

# Light Measurement Report

Print date: 4-9-2025

Measurement date and time: 4-9-2025 15:42:54 – Measurement no. VFR-250904-2937-MS

Measurement tracking No. and Link: [VT250904-002230](#)

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°  
2,5°  
12,10 m  
76,7 W – PF 0,98 – DPF 0,99  
230 V – 0,339 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

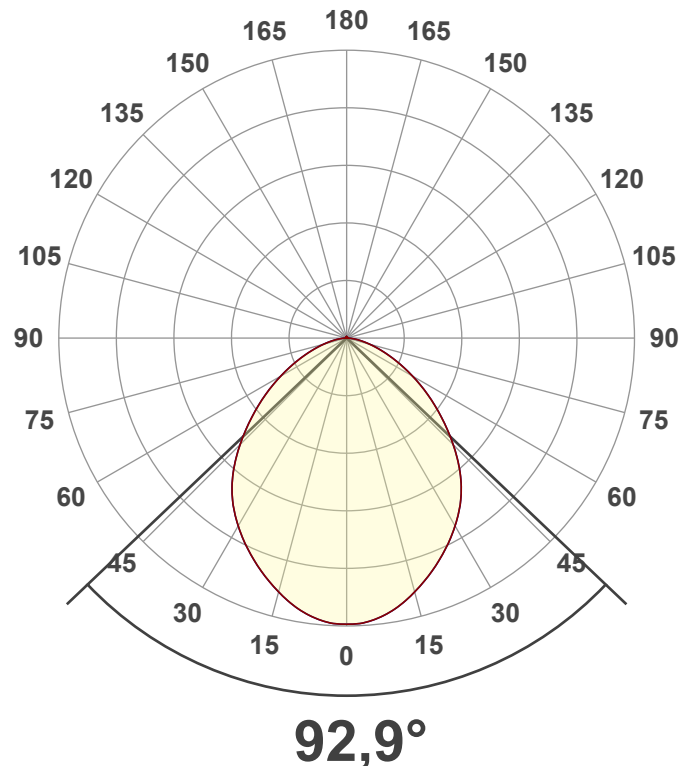
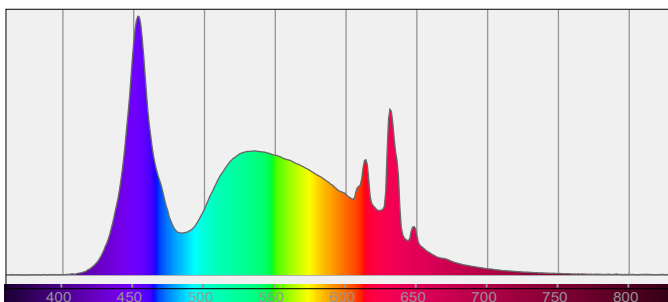
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

813789-6500K  
813789-6500K – Dutchfulfillment  
LICHTLIJN MODULE | JUPITER | 65-80W | 90° | 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

12054 lm – 0,97% / 99,03%  
157 lm/W  
5466 cd – 92,9°  
CCT = 6387 K / 6387 K  
CRI 84,0  
 $R_f$  83,6 –  $R_g$  96,4  
Duv 0,0081 – SDCM n/a  
SVM 0,01 – PstLM 0,02



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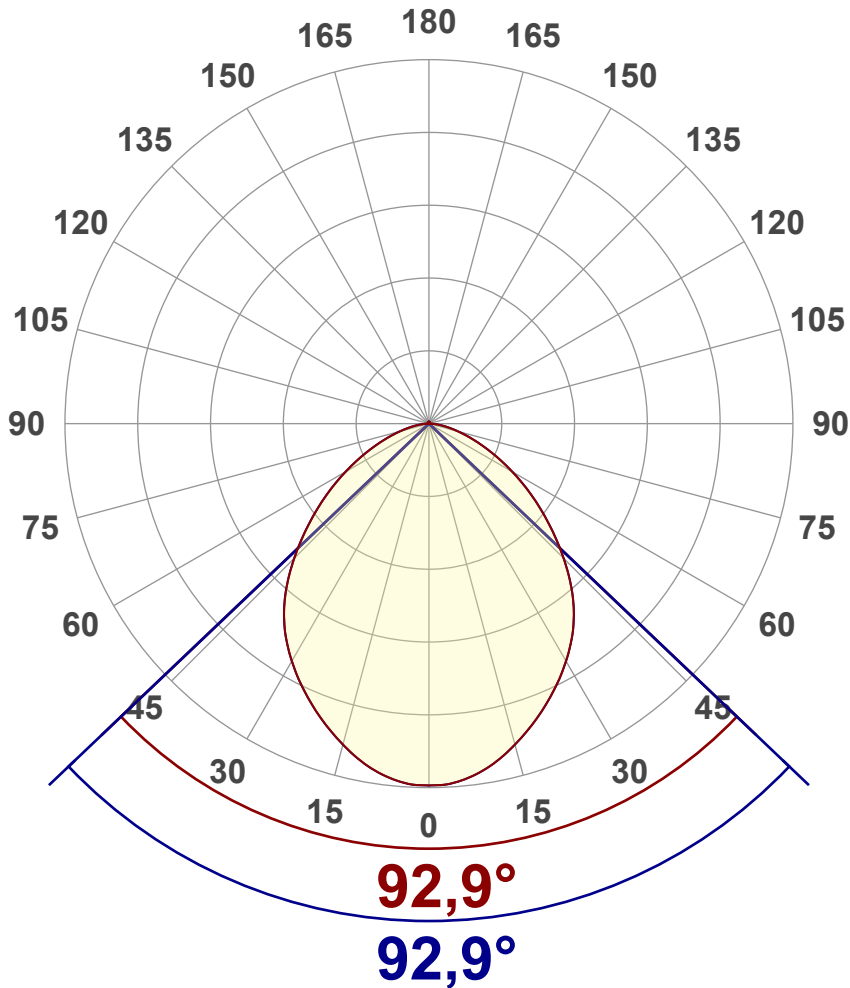
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	12054 lm
Lumen Up% / Down%	0,97% / 99,03%
Peak Intensity	5466 cd
Beam Angle (50%)	92,9°
Beam Angle (90%)	92,9°
Beam Angle (10%)	92,9°

