidelines

2.2.1. Temperature measurement

2.2.1.1. Lamp Temperature

Introduction

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.

Measurement setup

All lamps and measurement connections must be electrically insulated to withstand the maximum ignition pulses of typically 2.2kV for the Xtreme drivers. The lamps have to be operated on the appropriate Philips driver and in the PGZ12 lamp holder. Lamps should be stabilised at least ten minutes prior to the measurement. No sleeves have to be used around the lamps for the measurements.

The bulb temperature should be measured in horizontal burning position, with the lead wire downwards and the thermocouple at the upper side of the bulb, because this is the most critical situation. The maximal allowed temperatures are given in the next sections at Table 2.4. Critical points.

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. This temperature is most critical in the base-up burning position. 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. These are given in the Table 2.4 Critical points.

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 or a spring mechanism.

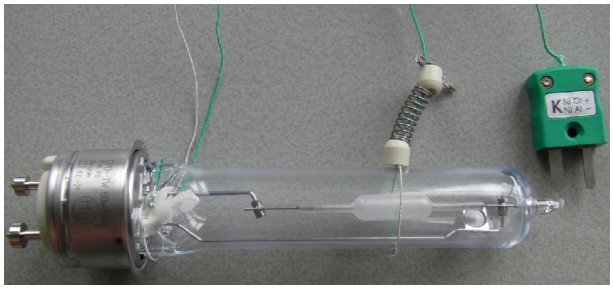


Figure 2.1 Thermocouple connected to bulb and pinch.

2.2.1.2. Gear Temperature

Introduction

The temperature of the electronics is an 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 high importance.

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 ambient temperature: temperature outside the luminaire (see Figure 2.1).

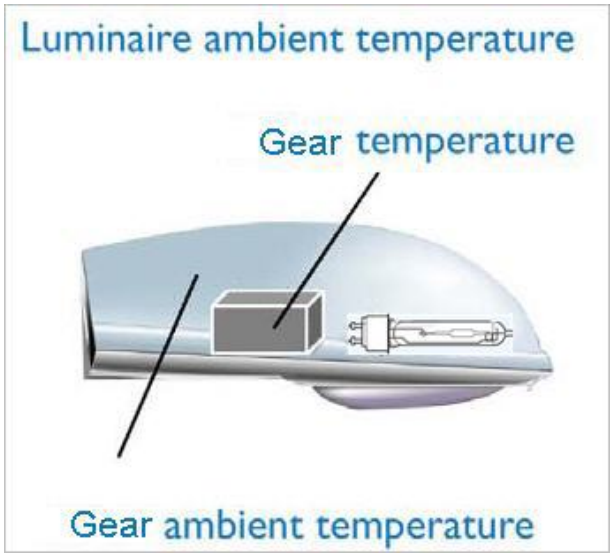


Figure 2.2 Temperature definitions

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 chapter 2.4 (Gear Data) are leading over ambient temperature values mentioned on the gear label.

Please refer to chapter 4 to (Additional Gear information) for the effect of the temperature on the gear lifetime.

2.2.2. 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 2.3.1.2 in table 2.4 should be taken into account to guarantee the life specifications for lamp and gear.

2.2.2.1. Reflection

Advice

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, leading to shorter life of the lamp.

Measurement setup

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. However, for lamps operated on an electronic gear such as Cosmopolis lamps, the lamp power is stabilized by the gear such that the lamp voltage remains practically unchanged.

2.2.3. Safety

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 of 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.

Temperature safety

For CosmoWhite lamps, it has been found that the lamp voltage does not increase significantly, as long as the reflector/housing is not too small. 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 gear). Therefore, light technical properties like luminous flux, colour rendering, and colour coordinates remain practically unchanged in a luminaire.

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.

Electrical safety

All CosmoWhite lamps have to be operated in fully closed luminaires.

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 gear.

Make sure that the wiring inside the luminaire is as much as possible in line with the description in this guide.

Photo biological safety

The standards on photo biological safety (I.E.C.62471/ ANSI/ IESNA RP-27.3-96) aim to prevent potential injury from light sources, by prescribing adequate cautions and warnings. Potential injuries in scope are skin burn and damage to eye retina or eye lens.

The standards contain a risk group classification-ranging from exempted to risk group 4-regarding these optical radiation hazards in the wavelength range from 200nm through 3000nm. For every risk group, adequate cautions and warning are prescribed with whom lamps must be labeled.

CosmoWhite lamps are classified in risk group 1 for blue light hazard. No warning information is necessary

2.2.4. End of life behaviour

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, 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 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 60W lamp operating on a 140W system, will speed up the occurrence of the above-mentioned failure mechanisms.

• 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.
When the lamp voltage reaches a too high value, the ballast 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.

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

Table 2.2 Effects that occur in possible combinations of the different Philips CPO-TW lamps and gears.

Lamp	Philips CosmoWhite 45W gear	Philips CosmoWhite 60W gear	Philips CosmoWhite 90W gear	Philips CosmoWhite 140W gear
Philips CosmoWhite 45W	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 strongly.	Stable lamp operation at 140W. Lifetime of lamp will be reduced drastically. Note: Burner may crack due to the thermo-mechanical stress.
Philips CosmoWhite 60W	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. Note: Burner may crack due to the thermo-mechanical stress.
Philips CosmoWhite 90W	Stable lamp operation at 45W. 2800K range: greenish colour appearance (too low power). 4000K: increase of colour temperature. Lamp Extinguishing is possible.	Stable lamp operation at 60W.	Ok	Stable lamp operation at 140W (overpower!). Lifetime of lamp will be reduced strongly.
Philips CosmoWhite 140W	Lamp may not start. 2800K range: greenish colour appearance (too low power). 4000K: increase of colour temperature. Lamp Extinguishing is possible.	Stable lamp operation at 60W. 2800K range: greenish colour appearance (too low power). 4000K: increase of colour temperature. Lamp Extinguishing is possible.	Stable lamp operation at 90W.	Ok

2.2.5. Other guidelines

Lamp handling

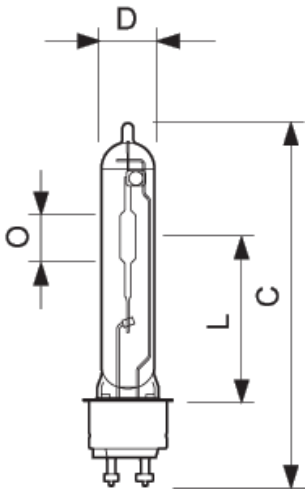
Fingerprints on metal halide lamps in a quartz outer bulb (including Philips CosmoPolis lamps).

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.

