

# Light Measurement Report

Print date: 19-8-2025

Measurement date and time: 19-8-2025 16:07:38 – Measurement no. VFR-250819-2616-MS

Measurement tracking No. and Link: [VT250819-008924](#)

Operator:



## Laboratory and Equipment

Laboratory Owner and Location  
Goniospectrometer System and Type  
Sensor Name, Calibr. Date and Serial No.  
Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark  
LabSpion – Type C, horizontal  
LabSensor Model2 – 11-1-2024 – 3130191315  
Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

## Measurement Conditions

Number of C-planes and Resolution  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power  
Warm-up Time and Variation

12 planes – 30°  
5°  
12,10 m  
74,4 W – PF 0,97 – DPF 0,97  
230 V – 0,334 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

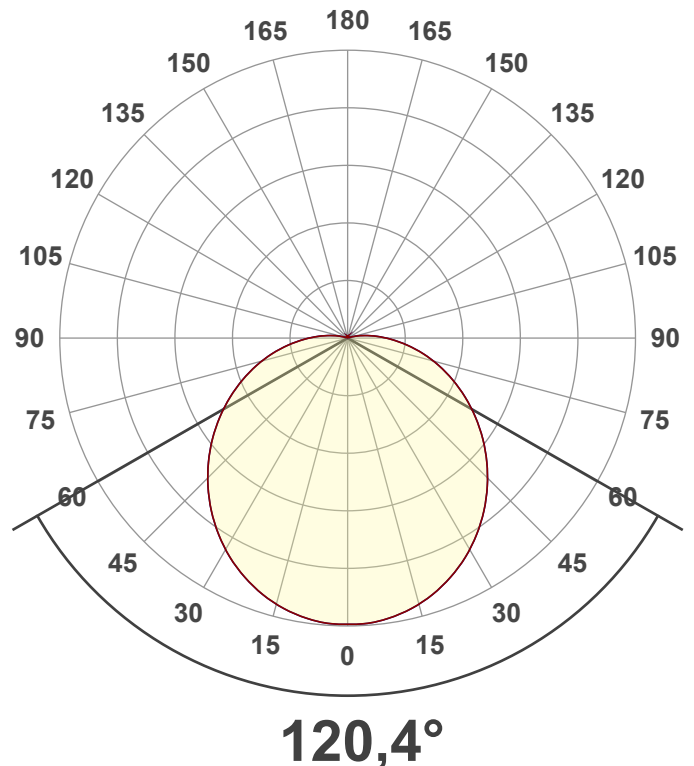
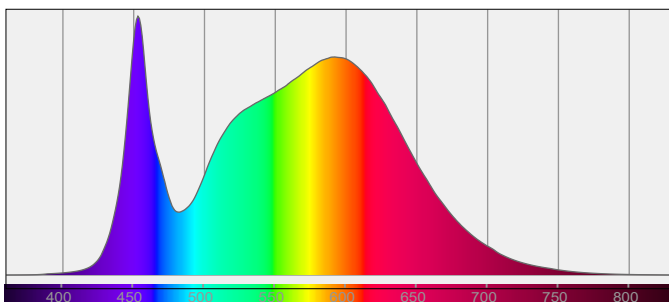
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

810351-4000K  
810351-4000K – Dutchfulfillment  
LICHTLIJN MODULE | JUPITER | 29-75W | 120° | CCT-SWITCH

## Main Light Measurement Results

Output – Total Lumen (Up% / Down%)  
Efficiency  
Peak Intensity and Beam Angle  
Correlated Color Temperature, Target/Measured  
Color Rendering Index  
Color Rendering TM30-18  
Color Shift, CIE duv and MacAdam Steps  
Flicker

10756 lm – 4,21% / 95,79%  
145 lm/W  
3128 cd – 120,4°  
CCT = 4000 K / 4125 K  
CRI 82,6  
 $R_f$  83,4 –  $R_g$  94,6  
Duv 0,0024 – SDCM 3,1  
SVM 0,03 – PstLM 0,01



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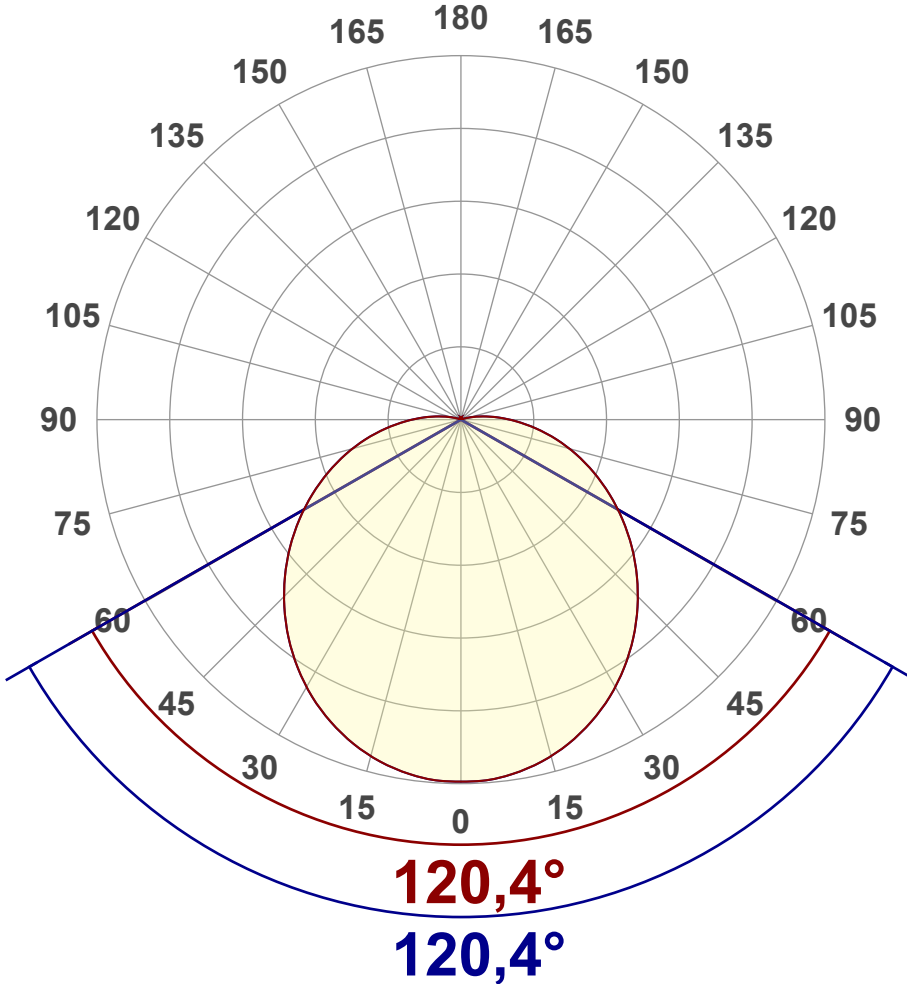
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	10756 lm
Lumen Up% / Down%	4,21% / 95,79%
Peak Intensity	3128 cd
Beam Angle (50%)	120,4°
Beam Angle (90%)	120,4°
Beam Angle (10%)	120,4°

