

# Light Measurement Report

Print date: 14-4-2025

Measurement date and time: 3-4-2025 11:00:56 – Measurement no. VFR-250403-0555-MS

Measurement tracking No. and Link: [VT250403-006892](#)

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

36 planes – 10°  
5°  
12,10 m  
76,3 W – PF 0,97 – DPF 0,98  
230 V – 0,342 A  
50 Hz  
Lamp stabilized in 15 min 2 sec – 2,0%

## Tested Light Source

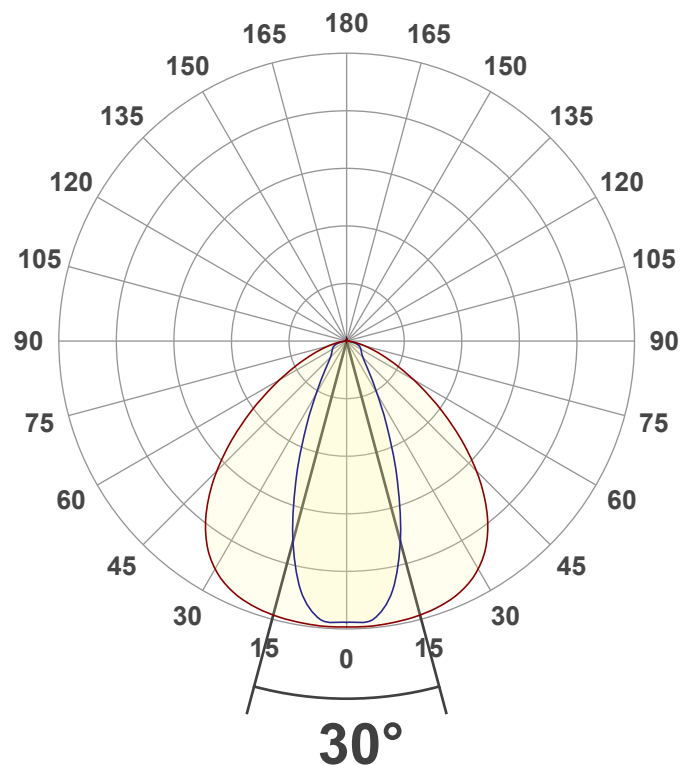
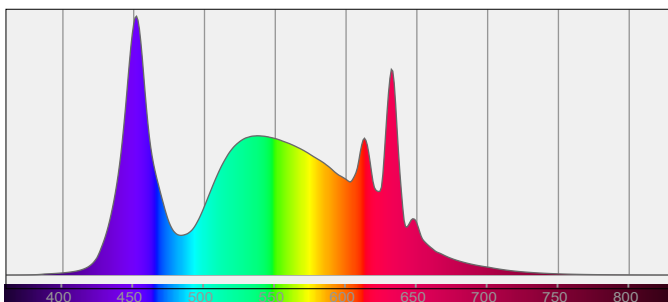
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

810764-5700K  
810764-5700K – Dutchfulfillment  
LICHTLIJN MODULE | JUPITER | 43-80W | 30° | 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

11869 lm – 0,97% / 99,03%  
156 lm/W  
9255 cd – 30°  
CCT = 5700 K / 5618 K  
CRI 85,5  
 $R_f$  84,3 –  $R_g$  100,0  
Duv 0,0039 – SDCM 5,4  
SVM 0,03 – PstLM 0,02



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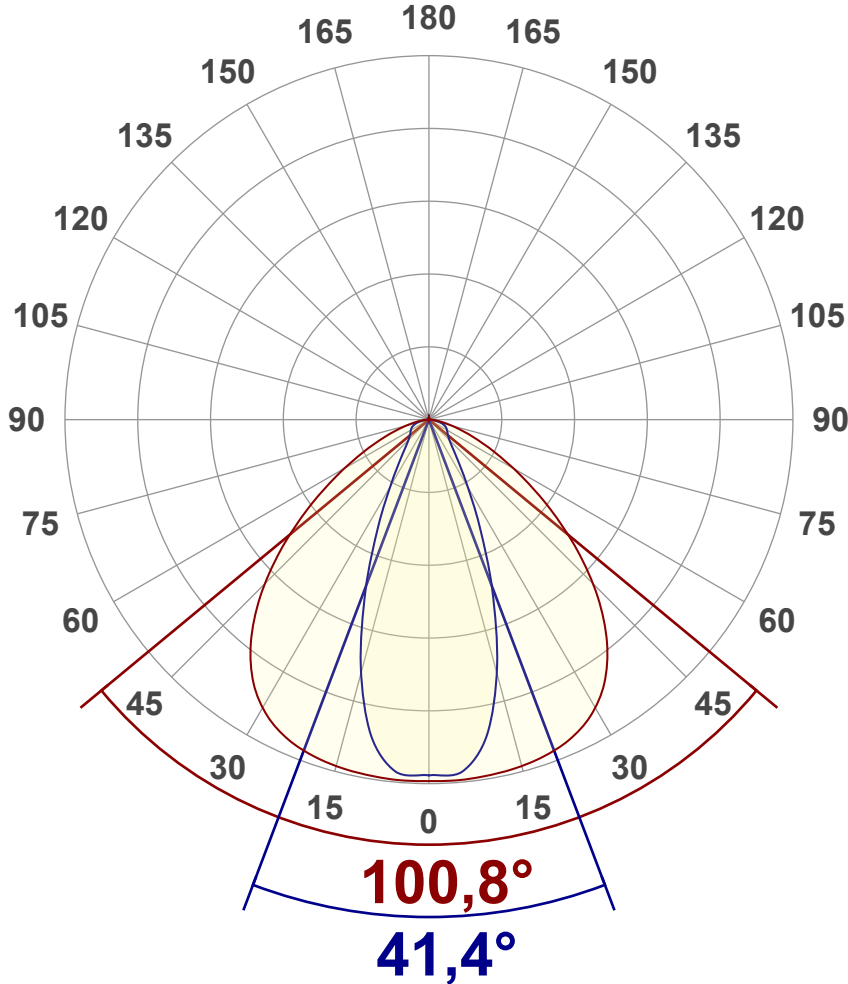
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Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	11869 lm
Lumen Up% / Down%	0,97% / 99,03%
Peak Intensity	9255 cd
Beam Angle (50%)	30°
Beam Angle (90%)	41,4°
Beam Angle (10%)	94,6°