## Cut-off Angle

Average 2,5%	167,7°
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## Field Angle

Average 10%	146,4°
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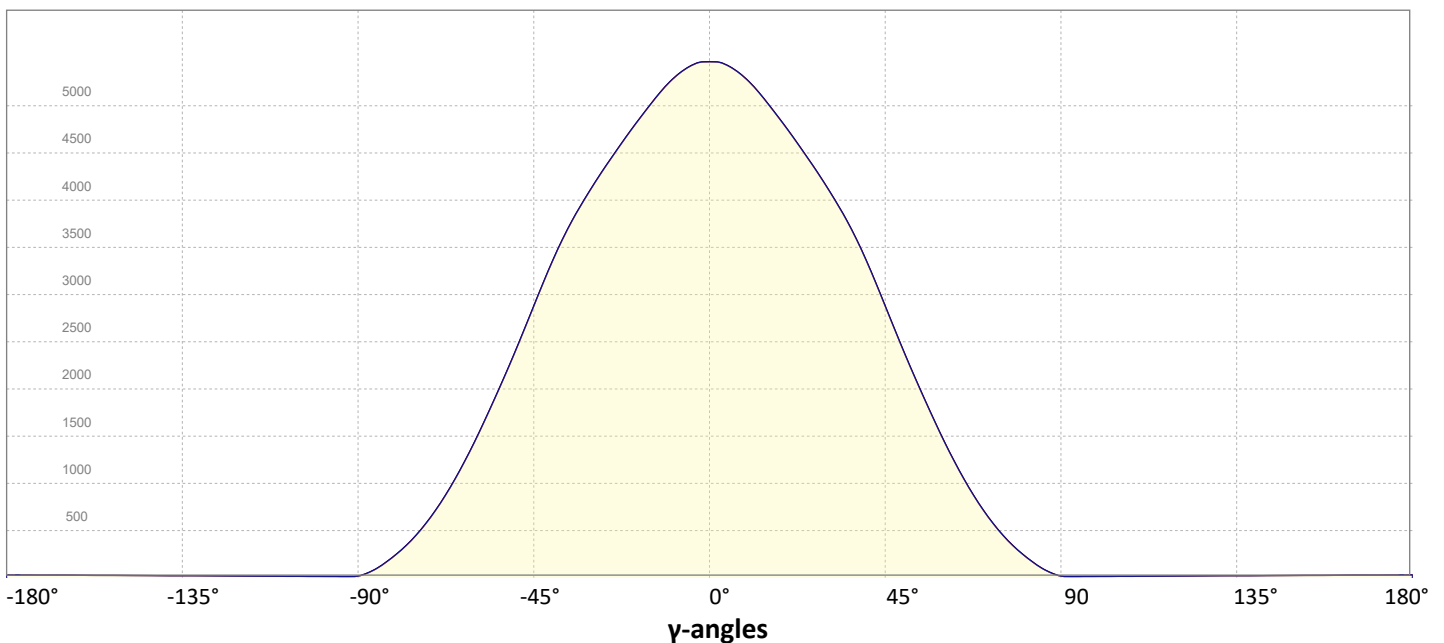
## Intensity Ratio