## Cut-off Angle

Average 2,5%	208,6°
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## Field Angle

Average 10%	187,4°
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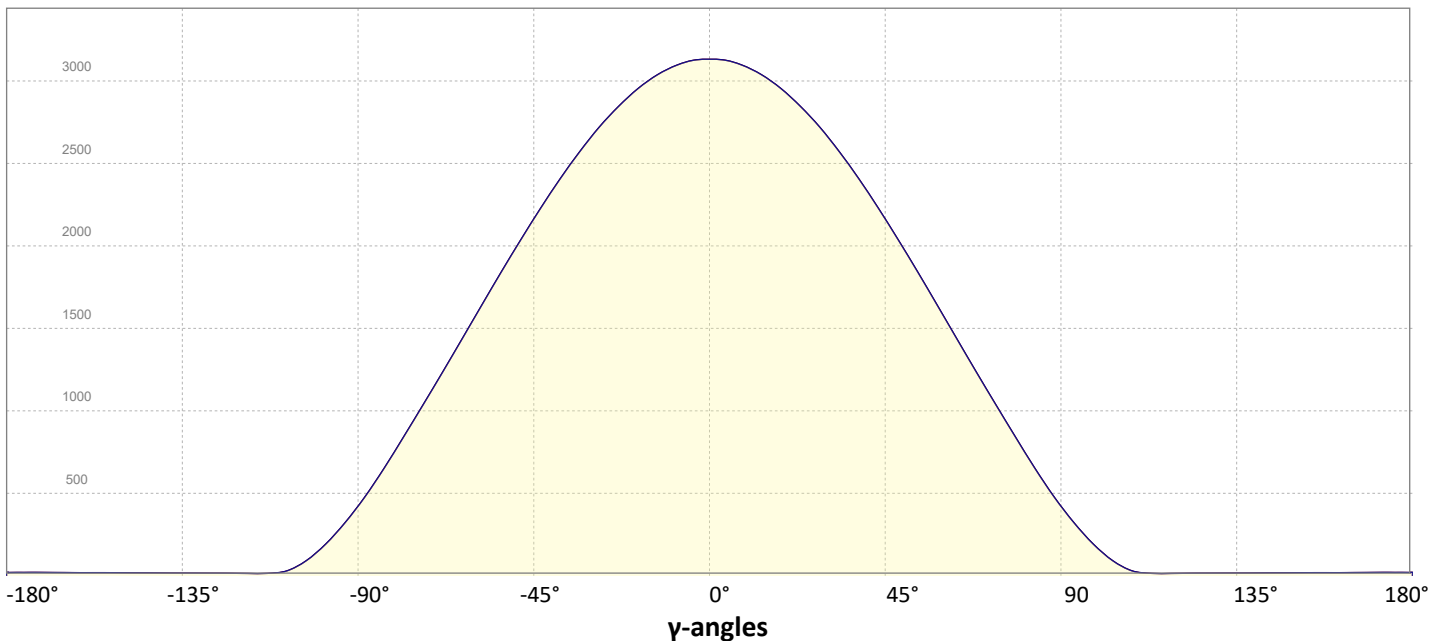
## Intensity Ratio