2.3. Lamps

2.3.1. CosmoWhite

2.3.1.1. Information



1 The CosmoWhite lamps can be operated in all positions, but with different properties. The lamp is optimized for horizontal burning. When rotating the lamp from the horizontal towards the vertical burning position, the colour temperature will drop around 150K for 2800K range and up to 250K for 4000K range compared to the horizontal data. The colour rendering (Ra8) will drop with ~5 points. Also lifetime properties will decrease. In the table below, the specifications of the lamp are given if operated in both horizontal and vertical burning position.
2 Definition S/P ratio: The eye sensitivity depends on the amount of light. This means, a human eye is more sensitive to blue light at low light levels. The S/P ratio contains the relation between the photopic (daylight) and scotopic (complete darkness) flux. To calculate the mesopic flux (twilight), the photopic flux has to be multiplied with the S/P ratio. S/P ration of Cosmo 2800K range is around 1.2, while for the 4000K range it is around 1.6. For reference, the S/P ratio for standard HPS lamps is around 0.5.
3 Product information requirements on lamps as in the E.U.P. regulation 245/2009 formulated.

- Rated Lamp Lumen Maintenance factor: as a factor or expressed in % - LLMF

- Rated Lamp Survival factor: as a factor or expressed in % - LSF

	Unit	CPO-TW 45W/ 728	CPO-TW 60W/ 728	CPO-TW 90W/ 728	CPO-TW 140W/ 728
Product Dimensions					
Overall Length-C max.	mm	132	132	143	149.8
Diameter-D max.	mm	20	20	20	20
Light Center Length-L nom.	mm	59	59	66	66
Arc Length-O nom.	mm	14	14	18	22
Electrical Characteristics					
Lamp Wattage Rated EL 25 degree C.	W	45	60	90	140
Lamp Current EL nom.	A	0.484	0.644	0.97	1.49
Lamp Wattage EL at +/- 60% power	W	30	36	54	84
Lamp Current EL at +/- 60% power	mA	0.309	0.383	0.577	0.931
Lamp Voltage nom.	V	91	92	92	94
Ignition Peak Voltage max. (Pulse)	V	5000	5000	5000	5000
General Characteristics					
Burning position		any	any	any	any
10% Survival rate, horizontal	hr	22000	22000	20000	16000
50% Survival rate, horizontal	hr	30000	30000	30000	30000
10% Survival rate, base up	hr	13000	13000	13000	16000
50% Survival rate, base up	hr	16000	16000	16000	30000
LSF EL 2kh Rated,12h cyc. horizontal	%	99	99	99	99
LSF EL 4kh Rated,12h cyc. horizontal	%	99	99	99	99
LSF EL 6kh Rated,12h cyc. horizontal	%	99	99	99	99
LSF EL 8kh Rated,12h cyc. horizontal	%	99	99	99	98
LSF EL 12kh Rated,12h cyc. horizontal	%	99	99	98	95
LSF EL 16kh Rated,12h cyc. horizontal	%	98	98	96	90
LSF EL 20kh Rated,12h cyc. horizontal	%	95	95	90	81
LSF EL 24kh Rated,12h cyc. horizontal	%	87	87	75	N.A.
LSF EL 30kh Rated,12h cyc. horizontal	%	50	50	50	N.A.
LSF EL 2kh Rated,12h cyc. base up	%	99	99	99	N.A.
LSF EL 4kh Rated,12h cyc. base up	%	99	99	99	N.A.
LSF EL 6kh Rated,12h cyc. base up	%	99	99	99	N.A.
LSF EL 8kh Rated,12h cyc. base up	%	99	99	99	N.A.
LSF EL 12kh Rated,12h cyc. base up	%	92	92	92	N.A.
LSF EL 16kh Rated,12h cyc. base up	%	50	50	50	N.A.
Light Technical Characteristics					
Color Temp. Technical, horizontal nom.	K	2725	2760	2750	2860
Color Temp. Technical, base up nom.	K	2630	2590	2640	2860
Colour Temp. at +/-60% power horiz.	K	2815	2715	2675	2880
Color Rendering Index, horizontal nom.	Ra8	66	73	66	66
Color Rendering Index, base up nom.	Ra8	60	67	58	66
Chromaticity Coordinate X nom.		459	453	454	444
Chromaticity Coordinate Y nom.		412	405	406	401
Chrom. Coord. X at +/- 60% power horiz.		459	461	463	449
Chrom. Coord. Y at +/- 60% power horiz.		424	414	414	414
Lum. Flux EL25 degree C. Rated. horiz.	Lm	4950	7200	10450	16500
Lum. Flux EL25 degree C, Rat. base up	Lm	4455	6780	10000	16500
Luminous Flux at +/- 60% power horiz.	Lm	2520	3240	4752	7560
Lum Effic Rat 25 degree C. horizontal	Lm/W	110	120	116	118
Lum Effic Rat EL 25 degree C. base up	Lm/W	99	113	111	118
Luminous Efficacy at +/- 60% power	Lm/W	84	90	88	90
LLMF EL 2 kh Rated, horizontal	%	92	92	94	97
LLMF EL 4 kh Rated, horizontal	%	90	90	91	97

	Unit	CPO-TW 45W/728	CPO-TW 60W/728	CPO-TW 90W/728	CPO-TW 140W/728
LLMF EL 6 kh Rated, horizontal	%	90	90	88	95
LLMF EL 8 kh Rated, horizontal	%	90	90	87	93
LLMF EL 12 kh Rated, horizontal	%	89	89	84	88
LLMF EL 16 kh Rated, horizontal	%	87	87	84	85
LLMF EL 20 kh Rated, horizontal	%	86	86	82	81
LLMF EL 24 kh Rated, horizontal	%	84	84	80	78
LLMF EL 30 kh Rated, horizontal	%	82	82	78	N.A.
LLMF EL 2 kh Rated, base up	%	90	89	94	95
LLMF EL 4 kh Rated, base up	%	87	87	92	92
LLMF EL 6 kh Rated, base up	%	87	87	92	91
LLMF EL 8 kh Rated, base up	%	86	86	92	90
LLMF EL 12 kh Rated, base up	%	84	84	88	87
LLMF EL 16 kh Rated, base up	%	77	77	88	85
UV-related Characteristics					
Damage Factor D/fc (h.klx) nom.		0.21	0.17	0.18	0.19
PET (NIOSH) h/500lx min.		8	8	8	8