In 120° cone	85,1%
In 90° cone	62,2%

**C000-C180**

**C090-C270**

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



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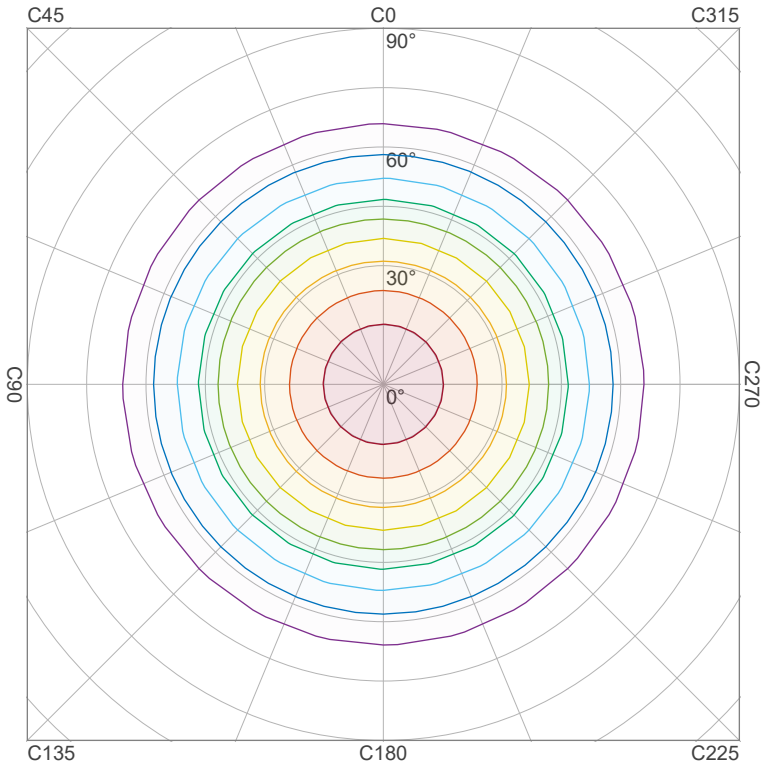
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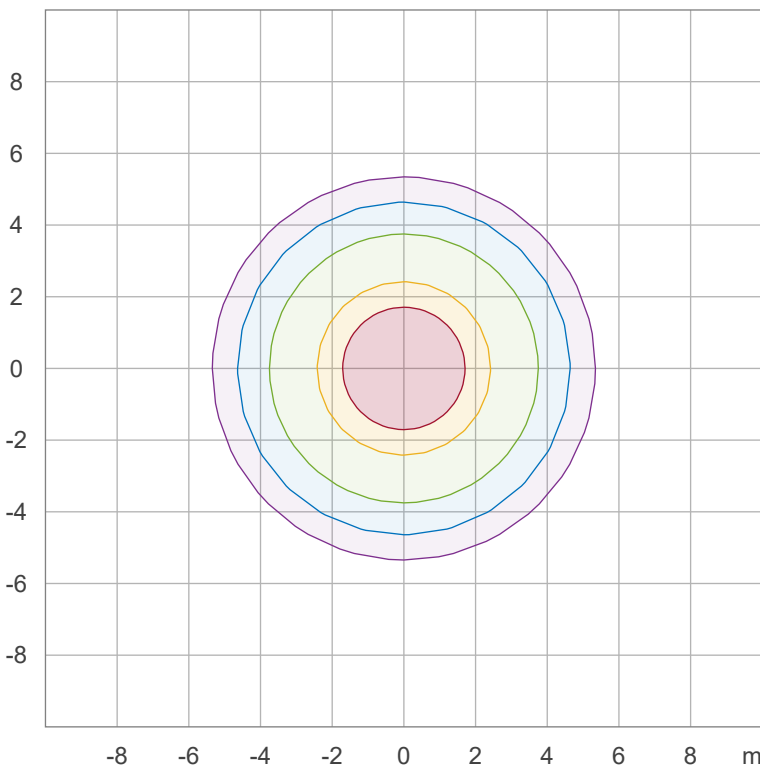
## Iso-intensity Diagram (Iso-candela)



90 %	4919,0 cd
80 %	4372,5 cd
70 %	3825,9 cd
60 %	3279,3 cd
50 %	2732,8 cd
40 %	2186,2 cd
30 %	1639,7 cd
20 %	1093,1 cd
10 %	546,6 cd

Peak intensity: 5465,6 cd  
Number of c-planes: 12

## Iso-illuminance Diagram (Iso-lux)



50,0 %	303,6 lx
30,0 %	182,2 lx
10,0 %	60,7 lx
5,0 %	30,4 lx
3,0 %	18,2 lx

Peak illuminance: 607,3 lx  
Mounting height: 3,0 m  
Number of c-planes: 12

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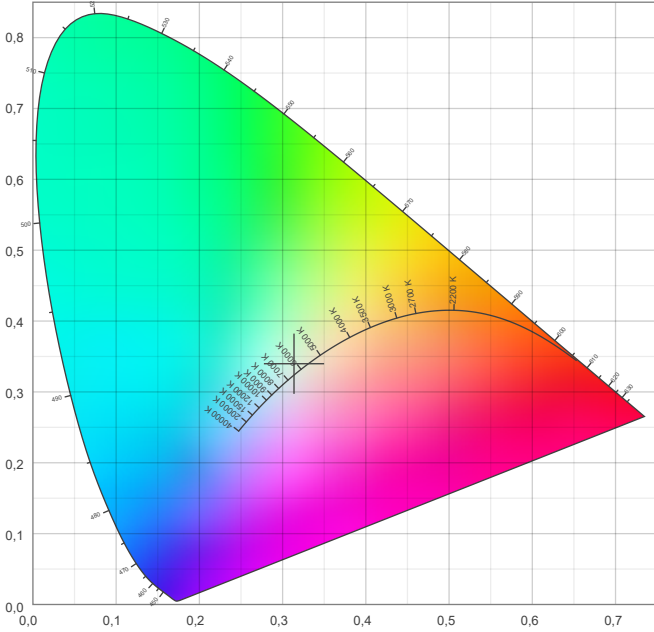


## Color details

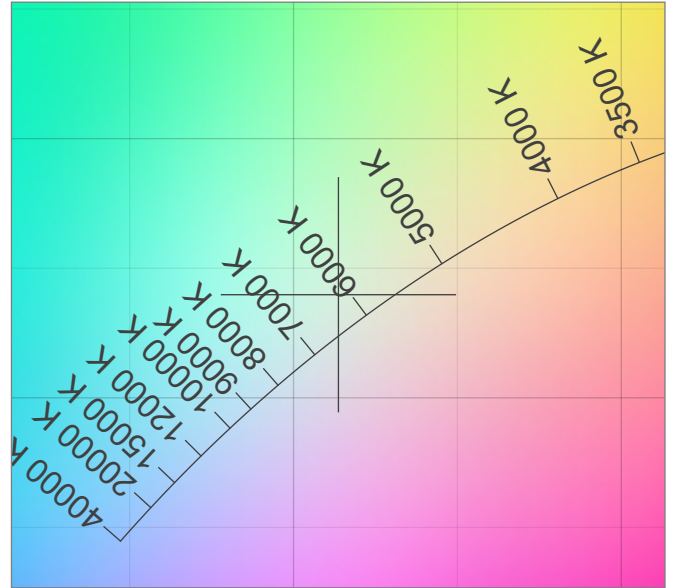
Correlated Color Temperature, Target CCT = 6387 K  
 Correlated Color Temperature, Measured CCT = 6387 K  
 Color Rendering Index CRI 84,0  
 Color Rendering Index, R9 (red component) R9 = 36,6  
 Color Rendering TM30-18 R<sub>f</sub> 83,6 – R<sub>g</sub> 96,4  
 Color Quality Scale CQS = 83,3