In 120° cone	67,6%
In 90° cone	45,1%

**C000-C180**

**C090-C270**

## Linear distribution diagram - Intensity (candela) vs $\gamma$ -angle



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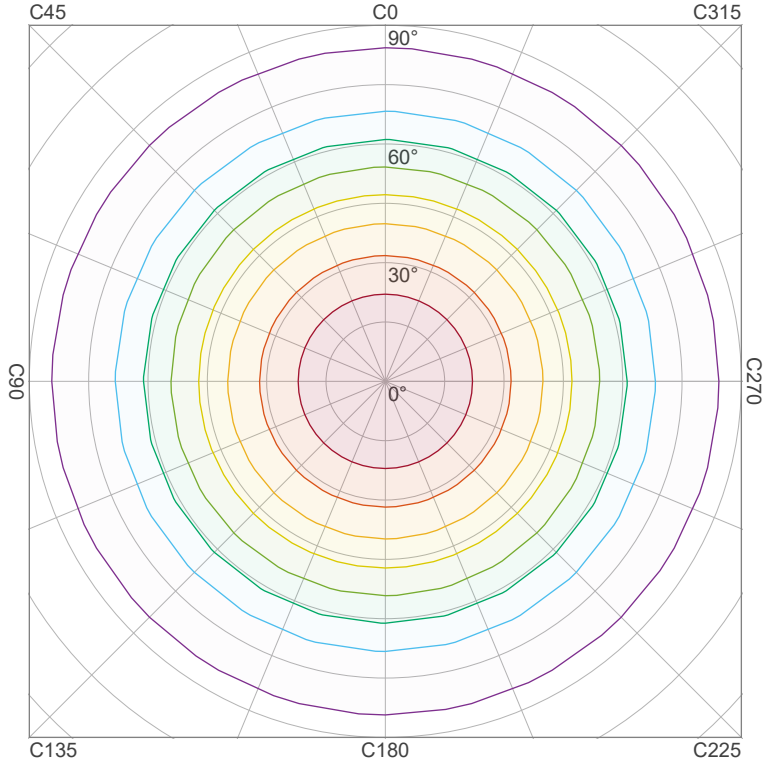
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Operator:



## Iso-intensity Diagram (Iso-candela)

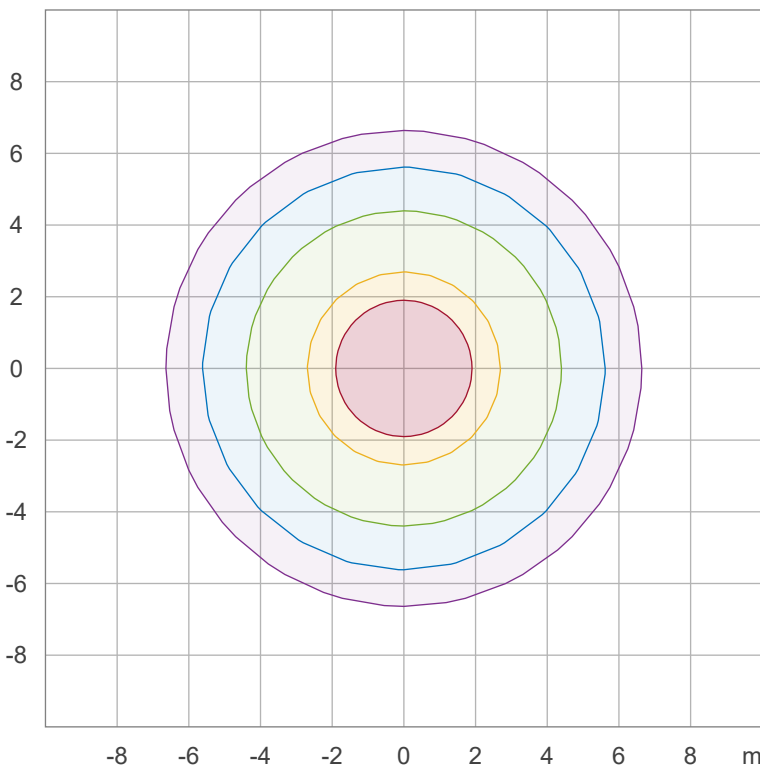


90 %	2815,5 cd
80 %	2502,6 cd
70 %	2189,8 cd
60 %	1877,0 cd
50 %	1564,1 cd
40 %	1251,3 cd
30 %	938,5 cd
20 %	625,7 cd
10 %	312,8 cd

Peak intensity: 3128,3 cd

Number of c-planes: 12

## Iso-illuminance Diagram (Iso-lux)



50,0 %	173,8 lx
30,0 %	104,3 lx
10,0 %	34,8 lx
5,0 %	17,4 lx
3,0 %	10,4 lx

Peak illuminance: 347,6 lx

Mounting height: 3,0 m

Number of c-planes: 12

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## Color details

Correlated Color Temperature, Target CCT = 4000 K  
 Correlated Color Temperature, Measured CCT = 4125 K  
 Color Rendering Index CRI 82,6  
 Color Rendering Index, R9 (red component) R9 = 8,5  
 Color Rendering TM30-18 R<sub>f</sub> 83,4 – R<sub>g</sub> 94,6  
 Color Quality Scale CQS = 82,0

MacAdam Steps SDCM = 3,1  
 Color coordinates CIE 1931 (x;y) = (0,381;0,377)  
 Color coordinate CIEs 1960 (u;v) = (0,225;0,334)  
 Color deviation from BBL Duv = 0,0024  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

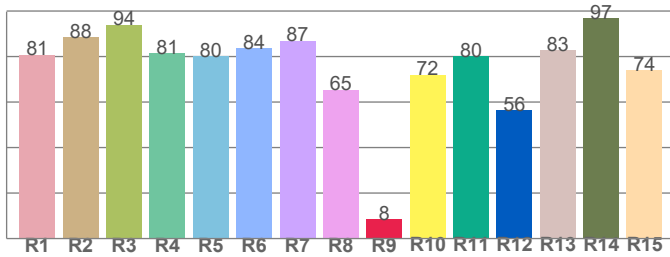
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



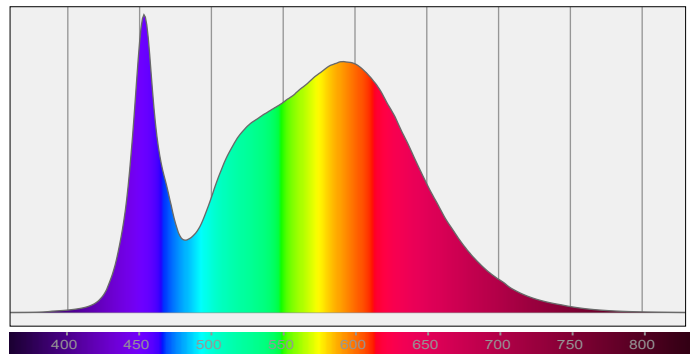
### Color Rendering Index per reference color (CIE 1995)