## Cut-off Angle

Average 2,5%	157,4°
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## Field Angle

Average 10%	107,5°
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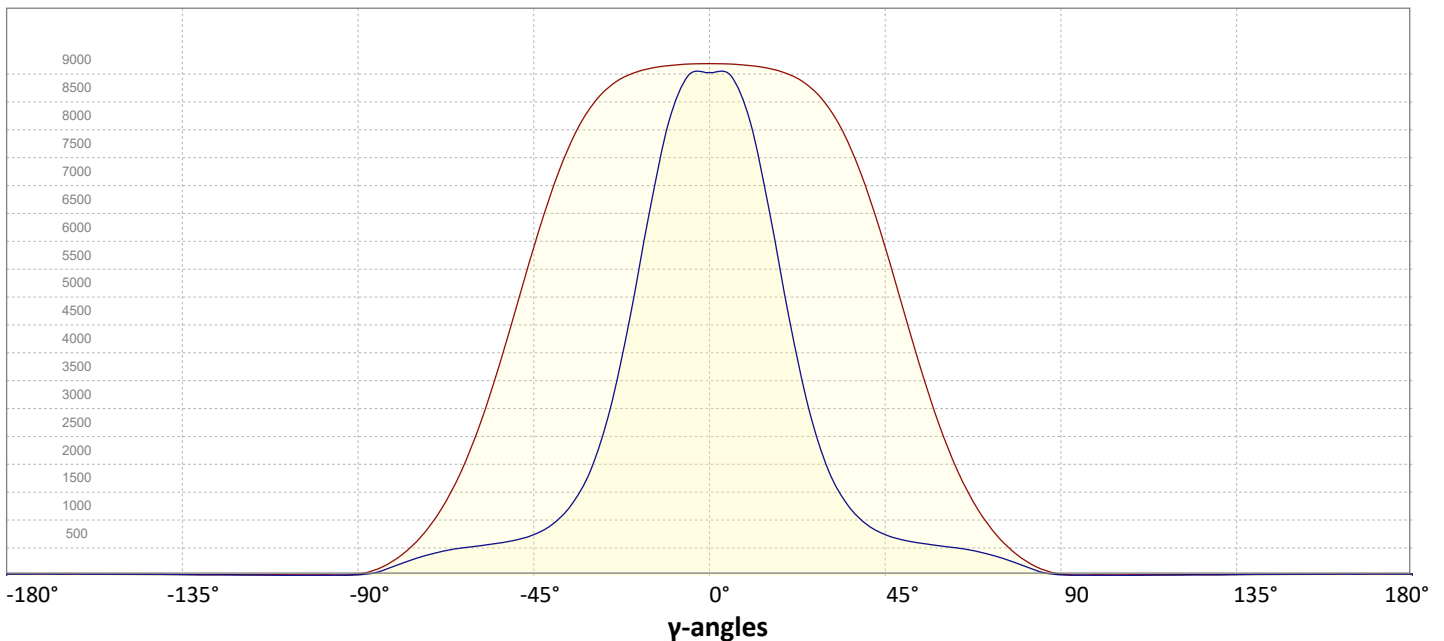
## Intensity Ratio