	Unit	CPO-TW 60W/840	CPO-TW 90W/840	CPO-TW 140W/840
Product Dimensions				
Overall Length-C max.	mm	132	143	149.8
Diameter-D max.	mm	20	20	20
Light Center Length-L nom.	mm	59	66	66
Arc Length-O nom.	mm	14	18	22
Electrical Characteristics				
Lamp Wattage Rated EL 25 degree C.	W	60	90	140
Lamp Current EL nom.	A	0.65	0.95	1.414
Lamp Wattage EL at +/- 60% power	W	36	54	84
Lamp Current EL at +/- 60% power	mA	0.395	0.610	0.928
Lamp Voltage nom.	V	92	96	99
Ignition Peak Voltage max. (Pulse)	V	5000	5000	5000
General Characteristics				
Burning position		any	any	any
10% Survival rate, horizontal	hr	12000	12000	12000
50% Survival rate, horizontal	hr	16000	15000	15000
10% Survival rate, base up	hr	12000	11000	10500
50% Survival rate, base up	hr	16000	14500	14000
LSF EL 2kh Rated,12h cyc. horizontal	%	99	99	99
LSF EL 4kh Rated,12h cyc. horizontal	%	99	99	99
LSF EL 6kh Rated,12h cyc. horizontal	%	99	99	99
LSF EL 8kh Rated,12h cyc. horizontal	%	98	98	98
LSF EL 12kh Rated,12h cyc. horizontal	%	90	91	90
LSF EL 16kh Rated,12h cyc. horizontal	%	50	45	N.A.
LSF EL 20kh Rated,12h cyc. horizontal	%	N.A.	N.A.	N.A.
LSF EL 24kh Rated,12h cyc. horizontal	%	N.A.	N.A.	N.A.
LSF EL 30kh Rated,12h cyc. horizontal	%	N.A.	N.A.	N.A.
LSF EL 2kh Rated,12h cyc. base up	%	99	99	99
LSF EL 4kh Rated,12h cyc. base up	%	99	99	99
LSF EL 6kh Rated,12h cyc. base up	%	99	98	98
LSF EL 8kh Rated,12h cyc. base up	%	98	96	96
LSF EL 12kh Rated,12h cyc. base up	%	90	80	82
LSF EL 16kh Rated,12h cyc. base up	%	50	N.A.	N.A.

	Unit	CPO-TW 60W/840	CPO-TW 90W/840	CPO-TW 140W/840
Light Technical Characteristics				
Color Temp. Technical, horizontal nom.	K	4050	3850	4000
Color Temp. Technical, base up nom.	K	3900	3620	3750
Colour Temp. at +/-60% power horiz.	K	4440	4125	4355
Color Rendering Index, horizontal nom.	Ra8	83	77	80
Color Rendering Index, base up nom.	Ra8	81	72	75
Chromaticity Coordinate X nom.		382	392	385
Chromaticity Coordinate Y nom.		392	397	400
Chrom. Coord. X at +/- 60% power horiz.		365	377	367
Chrom. Coord. Y at +/- 60% power horiz.		374	382	372
Lum. Flux EL25 degree C. Rated. horiz.	Lm	7020	10350	16100
Lum. Flux EL25 degree C, Rat. base up	Lm	6420	9450	15120
Luminous Flux at +/- 60% power horiz.	Lm	2988	4428	6720
Lum Effic Rat 25 degree C. horizontal	Lm/W	117	115	115
Lum Effic Rat EL 25 degree C. base up	Lm/W	107	105	110
Luminous Efficacy at +/- 60% power	Lm/W	83	82	80
LLMF EL 2 kh Rated, horizontal	%	91	95	98
LLMF EL 4 kh Rated, horizontal	%	91	93	95
LLMF EL 6 kh Rated, horizontal	%	91	93	94
LLMF EL 8 kh Rated, horizontal	%	89	92	94
LLMF EL 12 kh Rated, horizontal	%	85	90	90
LLMF EL 16 kh Rated, horizontal	%	N.A.	N.A.	N.A.
LLMF EL 20 kh Rated, horizontal	%	N.A.	N.A.	N.A.
LLMF EL 24 kh Rated, horizontal	%	N.A.	N.A.	N.A.
LLMF EL 30 kh Rated, horizontal	%	N.A.	N.A.	N.A.
LLMF EL 2 kh Rated, base up	%	87	95	95
LLMF EL 4 kh Rated, base up	%	87	93	91
LLMF EL 6 kh Rated, base up	%	87	93	91
LLMF EL 8 kh Rated, base up	%	84	92	90
LLMF EL 12 kh Rated, base up	%	82	90	90
LLMF EL 16 kh Rated, base up	%	N.A.	N.A.	N.A.
UV-related Characteristics				
Damage Factor D/fc (h.klx) nom.		0.250	0.23	0.21
PET (NIOSH) h/500lx min.		8	8	8

2.3.1.2. Critical points

The temperature of the bulb and the pinch are most critical, and must be kept below the values in the following table.

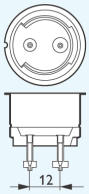
Table 2.4 Critical points

Figure	Max. temperature for	Philips CosmoWhite 45W/728	Philips CosmoWhite 60W/728 -60W/840	Philips CosmoWhite 90W/728 -90W/840	Philips CosmoWhite 140W/728 -140W/840
 *Figure 2.2*	bulb at position right above the center of the arc tube (most critical horizontal)	380°C	400°C	470°C	550°C
 *Figure 2.3*	pinch (most critical base-up)	250°C	300°C	300°C	300°C

2.3.1.3. Lamp base and holder

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

Table 2.5 Lamp base and holder.

Element	Explanation
Type holder	PGZ12 lamp base and holder.  *Figure 2.4 lamp base and holder.*
Orientation in luminaire	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.
Positioning	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 optimized optimal efficiency in road/street lighting optics as described before.
Fixation	The twist and lock concept guarantees an optimal fixation of the lamp in the luminaire, also in high vibration applications.

Note 1 : The lamp base is polarised, wich means it has pins with different diameters (see Fig. 2.4 in Table 2.5) such that it can be inserted in the lamp holder in one unique way. This implies that:

- For the HID-PV CPO TW gears, 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 lamp output of the Xtreme gear is not polarity sensitive in respect to the lamp. The ignition pulse has a symmetrical character.

Further, this polarisation assurs on good orientation in the luminaire as indicated in Table 2.5.

Note 2 : All CosmoWhite lamps use the same PGZ12 lamp cap and holder, without any key to prevent a misconnection of lamp and gear (for example a CosmoWhite 45W lamp on a CosmoWhite 140W gear) can cause lamp or very rarely gear failure. In Table 4.1 at the section Additional gear information, the effects that occur in all possible combinations of the different Cosmopolis lamps and gears are listed. No safety issues are encountered in any of these situations.

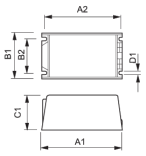
Note 3: Lamps should be held by the quartz bulb, not by the metal lamp base, while inserting the lamp.

2.4. Gear data

2.4.1. CPO-T White

2.4.1.1. Information

This chapter gives information about the gears used in CPO-T White lamp family.