MacAdam Steps  
 Color coordinates CIE 1931 (x;y) = (0,314;0,340)  
 Color coordinate CIEs 1960 (u;v) = (0,195;0,316)  
 Color deviation from BBL Duv = 0,0081  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,195;0,474)

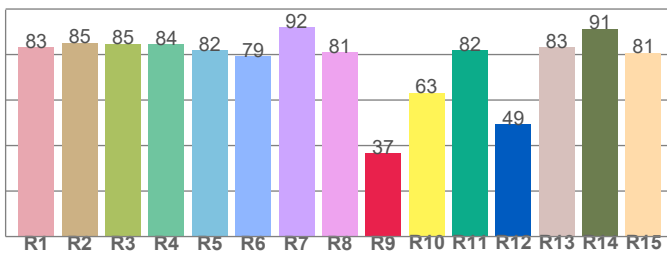
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



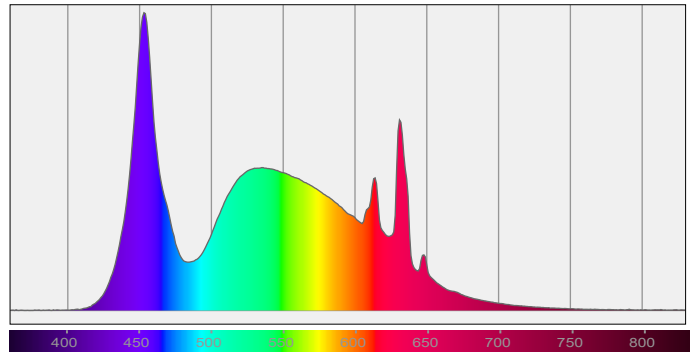
### Color Rendering Index per reference color (CIE 1995)



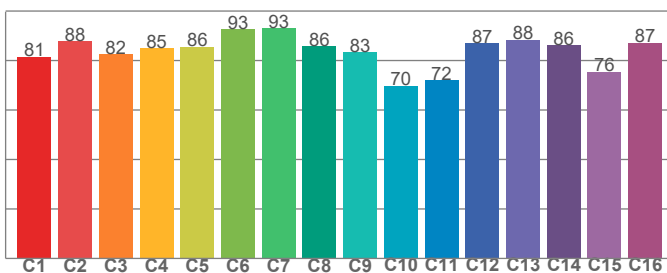
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
83,1	85,3	84,8	84,5	81,9	79,3	92,0	81,0	36,6	63,1	81,8	49,3	83,2	91,4	80,8

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



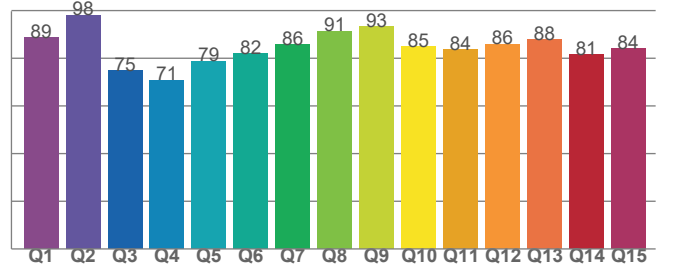
### TM30-18 R<sub>f</sub>-values per hue bin



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
81,5	87,8	82,5	85,0	85,6	92,6	93,1	85,8	83,4	69,8	72,1	86,9	88,3	86,1	75,5	87,1

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88,7	98,0	74,8	70,9	78,8	81,9	85,6	91,4	93,2	84,8	83,6	85,9	87,7	81,5	84,0