In 120° cone	88,6%
In 90° cone	72,5%

**C000-C180**

**C090-C270**

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



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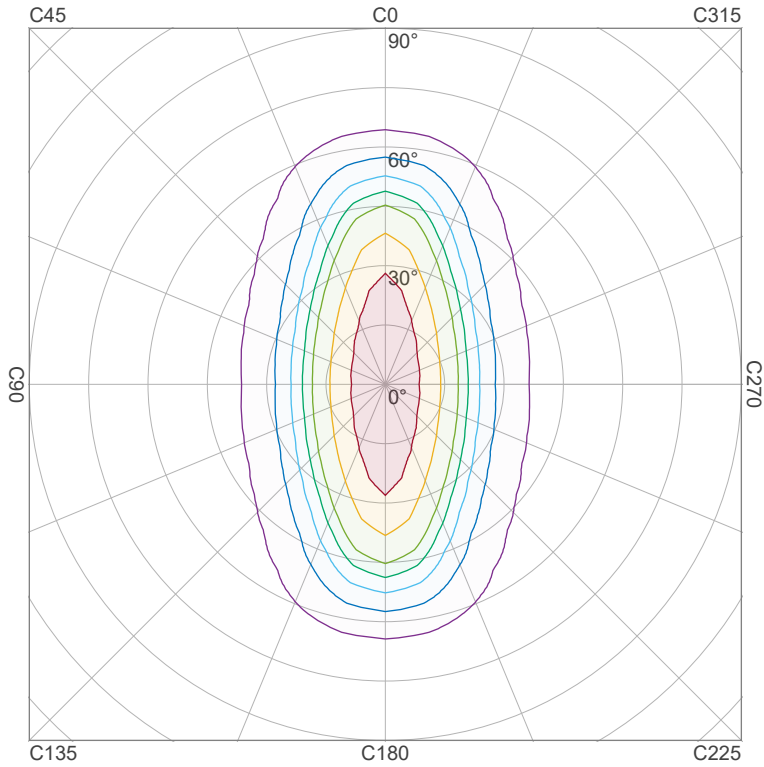
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Operator:



## Iso-intensity Diagram (Iso-candela)

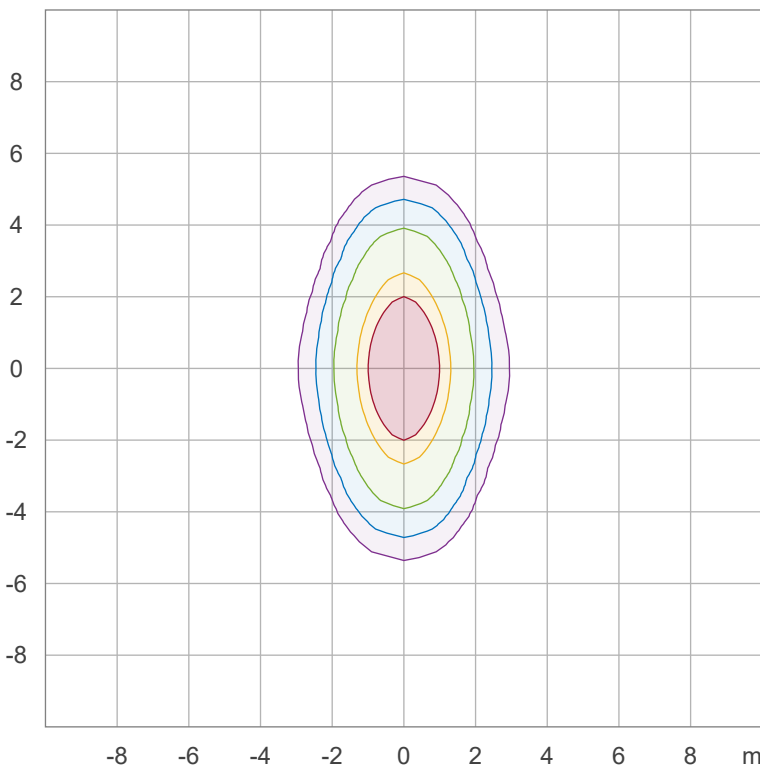


90 %	8297,2 cd
80 %	7375,3 cd
70 %	6453,4 cd
60 %	5531,5 cd
50 %	4609,6 cd
40 %	3687,6 cd
30 %	2765,7 cd
20 %	1843,8 cd
10 %	921,9 cd

Peak intensity: 9219,1 cd

Number of c-planes: 36

## Iso-illuminance Diagram (Iso-lux)



50,0 %	511,9 lx
30,0 %	307,2 lx
10,0 %	102,4 lx
5,0 %	51,2 lx
3,0 %	30,7 lx

Peak illuminance: 1023,9 lx

Mounting height: 3,0 m

Number of c-planes: 36

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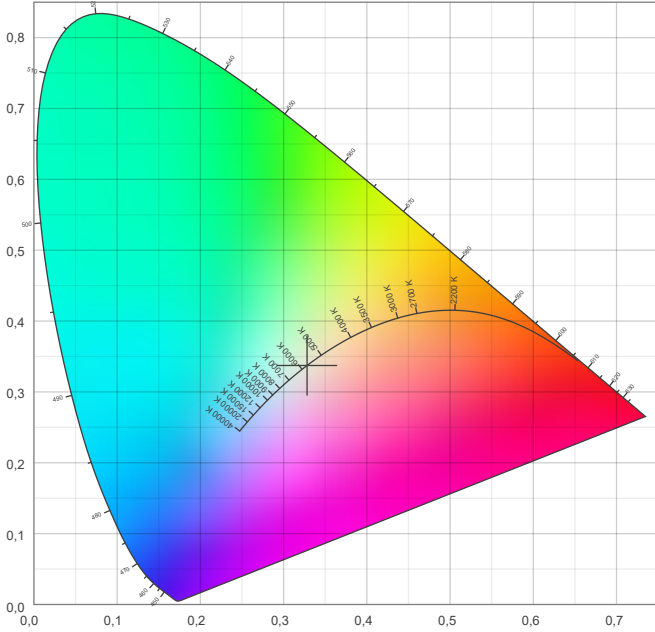