Example -IPVCPOXt 60/140/90/45

	Unit	HID-PrimaVision Xtreme 60 /S CPO-TW 220-240V 50/60Hz	HID-PrimaVision Xtreme 45 /S CPO-TW 220-240V 50/60Hz	HID-PrimaVision Xtreme 140 /S CPO-TW 220-240V 50/60Hz	HID-PrimaVision Xtreme 90 /S CPO-TW 220-240V 50/60Hz	HID-PV sXt 45 /S CPO 208-277V 50/60Hz	HID-PV sXt 60 /S CPO 208-277V 50/60Hz	HID-PV sXt 90 /S CPO 208-277V 50/60Hz	HID-PV sXt 140 /S CPO 208-277V 50/60Hz	DV LS sXt 60 CPO / 0-6-60%
Product Dimensions										
Length A1 nom	mm	135.0	135.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Fixing Hole Distance Length A2 nom	mm	125.7	125.7	135.9	135.9	135.9	135.9	135.9	135.9	135.9
Width B1 nom	mm	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Fixing Hole Distance Width B2 nom	mm	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
Height C1 nom	mm	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Fixing Hole Diameter D1 nom	mm	4.8	4.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0
General Characteristics										
Line Voltage	V	220-240	220-240	220-240	220-240	208-277	208-277	208-277	208-277	208-277
Line Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Rated Ballast-Lamp Wattage		60	45	140	90	45	60	90	140	60
Life time (max.10% failures)	hr	80000	80000	80000	80000	80000	80000	80000	80000	80000
Operating Characteristics										
PowerFactor 100% output power nom		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Ignition Voltage max.	kV	2.9	2.9	2.9	2.9	3.3	3.3	3.3	3.3	3.3
Inrush current Peak max.	A	29	29	55	55	29	29	56	56	28
Inrush current Width nom	ms	0.50	0.50	0.45	0.45	0.50	0.50	0.50	0.50	0.42
Earth leakage current max	mA	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Maximum ballast number on MCB nom	x	11	11	5	5	11	11	5	5	11

	Unit	HID-PrimaVision Xtreme 60 /S CPO-TW 220-240V 50/60Hz	HID-PrimaVision Xtreme 45 /S CPO-TW 220-240V 50/60Hz	HID-PrimaVision Xtreme 140 /S CPO-TW 220-240V 50/60Hz	HID-PrimaVision Xtreme 90 /S CPO-TW 220-240V 50/60Hz	HID-PV sXt 45 /S CPO 208-277V 50/60Hz	HID-PV sXt 60 /S CPO 208-277V 50/60Hz	HID-PV sXt 90 /S CPO 208-277V 50/60Hz	HID-PV sXt 140 /S CPO 208-277V 50/60Hz	DV LS sXt 60 CPO / 0-6-60%
System Char's on driver level										
Power Loss (W)		7.0	6.0	12.5	9.0	N.A.	N.A.	N.A.	N.A.	N.A.
Temperature Characteristics										
T-ambient max.	C	50	50	50	50	50	50	50	50	50
T-ambient min.	C	-20	-20	-20	-20	-30	-30	-30	-30	-30
T-case life nom.	C	80	80	80	80	80	80	80	80	80
Wiring Characteristics										
Cable-Cap outputwires mutual nom.	pF	1000	1000	1000	1000	1000	1000	1000	1000	1000
Max. cable length Device/ Lamp	m	15	15	15	15	2	2	2	2	2

	Unit	DV LS sXt 60 CPO / 2-6-60%	DV LS sXt 90 CPO / 0-6-60%	DV LS sXt 90 CPO / 2-6-60%	DV LS sXt 140 CPO / 0-6-60%	DV LS sXt 140 CPO / 2-6-60%	HID-DV LS-6 Xt 60 /S CPO-TW 220-240V	HID-DV LS-8 Xt 60 /S CPO-TW 220-240V	HID-DV LS-10 Xt 60 /S CPO-TW 220-240V	HID-DV DALI Xt 45 /S CPO 208-277V
Product Dimensions										
Length A1 nom	mm	150.0	150.0	150.0	150.0	150.0	135.0	135.0	135.0	150.0
Fixing Hole Distance Length A2 nom	mm	135.9	135.9	135.9	135.9	135.9	125.7	125.7	125.7	135.9
Width B1 nom	mm	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Fixing Hole Distance Width B2 nom	mm	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
Height C1 nom	mm	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Fixing Hole Diameter D1 nom	mm	5.0	5.0	5.0	5.0	5.0	4.8	4.8	4.8	5.0
General Characteristics										
Line Voltage	V	208-277	208-277	208-277	208-277	208-277	220-240	220-240	220-240	208-277
Line Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Rated Ballast-Lamp Wattage		60	90	90	140	140	60	60	60	45
Life time (max.10% failures)	hr	80000	80000	80000	80000	80000	80000	80000	80000	80000

	Unit	DV LS sXt 60 CPO / 2-6-60%	DV LS sXt 90 CPO / 0-6-60%	DV LS sXt 90 CPO / 2-6-60%	DV LS sXt 140 CPO / 0-6-60%	DV LS sXt 140 CPO / 2-6-60%	HID-DV LS-6 Xt 60 /S CPO-TW 220-240V	HID-DV LS-8 Xt 60 /S CPO-TW 220-240V	HID-DV LS-10 Xt 60 /S CPO-TW 220-240V	HID-DV DALI Xt 45 /S CPO 208-277V
Operating Characteristics										
PowerFactor 100% output power nom		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Ignition Voltage max.	kV	3.3	3.3	3.3	3.3	3.3	2.9	2.9	2.9	3.3
Inrush current Peak max.	A	28	52	52	52	52	29	29	29	28
Inrush current Width nom	ms	0.42	0.47	0.47	0.47	0.47	0.5	0.5	0.5	0.42
Earth leakage current max	mA	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Maximum ballast number on MCB nom	x	11	5	5	5	5	11	11	11	11
System Char's on driver level										
Power Loss (W)		N.A.	N.A.	N.A.	N.A.	N.A.	7.0	7.0	7.0	N.A.
Temperature Characteristics										
T-ambient max.	C	50	50	50	50	50	50	50	50	50
T-ambient min.	C	-30	-30	-30	-30	-30	-20	-20	-20	-30
T-case life nom.	C	80	80	80	80	80	80	80	80	80
Wiring Characteristics										
Cable-Cap outputwires mutual nom.	pF	1000	1000	1000	1000	1000	1000	1000	1000	1000
Max. cable length Device/ Lamp	m	2	2	2	2	2	N.A.	N.A.	N.A.	10