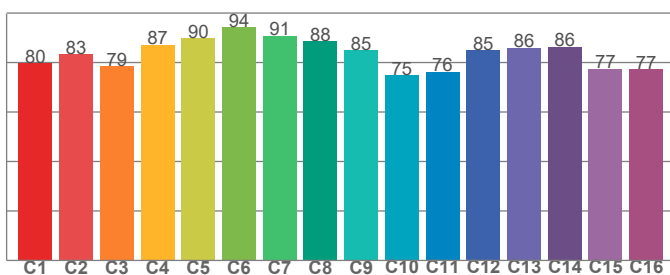
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,8	88,5	94,0	81,5	80,2	83,6	87,0	65,4	8,5	72,1	80,0	56,4	82,8	96,7	74,0

### Spectral power distribution (SPD) / W/nm – 0-100%



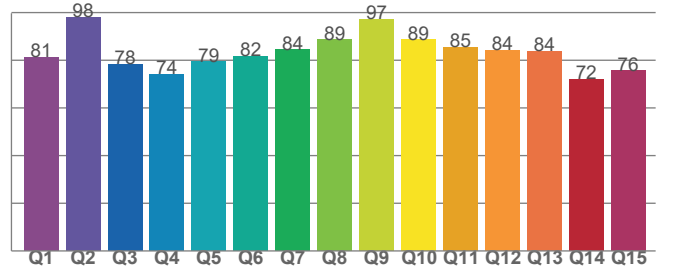
### TM30-18 Rf-values per hue bin



TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
79,6	83,3	78,5	87,2	89,8	94,2	90,8	88,5	85,0	74,9	76,3	84,8	86,0	86,5	77,4	77,2

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
81,4	98,1	78,3	74,2	79,4	81,6	84,4	88,6	97,3	88,5	85,4	84,3	83,8	71,9	75,5

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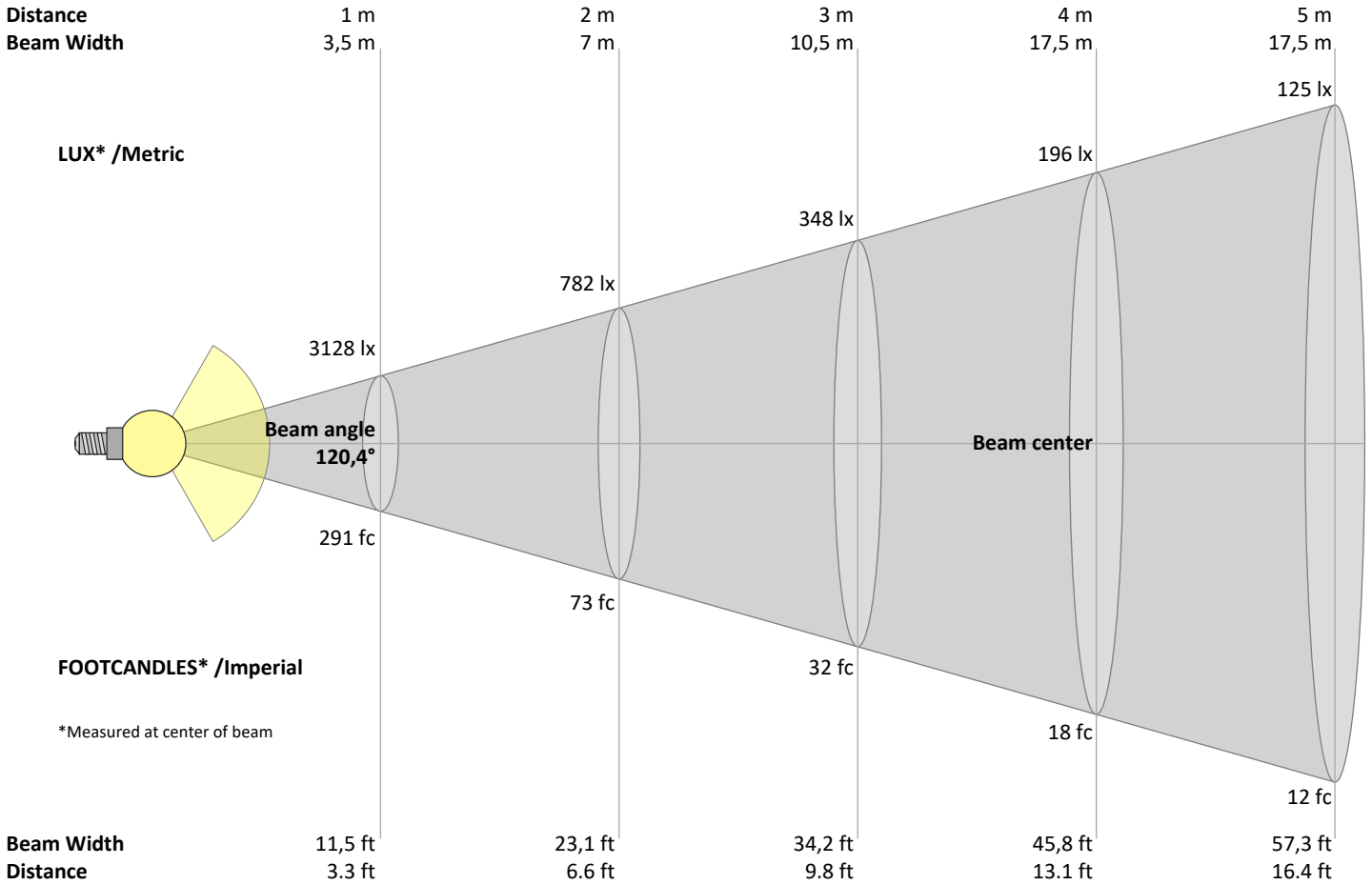
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## Beam Details



### Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3,3	6,6	9,8	13,1	16,4	19,7	23	26,2	29,5	32,8	36,1	39,4	42,7	45,9	49,2	52,5	55,8	59,1	62,3	65,6	ft
3128	782	348	196	125	87	64	49	39	31	26	22	19	16	14	12	11	10	9	8	lux
290,6	72,7	32,3	18,2	11,6	8,1	5,9	4,5	3,6	2,9	2,4	2	1,7	1,5	1,3	1,1	1	0,9	0,8	0,7	fc

### Intensities in 0° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ	
3128	3088	2959	2751	2480	2162	1815	1450	1090	740	424	178	33	14	16	16	17	19	19	20	cd	
100%	99%	95%	88%	79%	69%	58%	46%	35%	24%	14%	6%	1%	0%	0%	1%	1%	1%	1%	1%	1%	of 0°val

### Intensities in 90° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ	
3128	3088	2959	2751	2480	2162	1815	1450	1090	740	424	178	33	14	16	16	17	19	19	20	cd	
100%	99%	95%	88%	79%	69%	58%	46%	35%	24%	14%	6%	1%	0%	0%	1%	1%	1%	1%	1%	1%	of 0°val

### Intensities in 180° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ	
3128	3088	2959	2751	2480	2162	1815	1450	1090	740	424	178	33	14	16	16	17	19	19	20	cd	
100%	99%	95%	88%	79%	69%	58%	46%	35%	24%	14%	6%	1%	0%	0%	1%	1%	1%	1%	1%	1%	of 0°val

### Intensities in 270° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ	
3128	3088	2959	2751	2480	2162	1815	1450	1090	740	424	178	33	14	16	16	17	19	19	20	cd	
100%	99%	95%	88%	79%	69%	58%	46%	35%	24%	14%	6%	1%	0%	0%	1%	1%	1%	1%	1%	1%	of 0°val

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## Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	ρ Ceiling	70	70	50	50	30	70	70	50	50	30
	ρ Walls	50	30	50	30	30	50	30	50	30	30
	ρ Floor	20	20	20	20	20	20	20	20	20	20
Room size		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	25,2	26,5	25,6	26,9	27,2	26,0	27,2	26,3	27,6	27,9
	3H	26,9	28,2	27,4	28,6	28,9	27,9	29,2	28,4	29,6	29,9
	4H	27,7	29,0	28,2	29,3	29,7	29,0	30,2	29,4	30,6	30,9
	6H	28,5	29,6	28,9	30,0	30,4	30,1	31,2	30,4	31,5	32,0
	8H	28,8	29,9	29,2	30,3	30,8	30,6	31,7	31,0	32,0	32,5
	12H	29,1	30,2	29,5	30,6	31,1	31,1	32,2	31,6	32,6	33,1
4H	2H	26,0	27,2	26,4	27,6	27,9	26,5	27,8	27,0	28,1	28,5
	3H	27,9	29,0	28,4	29,4	29,9	28,8	29,9	29,2	30,2	30,8
	4H	28,8	29,9	29,3	30,3	30,9	29,9	30,9	30,4	31,3	32,0
	6H	29,7	30,6	30,3	31,1	31,5	31,1	32,0	31,6	32,4	32,9
	8H	30,1	30,9	30,7	31,4	31,9	31,7	32,5	32,2	33,0	33,4
	12H	30,5	31,2	31,0	31,7	32,2	32,3	33,1	32,9	33,6	34,1
8H	4H	29,3	30,1	29,8	30,6	31,1	30,2	31,0	30,8	31,5	32,0
	6H	30,4	31,0	30,9	31,6	32,2	31,6	32,3	32,1	32,8	33,4
	8H	30,9	31,5	31,5	32,1	32,8	32,3	32,9	32,9	33,5	34,2
	12H	31,4	31,9	32,0	32,5	33,2	33,1	33,7	33,8	34,2	34,9
12H	4H	29,4	30,1	29,9	30,6	31,1	30,2	30,9	30,8	31,4	32,0
	6H	30,6	31,2	31,1	31,7	32,5	31,7	32,3	32,3	32,9	33,6
	8H	31,1	31,7	31,8	32,2	32,9	32,5	33,0	33,1	33,6	34,2

### Variations with the observer position for the luminaire spacings, S:

S = 1.0H	0,1 / -0,1	0,1 / 0,0
S = 1.5H	0,1 / -0,1	0,1 / -0,1
S = 2.0H	0,2 / -0,3	0,2 / -0,3

## Coefficients of Utilization

Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR	(RCR: Room Cavity Ratio)																	
	Room Values are expressed as percentage of Lumen delivered to the task surface																	
0	118	118	118	118	115	115	115	115	109	109	109	103	103	103	98	98	98	96
1	106	100	95	90	102	97	92	88	92	88	85	87	84	81	83	80	78	76
2	95	86	78	72	92	84	76	70	79	73	68	75	70	66	72	67	64	61
3	86	75	66	59	83	73	65	58	69	62	56	66	60	55	63	58	53	51
4	79	66	56	49	76	64	55	49	61	54	47	58	52	46	56	50	45	43
5	72	59	49	42	70	57	48	42	55	47	41	52	45	40	50	44	39	37
6	67	53	43	37	64	51	43	36	49	41	35	47	40	35	45	39	34	32
7	62	48	38	32	60	47	38	32	45	37	31	43	36	31	41	35	30	28
8	57	43	35	29	56	42	34	28	41	33	28	39	32	27	38	32	27	25
9	54	40	31	26	52	39	31	25	37	30	25	36	29	25	35	29	24	22
10	50	37	29	23	49	36	28	23	35	28	23	33	27	22	32	26	22	20