## Color details

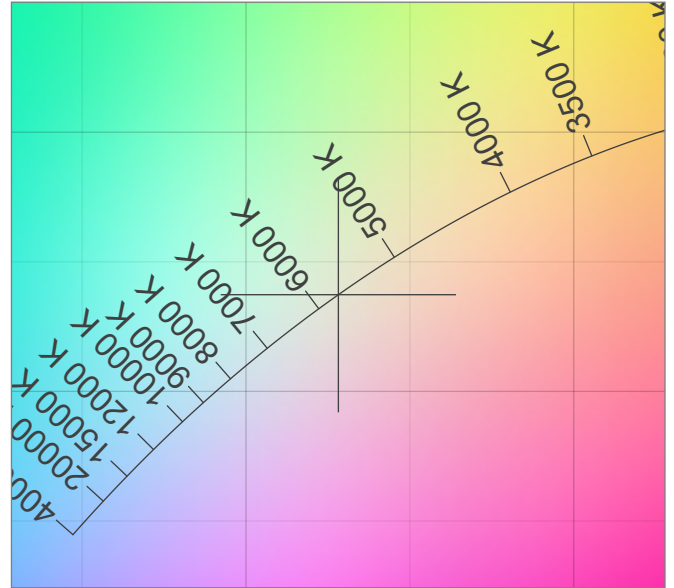
Correlated Color Temperature, Target CCT = 5700 K  
 Correlated Color Temperature, Measured CCT = 5618 K  
 Color Rendering Index CRI 85,5  
 Color Rendering Index, R9 (red component) R9 = 54,7  
 Color Rendering TM30-18 R<sub>f</sub> 84,3 – R<sub>g</sub> 100,0  
 Color Quality Scale CQS = 84,0

MacAdam Steps SDCM = 5,4  
 Color coordinates CIE 1931 (x;y) = (0,328;0,337)  
 Color coordinate CIEs 1960 (u;v) = (0,205;0,317)  
 Color deviation from BBL Duv = 0,0039  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,205;0,475)

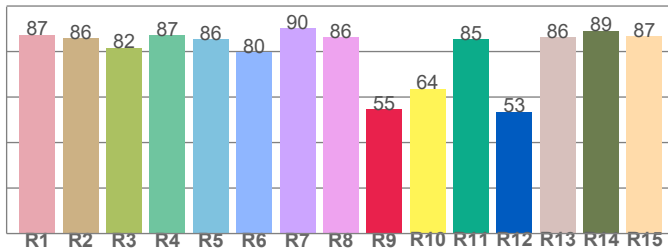
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



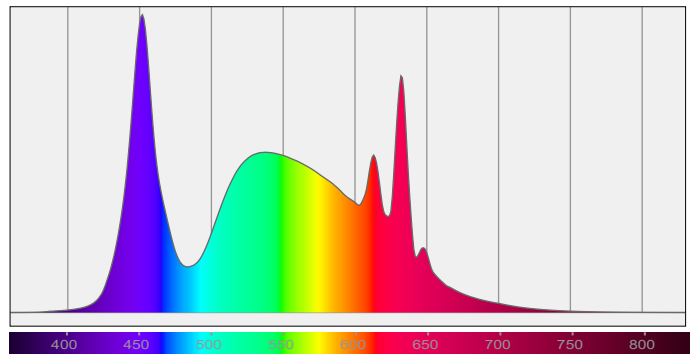
### Color Rendering Index per reference color (CIE 1995)



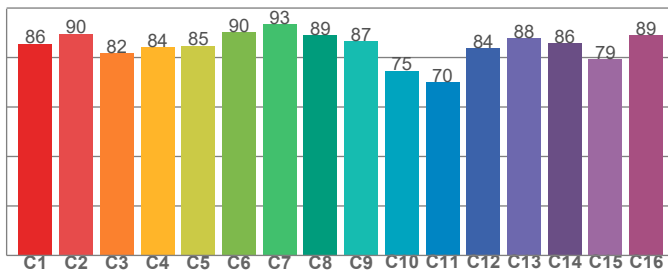
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
87,3	85,9	81,6	87,0	85,5	79,8	90,3	86,2	54,7	63,6	85,4	53,5	86,2	89,1	86,7