	Unit	HID-DV LS-6 Xt 140 /S CPO-TW 220-240V	HID-DV LS-8 Xt 140 /S CPO-TW 220-240V	HID-DV LS-10 Xt 140 /S CPO-TW 220-240V	HID-DV LS-6 Xt 90 /S CPO-TW 220-240V	HID-DV LS-8 Xt 90 /S CPO-TW 220-240V	HID-DV LS-10 Xt 90 /S CPO-TW 220-240V	HID-DV DALI Xt 60 /S CPO 208-277V	HID-DV DALI Xt 140 /S CPO 208-277V	HID-DV DALI Xt 90 /S CPO 208-277V
Product Dimensions										
Length A1 nom	mm	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Fixing Hole Distance Length A2 nom	mm	140.7	140.7	140.7	140.7	140.7	140.7	135.9	135.9	135.9
Width B1 nom	mm	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0

	Unit	HID-DV LS-6 Xt 140 /S CPO-TW 220-240V	HID-DV LS-8 Xt 140 /S CPO-TW 220-240V	HID-DV LS-10 Xt 140 /S CPO-TW 220-240V	HID-DV LS-6 Xt 90 /S CPO-TW 220-240V	HID-DV LS-8 Xt 90 /S CPO-TW 220-240V	HID-DV LS-10 Xt 90 /S CPO-TW 220-240V	HID-DV DALI Xt 60 /S CPO 208-277V	HID-DV DALI Xt 140 /S CPO 208-277V	HID-DV DALI Xt 90 /S CPO 208-277V
Fixing Hole Distance Width B2 nom	mm	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
Height C1 nom	mm	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Fixing Hole Diameter D1 nom	mm	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
General Characteristics										
Line Voltage	V	220-240	220-240	220-240	220-240	220-240	220-240	208-277	208-277	208/277
Line Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Rated Ballast-Lamp Wattage		140	140	140	90	90	90	60	140	90
Life time (max.10% failures)	hr	80000	80000	80000	80000	80000	80000	80000	80000	80000
Operating Characteristics										
PowerFactor 100% output power nom		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Ignition Voltage max.	kV	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Inrush current Peak max.	A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Inrush current Width nom	ms	0.45	0.45	0.42	0.45	0.45	0.45	0.50	0.42	0.42
Earth leakage current max	mA	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Maximum ballast number on MCB nom	x	5	5	5	5	5	5	11	5	5
System Char's on driver level										
Power Loss (W)		12.5	12.5	12.5	9.0	9.0	9.0	N.A.	N.A.	N.A.
Temperature Characteristics										
T-ambient max.	C	50	50	50	50	50	50	50	50	50
T-ambient min.	C	-20	-20	-20	-20	-20	-20	-30	-30	-30
T-case life nom.	C	80	80	80	80	80	80	80	80	80
Wiring Characteristics										
Cable-Cap outputwires mutual nom.	pF	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

	Unit	HID-DV LS-6 Xt 140 /S CPO-TW 220-240V	HID-DV LS-8 Xt 140 /S CPO-TW 220-240V	HID-DV LS-10 Xt 140 /S CPO-TW 220-240V	HID-DV LS-6 Xt 90 /S CPO-TW 220-240V	HID-DV LS-8 Xt 90 /S CPO-TW 220-240V	HID-DV LS-10 Xt 90 /S CPO-TW 220-240V	HID-DV DALI Xt 60 /S CPO 208-277V	HID-DV DALI Xt 140 /S CPO 208-277V	HID-DV DALI Xt 90 /S CPO 208-277V
Max. cable length Device/ Lamp	m	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	10	10	10

2.4.1.2. Circuitry

3. Additional lamp information

3.1. Starting characteristics

A resonant ignition voltage of typically 2.2 kVp is used by the CosmoWhite gear 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 gears are suitable for 24h/7 days operation. 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 figures 3.1 till 3.4.

CosmoWhite lamps do not re-ignite instantly. Warm re-ignition time is specified to be less than 15 minutes.

Run-up curve CPO-TW 45W

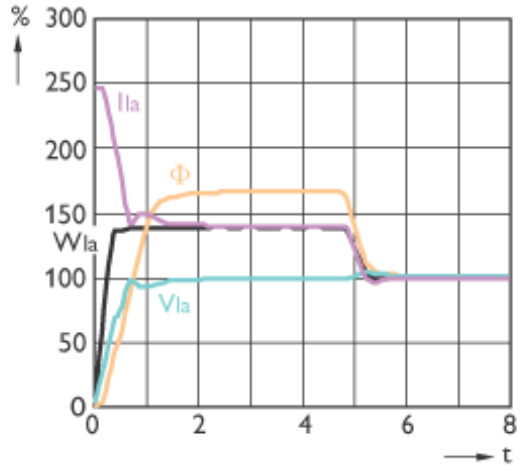


Figure 3.1

Run-up curve CPO-TW 60W

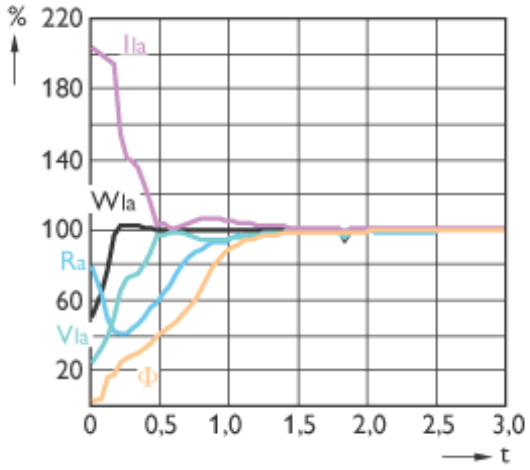


Figure 3.2

Run-up curve CPO-TW 90W

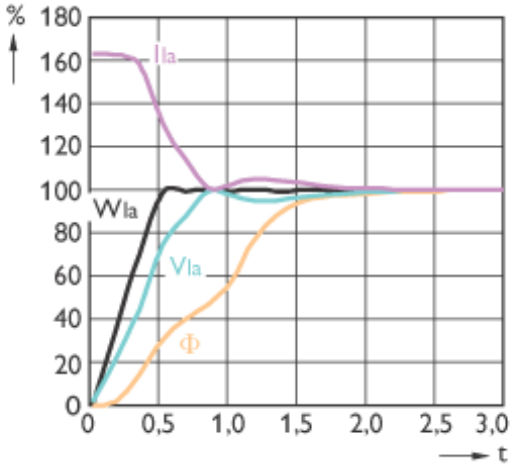


Figure 3.3

Run-up curve CPO-TW 140W

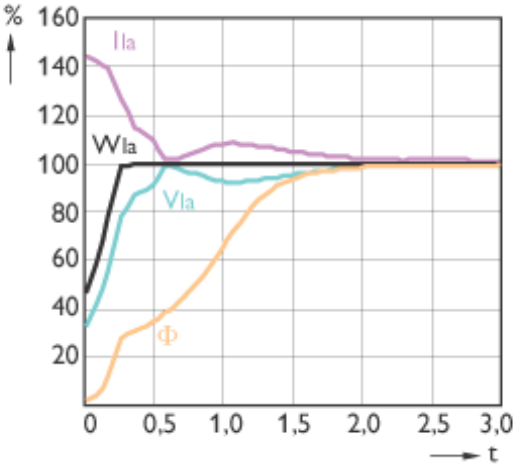


Figure 3.4

3.2. Luminous intensity distribution

Set-up

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

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.