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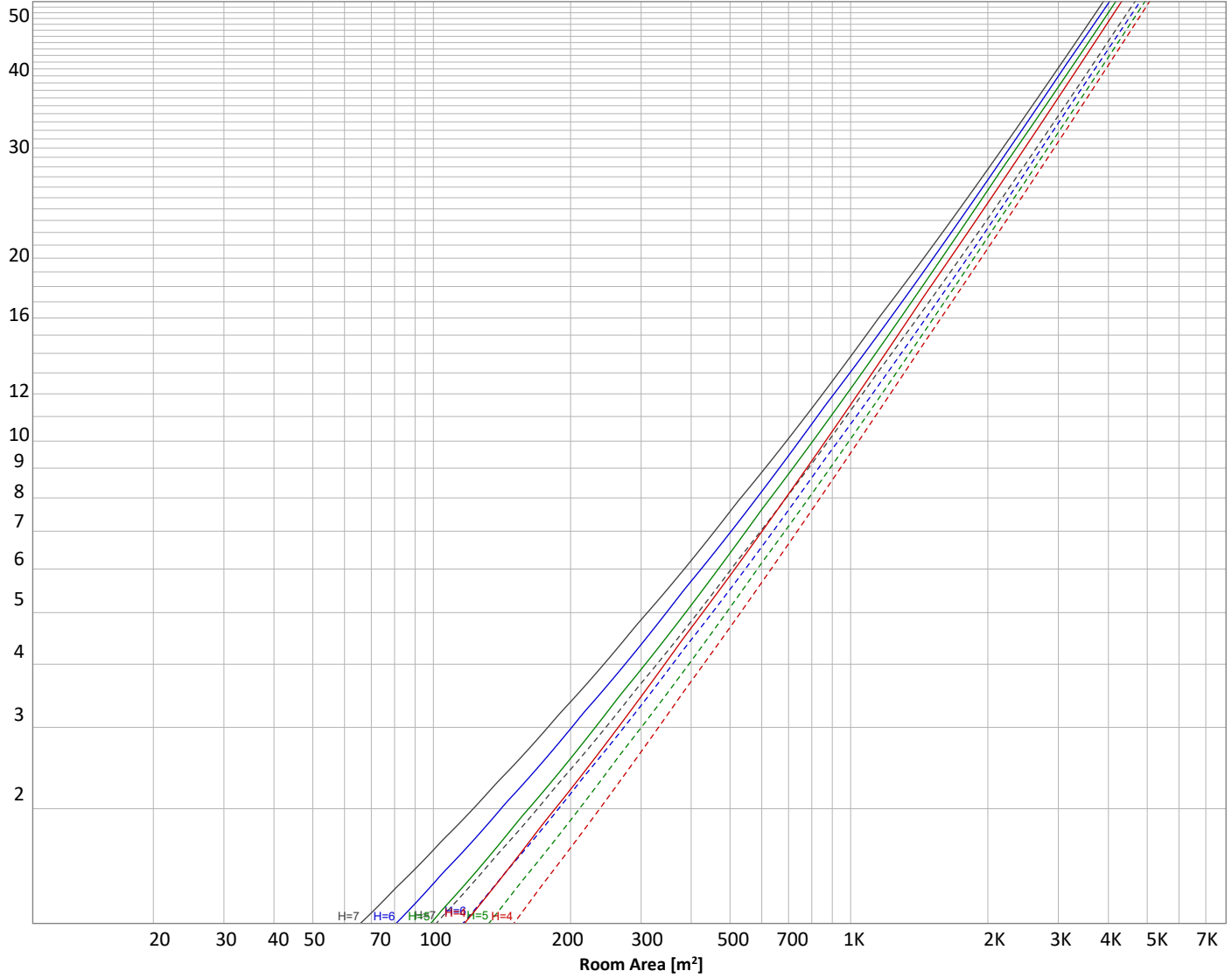
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 10756 lm				
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) Wall reflectance	Floor reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50	30
E <sub>work</sub> = Average lux on work area =	100 lx	—————	50	30	20

### Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
297 lm	850 lm	1293 lm	1574 lm	1670 lm	1588 lm	1357 lm	1027 lm	648 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
306 lm	77,6 lm	15,5 lm	13,9 lm	12,6 lm	11,0 lm	8,70 lm	5,49 lm	1,95 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	297 lm	2,8%
10-20°	850 lm	7,9%
20-30°	1293 lm	12,0%
30-40°	1574 lm	14,6%
40-50°	1670 lm	15,5%
50-60°	1588 lm	14,8%
60-70°	1357 lm	12,6%
70-80°	1027 lm	9,5%
80-90°	648 lm	6,0%
90-100°	306 lm	2,8%
100-110°	78 lm	0,7%
110-120°	16 lm	0,1%
120-130°	14 lm	0,1%
130-140°	13 lm	0,1%
140-150°	11 lm	0,1%
150-160°	9 lm	0,1%
160-170°	5 lm	0,1%
170-180°	2 lm	0,0%
<b>Total</b>	<b>10756 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	3128 cd
Intensity, 90°	424 cd
Intensity, 0°	3128 cd