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



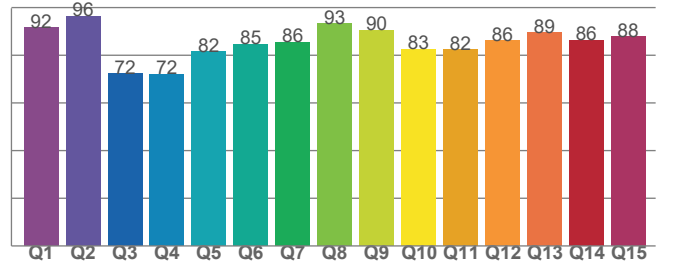
### TM30-18 Rf-values per hue bin



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
85,5	89,7	81,8	84,1	84,7	90,3	93,4	88,9	86,5	74,7	70,0	83,7	87,7	85,7	79,3	89,0

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
91,6	96,5	72,2	71,9	81,5	84,5	85,5	93,2	90,4	82,6	82,4	86,0	89,4	86,4	87,7

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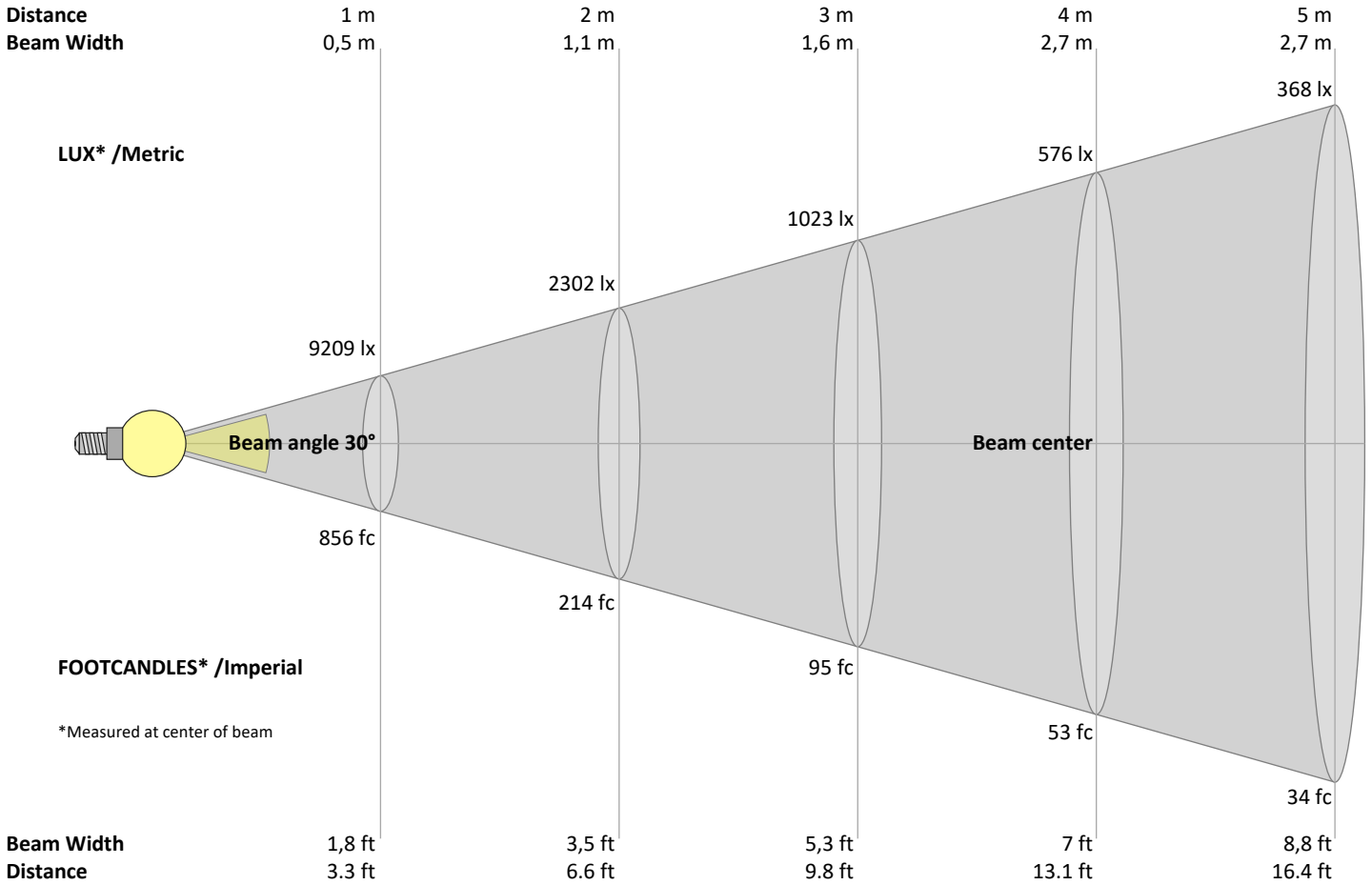
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## Beam Details