Polar intensity diagram

The Polar intnsity diamgrams of Cosmo White 45, 60, 90 and 140W are given in figures 3.5 till 3.8 below.

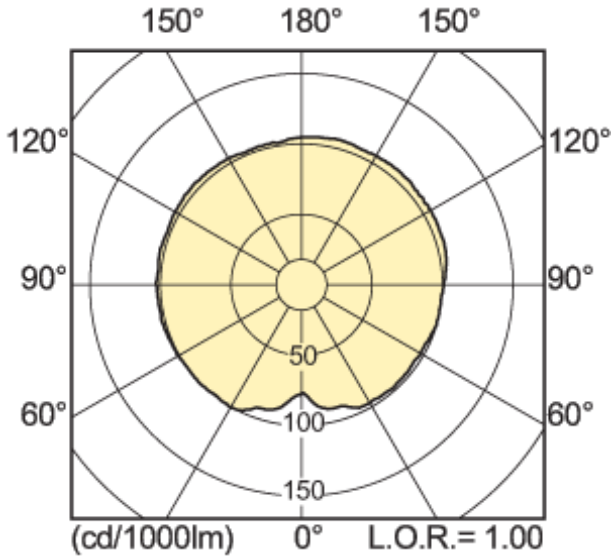


Figure 3.5 Polar Light distribution CPO-TW 45W

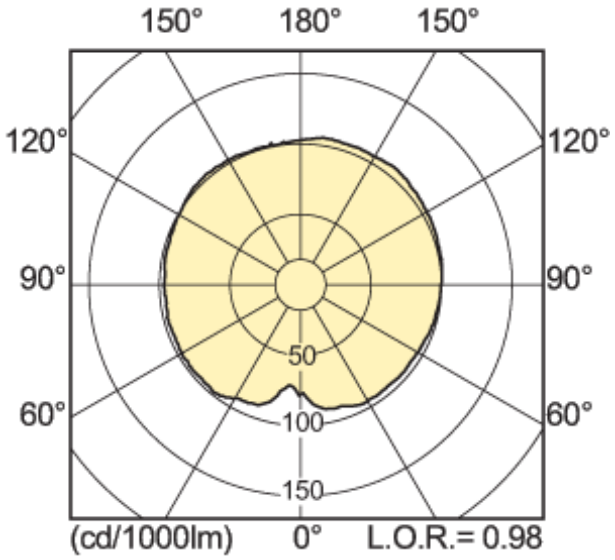


Figure 3.6 Polar Light distribution CPO-TW 60W

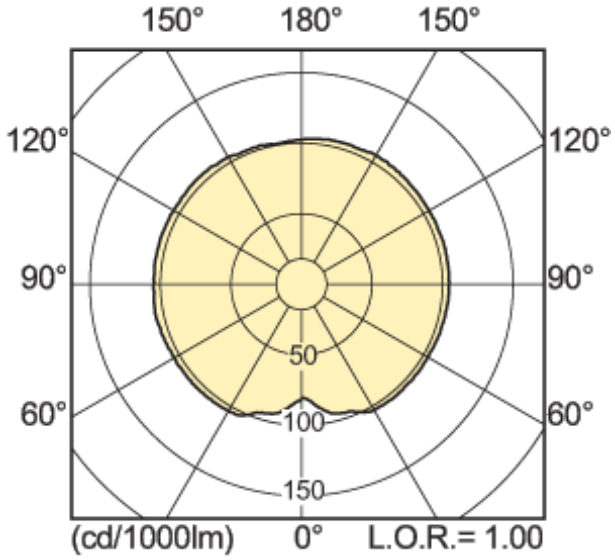


Figure 3.7 Polar Light distribution CPO-TW 90W

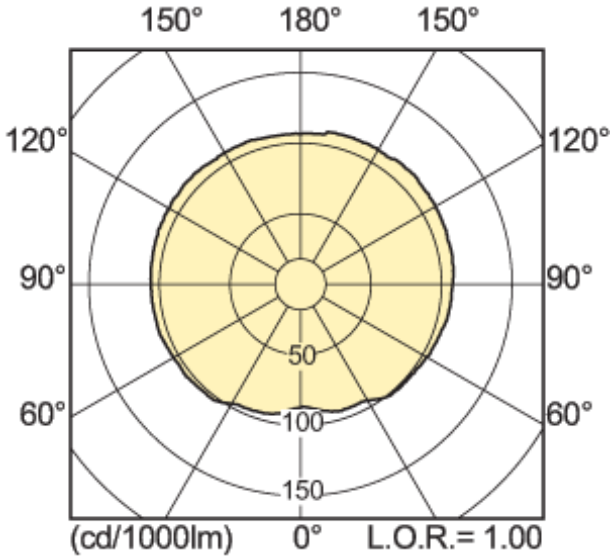


Figure 3.8 Polar Light distribution CPO-TW 140W

3.3. Spectral power distribution

The spectral power distributions of CosmoWhite 45, 60, 90 and 140W are given in figures 3.9 till 3.15 below.