### Zonal Lumen summary

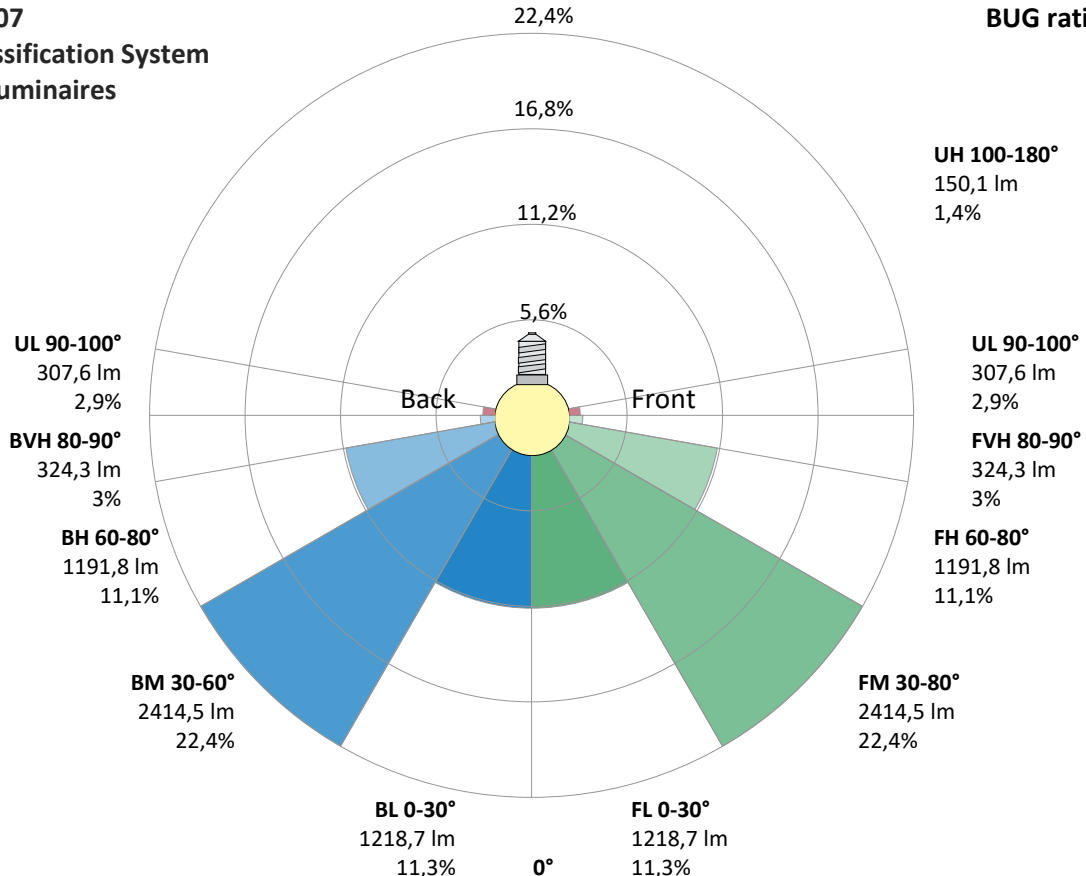
Zone (γ)	Lumen	% Total
0-30°	2440 lm	22,7%
0-40°	4014 lm	37,3%
0-60°	7272 lm	67,6%
60-90°	3032 lm	28,2%
70-100°	1981 lm	18,4%
90-120°	399 lm	3,7%
0-90°	10304 lm	95,8%
90-180°	453 lm	4,2%
0-180°	10756 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1219 lm	11,3%
Medium(30-60°)	2414 lm	22,4%
High(60-80°)	1192 lm	11,1%
Very high(80-90°)	324 lm	3,0%
<b>Back light</b>		
Low(0-30°)	1219 lm	11,3%
Medium(30-60°)	2414 lm	22,4%
High(60-80°)	1192 lm	11,1%
Very high(80-90°)	324 lm	3,0%
<b>Uplight</b>		
Low(90-100°)	308 lm	2,9%
High(100-180°)	150 lm	1,4%

## IESNA TM-15-07 Luminaire Classification System For Outdoor Luminaires

**BUG rating B3 U3 G3**



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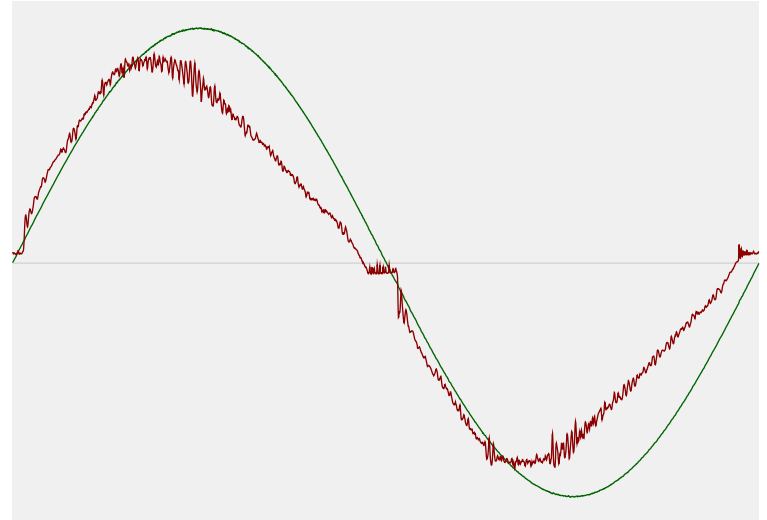