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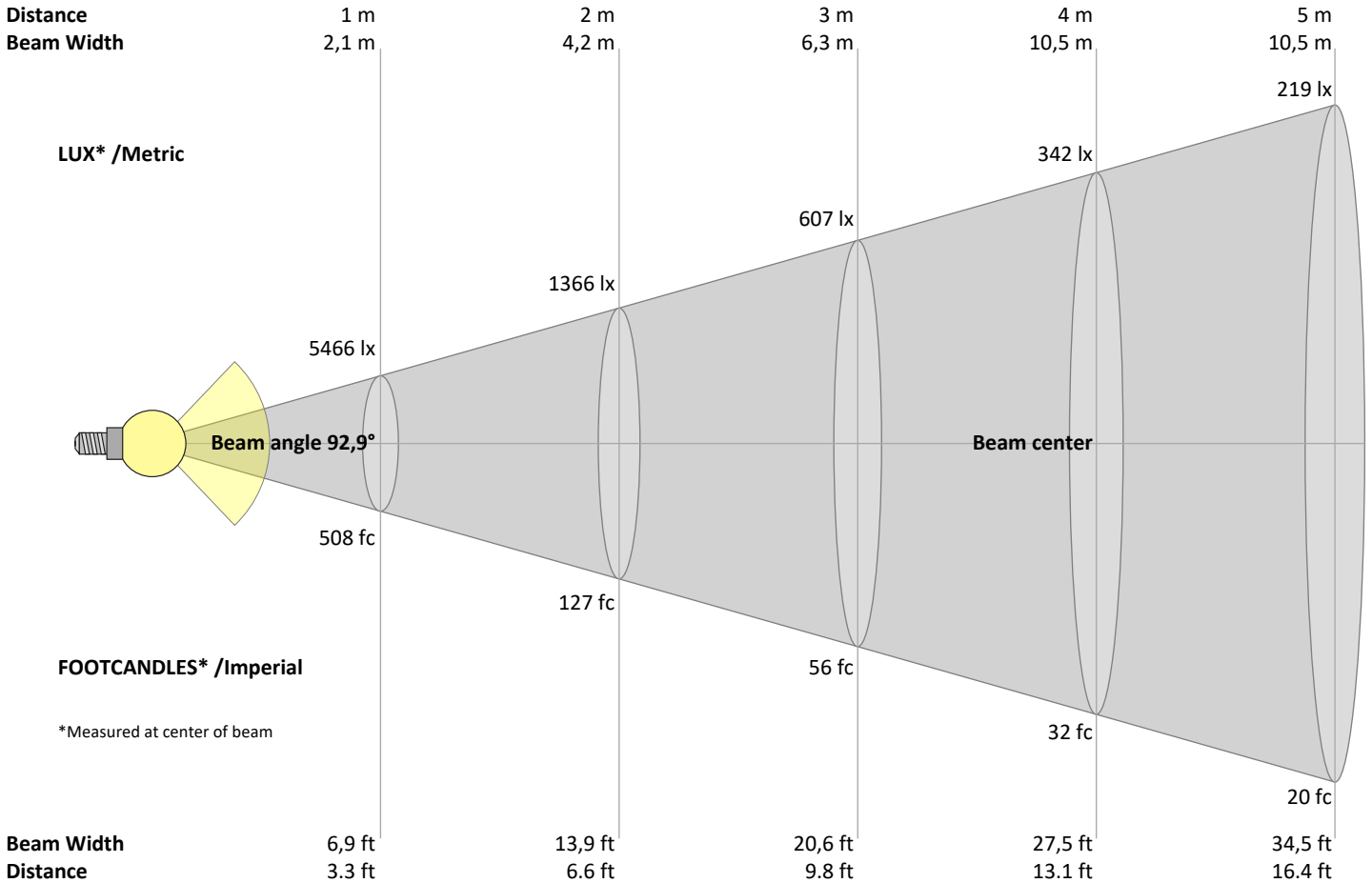
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Operator:



## 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
5466	1366	607	342	219	152	112	85	67	55	45	38	32	28	24	21	19	17	15	14	lux
507,8	126,9	56,4	31,7	20,3	14,1	10,4	7,9	6,3	5,1	4,2	3,5	3	2,6	2,3	2	1,8	1,6	1,4	1,3	fc

### Intensities in 0° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
5466	5417	5260	5020	4748	4455	4142	3796	3374	2878	2373	1899	1454	1058	724	458	256	105	19	14	cd
100%	99%	96%	92%	87%	82%	76%	69%	62%	53%	43%	35%	27%	19%	13%	8%	5%	2%	0%	0%	of 0°val

### Intensities in 90° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
5466	5417	5260	5020	4748	4455	4142	3796	3374	2878	2373	1899	1454	1058	724	458	256	105	19	14	cd
100%	99%	96%	92%	87%	82%	76%	69%	62%	53%	43%	35%	27%	19%	13%	8%	5%	2%	0%	0%	of 0°val

### Intensities in 180° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
5466	5417	5260	5020	4748	4455	4142	3796	3374	2878	2373	1899	1454	1058	724	458	256	105	19	14	cd
100%	99%	96%	92%	87%	82%	76%	69%	62%	53%	43%	35%	27%	19%	13%	8%	5%	2%	0%	0%	of 0°val

### Intensities in 270° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
5466	5417	5260	5020	4748	4455	4142	3796	3374	2878	2373	1899	1454	1058	724	458	256	105	19	14	cd
100%	99%	96%	92%	87%	82%	76%	69%	62%	53%	43%	35%	27%	19%	13%	8%	5%	2%	0%	0%	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	26,0	27,1	26,2	27,4	27,6	26,4	27,4	26,6	27,8	28,0
	3H	26,7	27,8	27,1	28,1	28,3	27,2	28,3	27,6	28,6	28,8
	4H	26,9	28,0	27,4	28,3	28,6	27,5	28,6	27,9	28,8	29,1
	6H	27,1	28,1	27,5	28,4	28,8	27,7	28,7	28,1	29,0	29,4
	8H	27,2	28,1	27,5	28,4	28,8	27,8	28,7	28,1	29,0	29,5
	12H	27,1	28,0	27,5	28,4	28,8	27,8	28,7	28,2	29,0	29,5
4H	2H	26,3	27,4	26,8	27,7	28,0	26,6	27,7	27,1	28,0	28,3
	3H	27,3	28,2	27,7	28,6	29,0	27,7	28,6	28,1	29,0	29,4
	4H	27,6	28,4	28,0	28,8	29,4	28,1	28,9	28,5	29,3	29,9
	6H	27,8	28,6	28,3	29,0	29,3	28,3	29,1	28,9	29,5	29,9
	8H	27,8	28,6	28,4	28,9	29,3	28,4	29,1	29,0	29,5	29,9
	12H	27,8	28,4	28,4	28,9	29,4	28,5	29,1	29,0	29,5	30,0
8H	4H	27,7	28,4	28,2	28,8	29,2	28,2	28,9	28,7	29,3	29,6
	6H	28,0	28,5	28,5	29,0	29,6	28,5	29,1	29,0	29,5	30,1
	8H	28,1	28,6	28,6	29,1	29,8	28,7	29,1	29,2	29,7	30,3
	12H	28,2	28,5	28,7	29,1	29,7	28,8	29,2	29,4	29,7	30,3
12H	4H	27,7	28,3	28,2	28,7	29,2	28,1	28,7	28,6	29,2	29,6
	6H	28,0	28,5	28,6	29,0	29,7	28,6	29,0	29,1	29,5	30,2
	8H	28,1	28,5	28,7	29,0	29,7	28,7	29,1	29,3	29,6	30,2