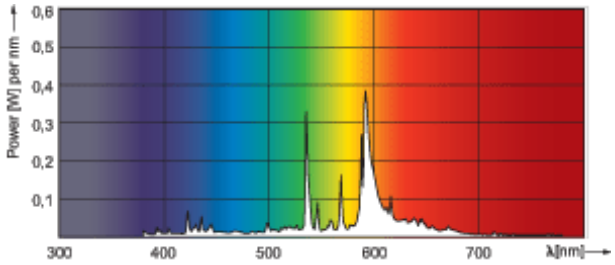


Figure 3.9 Spectral power distribution CPO-TW 45W/728

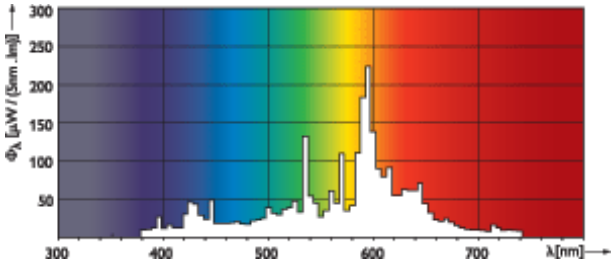


Figure 3.10 Spectral power distribution CPO-TW 60W/728

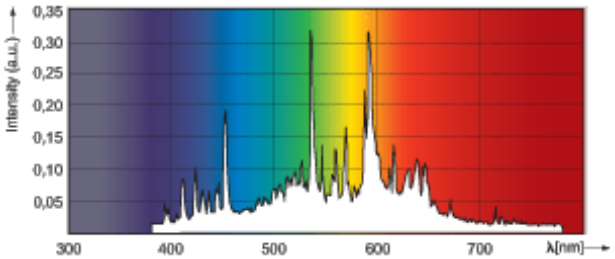


Figure 3.11 Spectral power distribution CPO-TW 60W/840

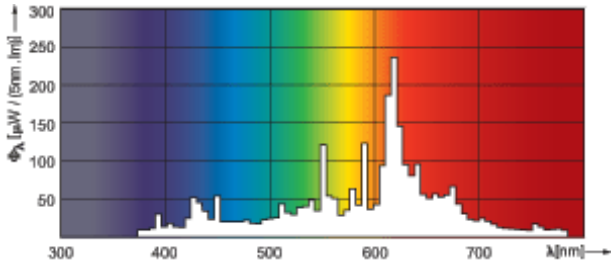


Figure 3.12 Spectral power distribution CPO-TW 90W/728

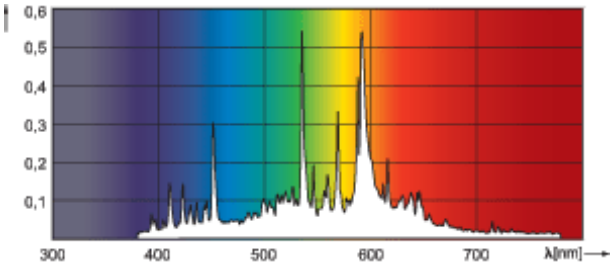


Figure 3.13 Spectral power distribution CPO-TW 90W/840

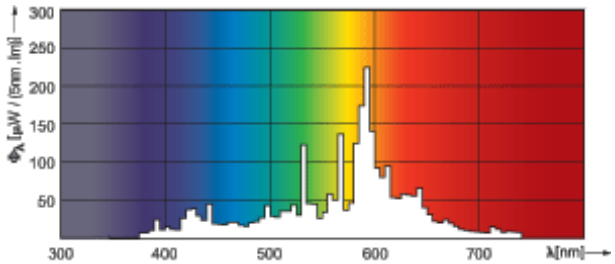


Figure 3.14 Spectral power distribution CPO-TW 140W/728

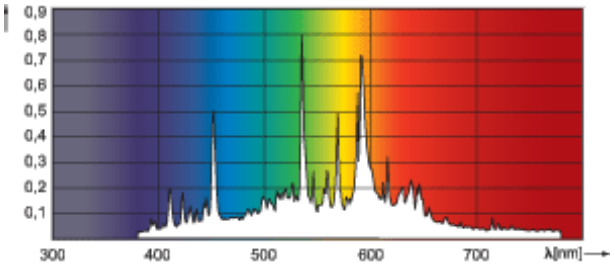


Figure 3.15 Spectral power distribution CPO-TW 140W/840

3.4. Dimming of CosmoWhite lamps

CosmoWhite lamps can be dimmed on its CosmoWhite Xtreme gear with LumiStep technology or DALI application.

The lifetime and maintenance of the lamps do not change if the lamps are dimmed on these gears.

The lamps are dimmable to 60% of the lamp power. This corresponds with a light level slightly less than 50% of the full power light level. The CosmoWhite 45W lamp is dimmable to 30W.

The nominal performance of the lamp at full and dimmed power is given in the lamp specifications at chapter 2.3.1.1. These values are obtained with 100h seasoned CosmoWhite lamps on a nominal CosmoWhite LumiStep gear.

4. Additional gear information

4.1. Gear selection

Remote lamp operation

Remote operation is a name for all applications in outdoor lighting where the gear 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 stay 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.

4.2. Electronic gear

Indoor versus outdoor

Table 4.1

	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-600-68-2-6-Fc Frequency range 10-150 Hz. Acceleration/amplitude 2G/0.15 mm peak	IEC-600-68-2-29 Eb Frequency range 10-150 Hz. Acceleration/amplitude 5G/0.15 mm peak
Lifetime	50.000 hours with 10% failures	80.000 hours with 10% failures
Mains voltage (operating)	220-240V -6%..+6%	220-240V -10%..+10% (Xtreme)
Mains voltage (safety)	220-240V -10%..+10%	220-240V -20%..+12% (Xtreme)
EMC	CISPR 15 ed 7.1	CISPR 15 ed 7.1
Temperatures	0 to 50°C	-30 to 50°C
Classification	Class 1	Class 1 and 2

Lifetime

The temperature of the electronics is an 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.

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 Tc point specification of the CosmoPolis Xtreme gear 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 gear 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.

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

Example:

If in the application the Tc point is 80°C (=Tc at which the lifetime spec. of 80.000 hours with 90% survivors is reached for CosmoWhite (s)Xtreme gear) 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 archieve the specified lifetime at Tc=80°C.

Tc temperature and value on the (s)Xtreme gear

Tc is specified at 80°C on the lable of the CosmoPolis Xtreme gears. At this temperature the lifetime of 80.000 hours with 90% survivors is reached. At 90°C the thermal protection will switch off the gear. The gear will start trying to reignite the lamp as the gear has cooled down to 80°C.

Operating or even storing the gear 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 gear 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.

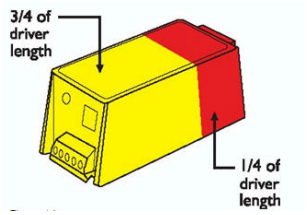


Figure 4.1

Thermal guard

If the gear temperature exceeds the maximum Tcase, 92±2°C, the thermal protection mechanism will start to dim the lamp power. For the COSMOPOLIS, the lamp power will be reduced to 60% (50% light) and for SON, it will be reduced to 35% (20% light). The gear will be switched off immediately when Tcase reaches 95±2°C. If the temperature drops below Tcase 92±2° C within 25 minutes, the gear will return to full light level.

If the Tcase falls below 80±2°C, the gear will return to the previous value. Ignition is possible from -30°C upwards. At very low temperatures it may take slightly longer to ignite the lamp.