### 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
9209	2302	1023	576	368	256	188	144	114	92	76	64	54	47	41	36	32	28	26	23	lux
855,6	213,9	95,1	53,5	34,2	23,8	17,5	13,4	10,6	8,6	7,1	5,9	5,1	4,4	3,8	3,3	3	2,6	2,4	2,1	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
9209	9178	9151	9099	8993	8791	8422	7820	6957	5881	4691	3525	2502	1683	1068	627	323	130	36	16	cd
100%	100%	99%	99%	98%	95%	91%	85%	76%	64%	51%	38%	27%	18%	12%	7%	4%	1%	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
9209	8977	8211	6643	4768	3130	1988	1319	942	741	636	576	527	482	410	313	190	68	17	9	cd
100%	97%	89%	72%	52%	34%	22%	14%	10%	8%	7%	6%	6%	5%	4%	3%	2%	1%	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
9209	9178	9151	9099	8993	8791	8422	7820	6957	5881	4691	3525	2502	1683	1068	627	323	130	36	16	cd
100%	100%	99%	99%	98%	95%	91%	85%	76%	64%	51%	38%	27%	18%	12%	7%	4%	1%	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
9209	8977	8211	6643	4768	3130	1988	1319	942	741	636	576	527	482	410	313	190	68	17	9	cd
100%	97%	89%	72%	52%	34%	22%	14%	10%	8%	7%	6%	6%	5%	4%	3%	2%	1%	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	27,8	28,7	28,0	29,0	29,2	18,0	19,0	18,2	19,2	19,5
	3H	28,6	29,6	29,0	29,9	30,1	19,4	20,5	19,8	20,7	20,9
	4H	28,9	29,9	29,4	30,2	30,5	20,1	21,1	20,5	21,4	21,6
	6H	29,2	30,0	29,5	30,3	30,7	20,7	21,5	21,0	21,8	22,2
	8H	29,2	30,1	29,6	30,4	30,8	20,7	21,6	21,1	21,9	22,3
	12H	29,2	30,0	29,6	30,4	30,8	20,8	21,6	21,1	21,9	22,4
4H	2H	27,5	28,5	27,9	28,8	29,0	19,0	20,0	19,4	20,2	20,5
	3H	28,6	29,4	29,0	29,7	30,2	20,5	21,3	20,9	21,7	22,1
	4H	28,9	29,7	29,4	30,1	30,6	21,2	21,9	21,6	22,4	22,9
	6H	29,2	29,9	29,7	30,3	30,7	21,7	22,4	22,2	22,8	23,2
	8H	29,3	29,9	29,8	30,3	30,7	21,9	22,5	22,4	22,9	23,3
	12H	29,3	29,9	29,8	30,3	30,8	21,9	22,4	22,4	22,9	23,3
8H	4H	28,8	29,5	29,4	29,9	30,3	21,5	22,2	22,1	22,6	23,0
	6H	29,2	29,7	29,7	30,1	30,7	22,2	22,6	22,7	23,1	23,7
	8H	29,3	29,7	29,9	30,3	30,9	22,4	22,8	22,9	23,3	24,0
	12H	29,4	29,7	30,0	30,3	30,9	22,4	22,8	23,0	23,3	23,9
12H	4H	28,8	29,3	29,3	29,8	30,2	21,6	22,1	22,1	22,5	23,0
	6H	29,2	29,6	29,7	30,1	30,8	22,3	22,6	22,8	23,2	23,8
	8H	29,3	29,6	29,9	30,2	30,8	22,4	22,8	23,0	23,3	23,9

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

S = 1.0H	0,7 / -0,7	0,5 / -0,4
S = 1.5H	1,9 / -1,8	0,8 / -0,6
S = 2.0H	3,3 / -2,8	0,9 / -0,8

## 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	111	107	104	101	108	105	102	99	100	98	96	96	94	93	93	91	90	88
2	103	96	91	86	100	94	89	85	91	87	83	88	84	81	85	82	79	77
3	96	87	81	75	93	86	79	75	83	77	73	80	76	72	77	74	71	69
4	89	79	72	67	87	78	71	66	76	70	65	73	68	64	71	67	63	61
5	83	73	65	60	81	72	65	59	69	63	59	68	62	58	66	61	57	55
6	78	67	59	54	76	66	59	54	64	58	53	63	57	53	61	56	52	50
7	73	62	54	49	72	61	54	49	60	53	49	58	52	48	57	52	48	46
8	69	57	50	45	68	57	50	45	55	49	45	54	49	44	53	48	44	42
9	65	54	46	42	64	53	46	41	52	46	41	51	45	41	50	45	41	39
10	62	50	43	39	60	50	43	39	49	43	38	48	42	38	47	42	38	36