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

S = 1.0H	0,2 / -0,3	0,2 / -0,2
S = 1.5H	0,5 / -0,8	0,4 / -0,7
S = 2.0H	1,1 / -1,5	1,1 / -1,4

## 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	119	119	119	119	116	116	116	116	111	111	106	106	106	101	101	101	99	
1	110	106	102	98	107	103	100	97	99	96	93	95	93	90	91	89	88	86
2	101	93	87	82	98	91	86	81	88	83	79	84	81	77	81	78	75	73
3	93	83	76	70	90	81	75	69	78	72	68	76	71	66	73	69	65	63
4	85	74	66	60	83	73	65	60	70	64	59	68	62	58	66	61	57	55
5	79	67	59	52	77	66	58	52	64	57	51	62	56	51	60	54	50	48
6	73	61	52	46	71	60	52	46	58	51	45	56	50	45	54	49	45	43
7	68	55	47	41	66	54	47	41	53	46	41	51	45	40	50	44	40	38
8	64	51	43	37	62	50	42	37	49	42	37	47	41	36	46	40	36	34
9	59	47	39	34	58	46	39	33	45	38	33	44	37	33	43	37	33	31
10	56	43	36	31	55	43	35	30	42	35	30	41	34	30	40	34	30	28

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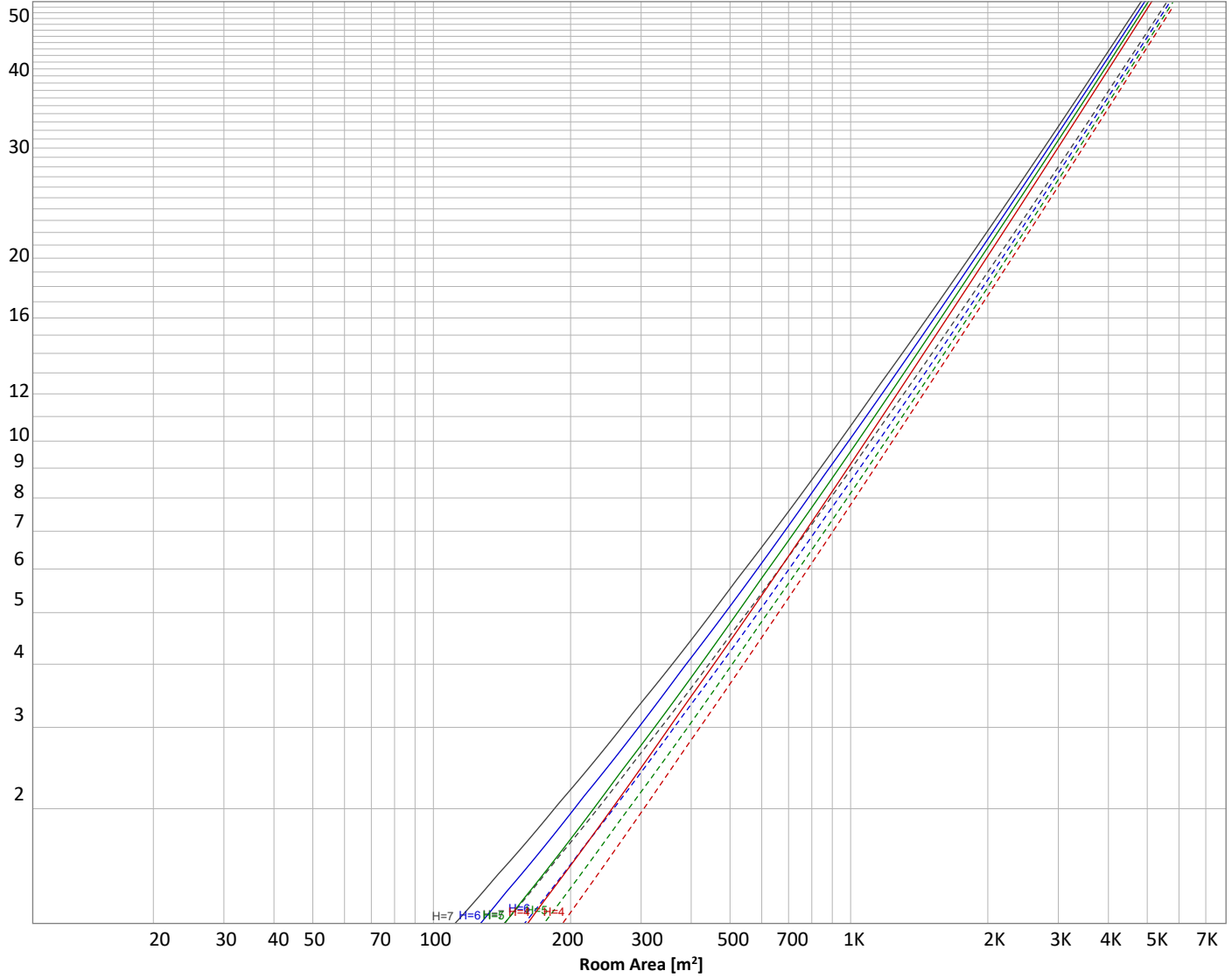
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 12054 lm			
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) Wall reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50
E <sub>work</sub> = Average lux on work area =	100 lx	—————	50	30
				Floor reflectance
				20

### Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
512 lm	1413 lm	2053 lm	2365 lm	2216 lm	1699 lm	1056 lm	495 lm	127 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
15,4 lm	15,7 lm	16,5 lm	17,0 lm	16,2 lm	14,5 lm	11,6 lm	7,61 lm	2,62 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	512 lm	4,2%
10-20°	1413 lm	11,7%
20-30°	2053 lm	17,0%
30-40°	2365 lm	19,6%
40-50°	2216 lm	18,4%
50-60°	1699 lm	14,1%
60-70°	1056 lm	8,8%
70-80°	495 lm	4,1%
80-90°	127 lm	1,1%
90-100°	15 lm	0,1%
100-110°	16 lm	0,1%
110-120°	16 lm	0,1%
120-130°	17 lm	0,1%
130-140°	16 lm	0,1%
140-150°	15 lm	0,1%
150-160°	12 lm	0,1%
160-170°	8 lm	0,1%
170-180°	3 lm	0,0%
<b>Total</b>	<b>12054 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	5466 cd
Intensity, 90°	19 cd
Intensity, 0°	5466 cd

### Zonal Lumen summary

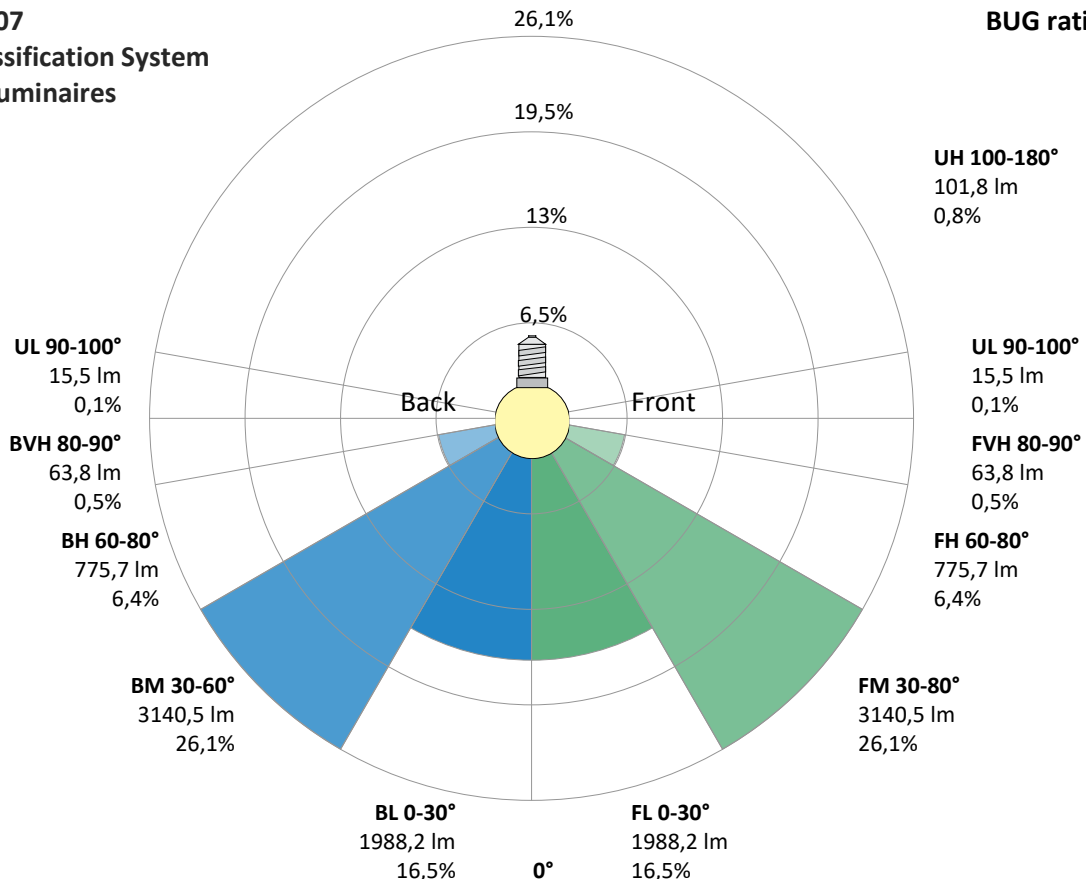
Zone (γ)	Lumen	% Total
0-30°	3978 lm	33,0%
0-40°	6342 lm	52,6%
0-60°	10258 lm	85,1%
60-90°	1678 lm	13,9%
70-100°	637 lm	5,3%
90-120°	48 lm	0,4%
0-90°	11936 lm	99,0%
90-180°	117 lm	1,0%
0-180°	12054 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1988 lm	16,5%
Medium(30-60°)	3140 lm	26,1%
High(60-80°)	776 lm	6,4%
Very high(80-90°)	64 lm	0,5%
<b>Back light</b>		
Low(0-30°)	1988 lm	16,5%
Medium(30-60°)	3140 lm	26,1%
High(60-80°)	776 lm	6,4%
Very high(80-90°)	64 lm	0,5%
<b>Uplight</b>		
Low(90-100°)	15 lm	0,1%
High(100-180°)	102 lm	0,8%

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

**BUG rating B3 U3 G1**



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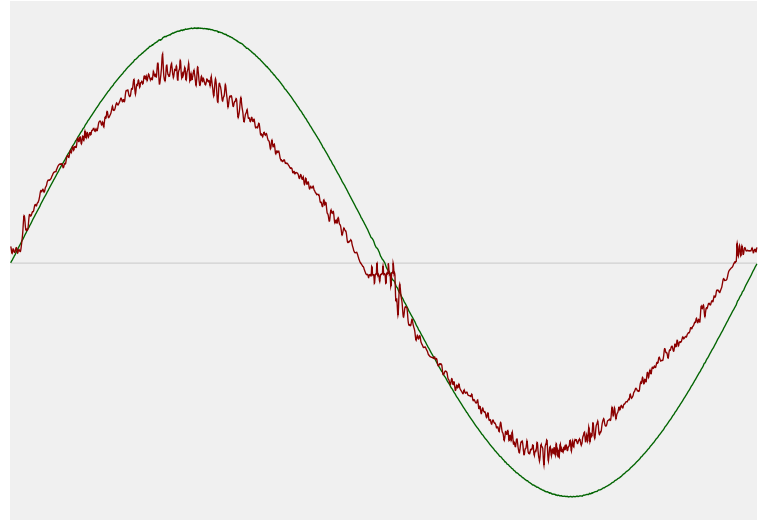