Table 4.2

CPO	45W _ 30W	60W _ 36W
SON	50W _ 30W	45W _ 30W
	50W _ 37.5W (75%)	45W _ 30W
CDO		
	« 70% light»	« 70% light»

Advise to obtain maximum lifetime:

- Ensure good thermal contact between gear and coldest spot of luminaire. The CosmoPolis (s)Xtreme gear is designed to comply with all requirements for Class1 and Class2 applications hence direct contact with the metal parts of the luminaire are allowed.
- The CosmoPolis Xtreme gear has heat producing components both in the upper and lower part of the gear. 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 gear, including the upper part of the sides. Be aware that for proper verification of gear temperature in this case a gear with thermocouples supplied by Philips is needed ask your Philips representative for advice.
- 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 gear.

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

Ignition is possible from -30°C upwards. At very low temperatures it can take a bit more time to ignite the lamp.

Housing

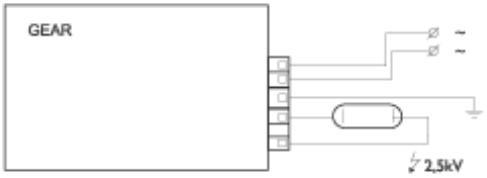


Figure 4.2 Wiring diagram gear .

4.2.1. Gear data

Lifetime
80000 hours with 10% failures

Vibrations
Frequency range 10-150Hz

Acceleration/amplitude

5G/0.15mm peak

Housing
Class 2 material : Plastic

Installing cabling/EMC
Care should be taken when connecting the electronic gear. 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 gear with reversed lamps and mains cabling can cause a severe risk.

Other information

4.3. Digital control interface

4.3.1. DALI GEAR

DALI Hardware

The signals on the DALI control lines are single pole. This means that the DALI control voltage is polarity sensitive. The connection of the DALI control lines to the interface terminals is marked with "DA" for data, because the input is made polarity insensitive (see Fig. 4.3).

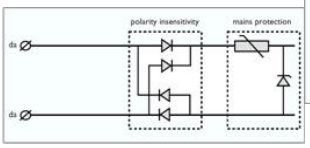


Fig. 4.3 Mains protection and polarity insensivity Dali gear

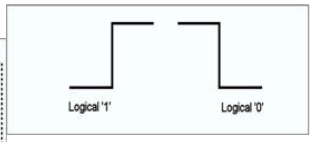


Fig. 4.4 Bi-phase encoding

Because the DALI terminals are close to the mains terminals, caution must be exercised when the installation is being connected. To prevent damage caused by interchanging the DALI control lines, lamp wires and the mains wires, the DALI system is equipped with extra hardware in the interface that can withstand the mains voltage (see Fig. 4.3). Because a number of gears, connected to different mains phases, can be connected to each other by means of the DALI input, all DALI inputs are fully isolated from the power electronics inside the gear.

This isolation is done in the gear by means of an optical isolator (opto-coupler). The gear backward channel switch, which is controlled by the intelligent module (microcontroller) of the ballast, shorts the DALI control lines. The short circuit current of the DALI control lines, which is generated by the DALI master or power supply, is therefore limited. The current is limited to 250 mA as played down in the DALI standard. The maximum voltage drop is limited to 2 volt for the DALI line. A DALI bus can be fed at any point on the bus including the end or middle. Any number of branches may be used as long as any one of them does not exceed 300 meter.

Digital control

The electronic gears are connected to the controller via two wires. Data packets consisting of 19 bits enable the controller to communicate with the electronic ballasts at an effective rate of 1200 bauds per second. A message is built up by 1 start bit, 8 address bits, 8 data bits and 2 stop bits (see figs. 4.5 and 4.6).

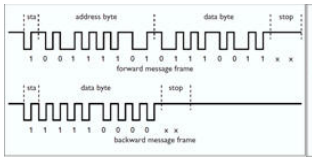


Fig. 4.5 Dali message frame

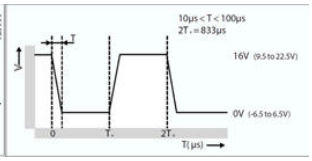


Fig. 4.6 Tolerances of DALI line voltage

The DALI line has a voltage of 16 V, with the tolerances shown in Fig. 4.6. The DALI standard requires that the voltage drop between the power supply and any DALI device be no more than 2 volts.

The current in a DALI controller is limited to a maximum of 250 mA in accordance with IEC 60929. The current consumption per electronic ballast is set at 2 mA. The bus connected load should not exceed 80% of this rating in order to provide sufficient charging current.

Example: Given 50 gears at 2mA each, a 250mA power supply, and 6mA per control, 16 controls may be used on the bus in addition to the gears. (250* 80% — 50*20%)/6 = 16 controls/ bus

The DALI Gear

The architecture of digital gear is shown in Fig. 4.7. The solid lines depict power signals, the dashed lines depict control and sensor signals. The micro controller is the central unit in the digital gear. It receives commands from the DALI control lines via a transceiver unit, which is essentially no more than a voltage scaling and protection unit.

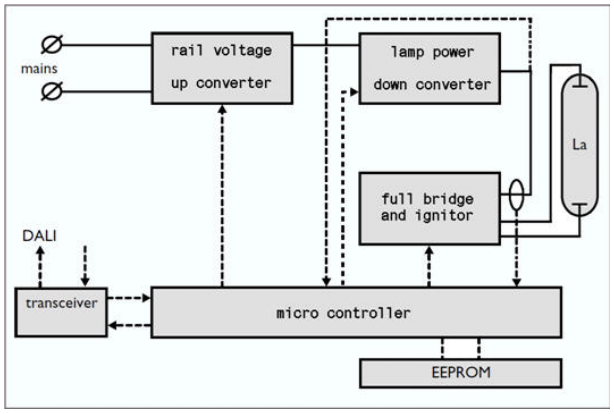


Fig. 4.7 Architecture of Digital Gear

The gear has three power converter units. An upconverter acts as a mains preconditioner, a down convertor, which regulates the power to the lamp and open circuit voltage, and finally a full bridge which converts DC signal into AC, and an ignitor which ignites the lamp with 2.7 – 4.5kV pulses. Both the down convertor, full bridge, and ignitor receive their drive signals directly from the micro controller. The micro controller receives lamp current and voltage signals from sensors in the power circuit. The micro controller can store data that are not to be lost when the gear is disconnected from the mains in a non-volatile memory such as an EEPROM.

With this architecture many advantages are obtained:

- lamp curves for different lamp types can be stored: multi-lamp gear.

- all control loops and signal processing is controlled by the micro controller: high reliability, better accuracy, miniaturization, flexibility.

- high design flexibility: changes often require only software adjustments.

- DALI interface is integrated in the gear rather than being added to it: optimal use of functionality.

- Gears can report problems such as lamp failure on request.

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.