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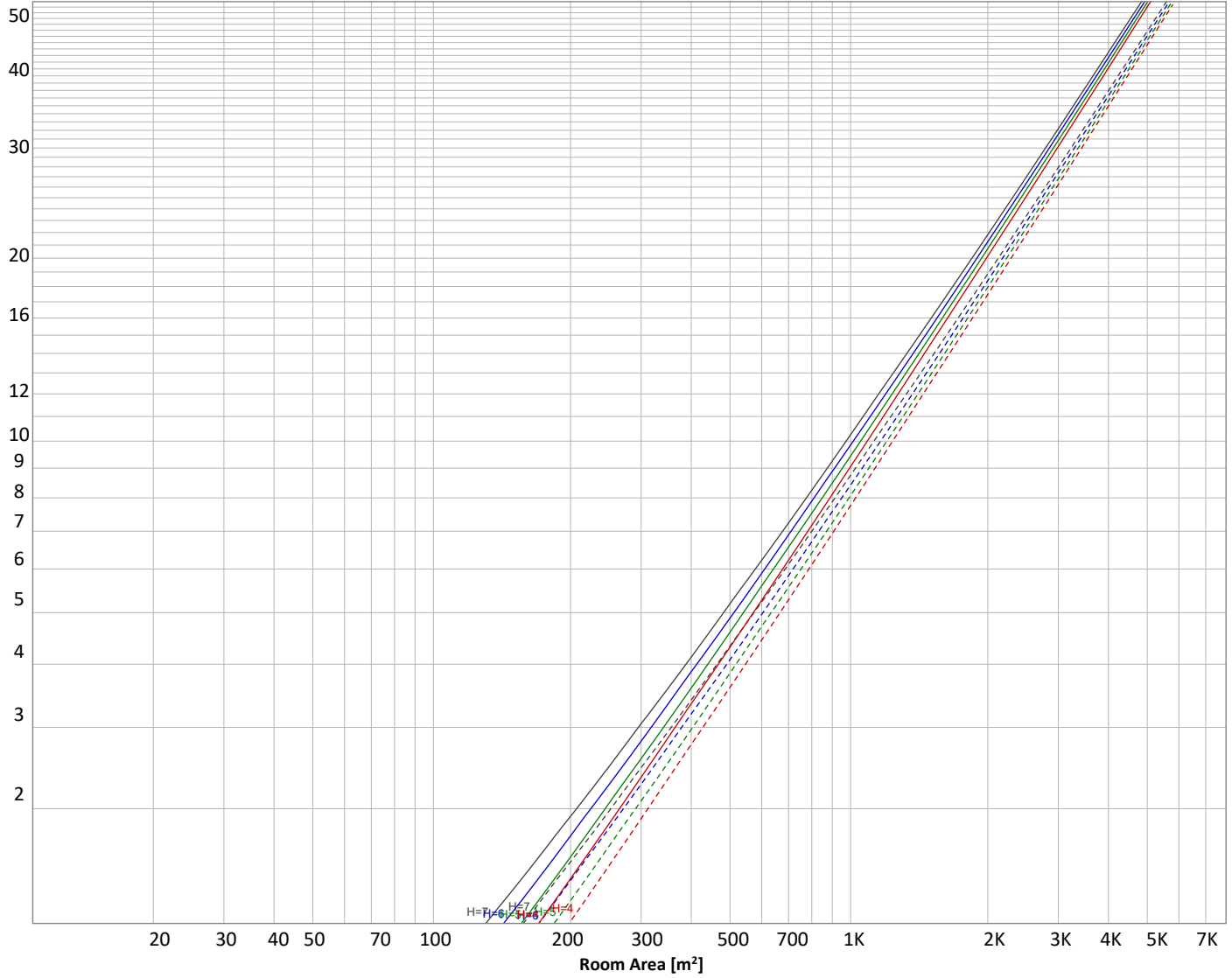
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 11869 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°
854 lm	2177 lm	2511 lm	2166 lm	1651 lm	1159 lm	739 lm	387 lm	108 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
15,6 lm	14,0 lm	14,8 lm	15,7 lm	16,6 lm	15,4 lm	12,5 lm	7,98 lm	2,78 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	854 lm	7,2%
10-20°	2177 lm	18,3%
20-30°	2511 lm	21,2%
30-40°	2166 lm	18,2%
40-50°	1651 lm	13,9%
50-60°	1159 lm	9,8%
60-70°	739 lm	6,2%
70-80°	387 lm	3,3%
80-90°	108 lm	0,9%
90-100°	16 lm	0,1%
100-110°	14 lm	0,1%
110-120°	15 lm	0,1%
120-130°	16 lm	0,1%
130-140°	17 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>11869 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	9255 cd
Intensity, 90°	36 cd
Intensity, 0°	9209 cd