## Power Details

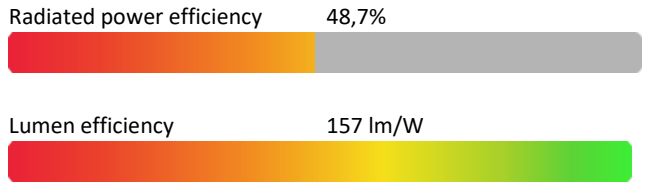
### Input Power

Power feed to light source	76,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,339 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	77,96 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,98
Total harmonic distortion of the current	6,23%
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	6387 K
CCT shift	+0 K
CCT end	6387 K

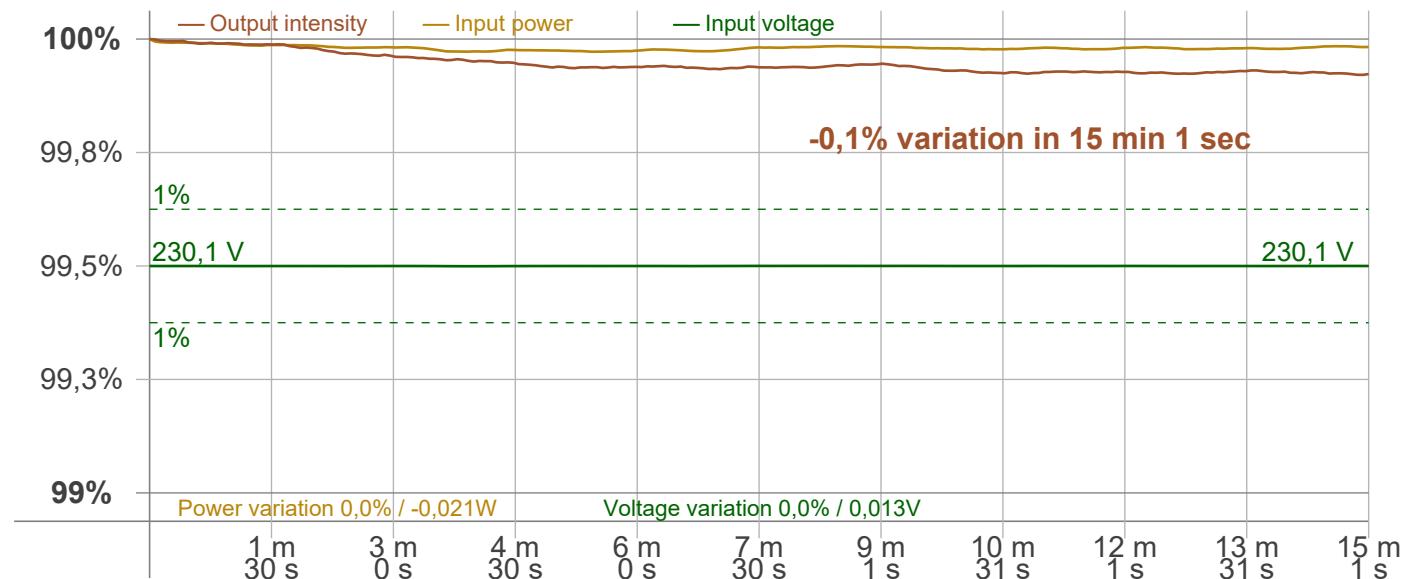
### Warmup Result

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

### Output Change

Output start	12064 lm
Output change	-10 lm
Output end	12054 lm

### Stabilization Curve



# Light Measurement Report

Print date: 4-9-2025

Measurement date and time: 4-9-2025 15:42:54 – Measurement no. VFR-250904-2937-MS

Measurement tracking No. and Link: [VT250904-002230](#)

Operator:



## 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 0,32 %  
 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 0,31 %  
 JA8/10 400 Hz 0,31 %  
 JA8/10 1000 Hz 0,31 %

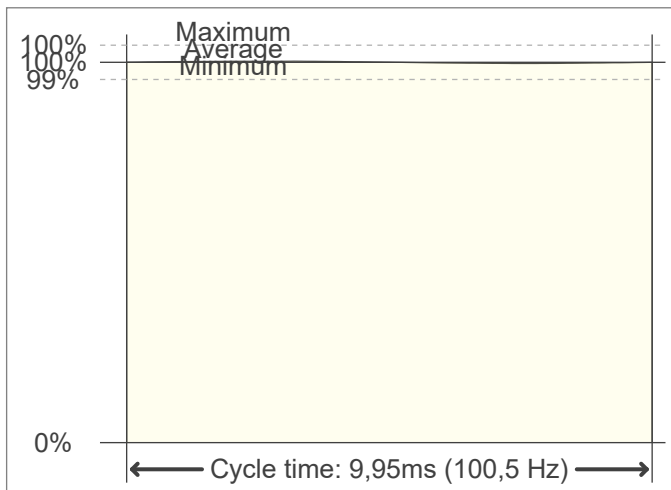
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,02  
 SVM value (80 < F < 2000 Hz) 0,01

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

Perception metric, Assist Mp 0,02

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



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



### IEEE 1789 Frequency/modulation plot