## Power Details

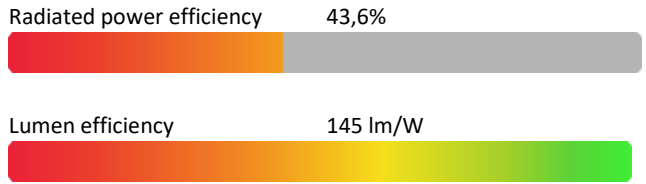
### Input Power

Power feed to light source	74,4 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,334 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	76,96 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	11,54%
Total harmonic distortion of the voltage	0,07%

### Input Power Curve



### Efficiency



## Stabilization Details

### Warmup Conditions

Stable period	15 min
Stable change max	2,0%
Minimum time	15 min

### Color Temperature Change

CCT start	3993 K
CCT shift	+7 K
CCT end	4000 K

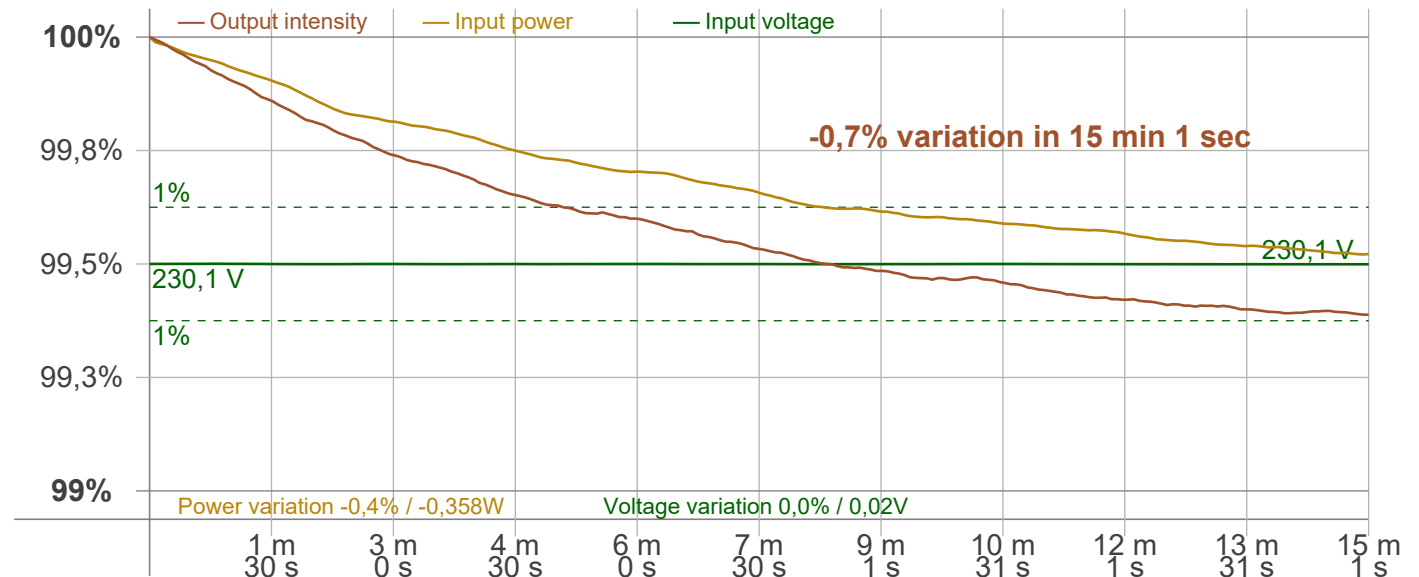
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,7%

### Output Change

Output start	10824 lm
Output change	-68 lm
Output end	10756 lm

### Stabilization Curve



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## Flicker /TLA details

Flicker Meter Type Viso Systems LabFlicker  
 Frequency of input power 50 Hz  
 Flicker/TLA sample rate 20000 samples/s

**Measurement time**  
 PstLM 180 sec  
 All other indices 1,2 sec

### Flicker indices according to Illuminating Engineering Society (IES)

Flicker frequency 100,5 Hz  
 Percent Flicker 0,88 %  
 Flicker index 0

### Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz 0,02 %  
 JA8/10 90 Hz 0,03 %  
 JA8/10 200 Hz 0,86 %  
 JA8/10 400 Hz 0,87 %  
 JA8/10 1000 Hz 0,88 %

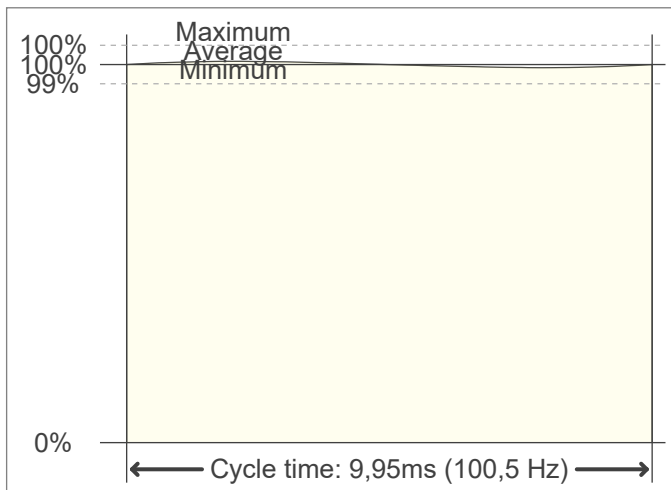
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,01  
 SVM value (80 < F < 2000 Hz) 0,03

### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,01

### Flicker frame (frame of one flicker period in time domain)



### Flicker FFT (flicker curve in frequency domain)



### IEEE 1789 Frequency/modulation plot