### Zonal Lumen summary

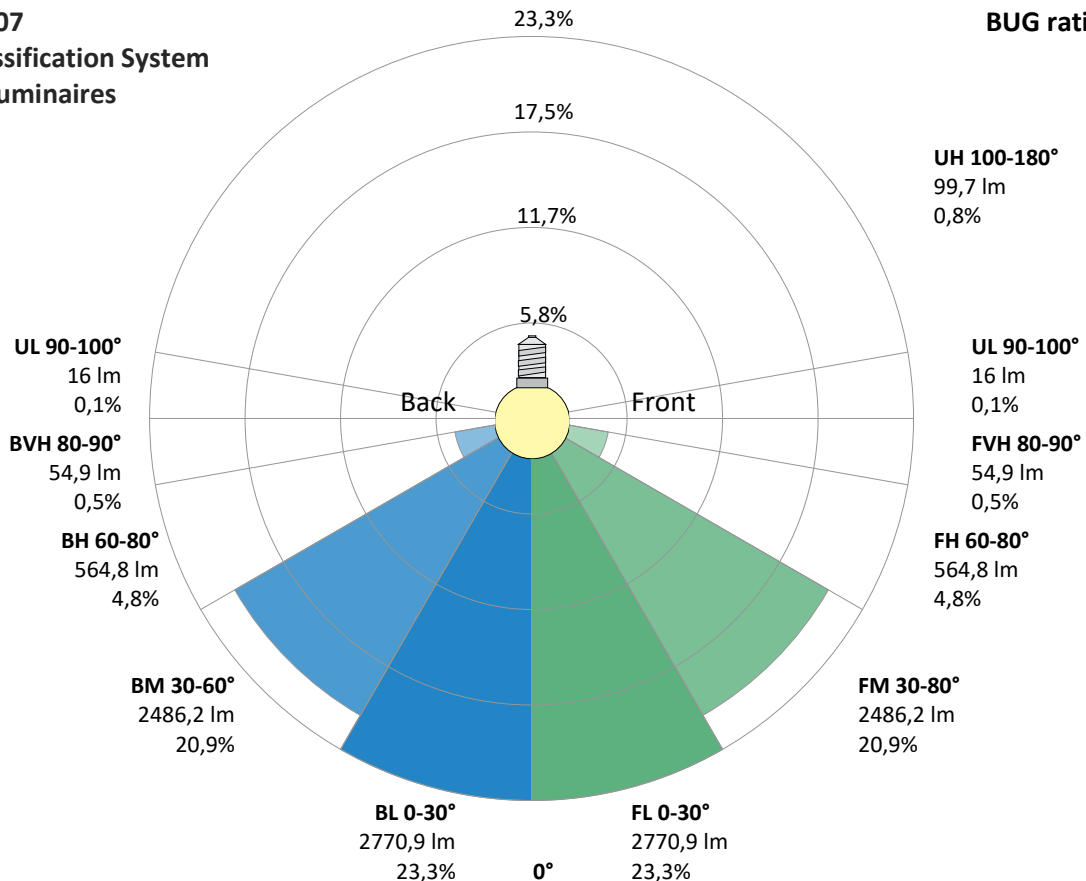
Zone (γ)	Lumen	% Total
0-30°	5543 lm	46,7%
0-40°	7708 lm	64,9%
0-60°	10519 lm	88,6%
60-90°	1234 lm	10,4%
70-100°	511 lm	4,3%
90-120°	44 lm	0,4%
0-90°	11754 lm	99,0%
90-180°	115 lm	1,0%
0-180°	11869 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2771 lm	23,3%
Medium(30-60°)	2486 lm	20,9%
High(60-80°)	565 lm	4,8%
Very high(80-90°)	55 lm	0,5%
<b>Back light</b>		
Low(0-30°)	2771 lm	23,3%
Medium(30-60°)	2486 lm	20,9%
High(60-80°)	565 lm	4,8%
Very high(80-90°)	55 lm	0,5%
<b>Uplight</b>		
Low(90-100°)	16 lm	0,1%
High(100-180°)	100 lm	0,8%

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

BUG rating B4 U3 G1



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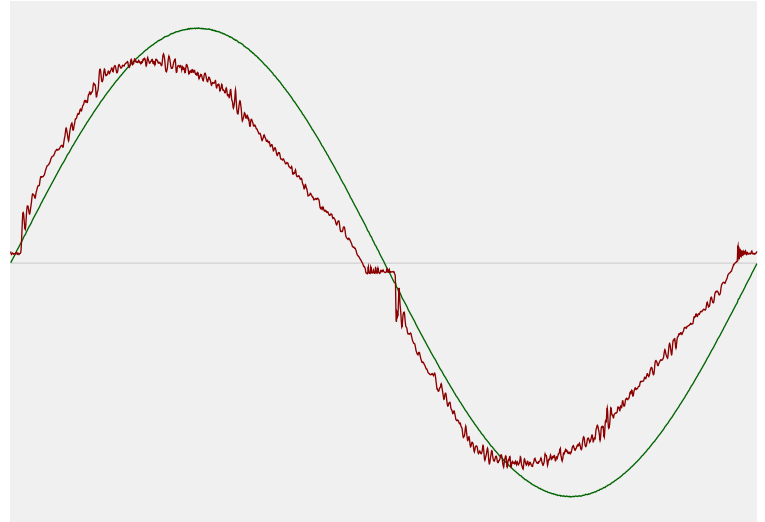


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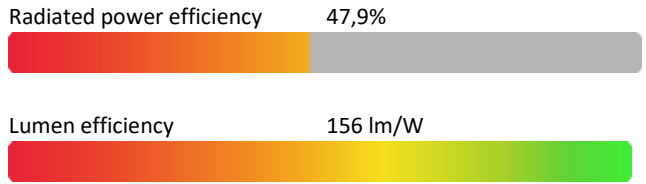
### Input Power

Power feed to light source	76,3 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,342 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	78,57 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	9,61%
Total harmonic distortion of the voltage	0,08%

### 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	5700 K
CCT shift	0 K
CCT end	5700 K

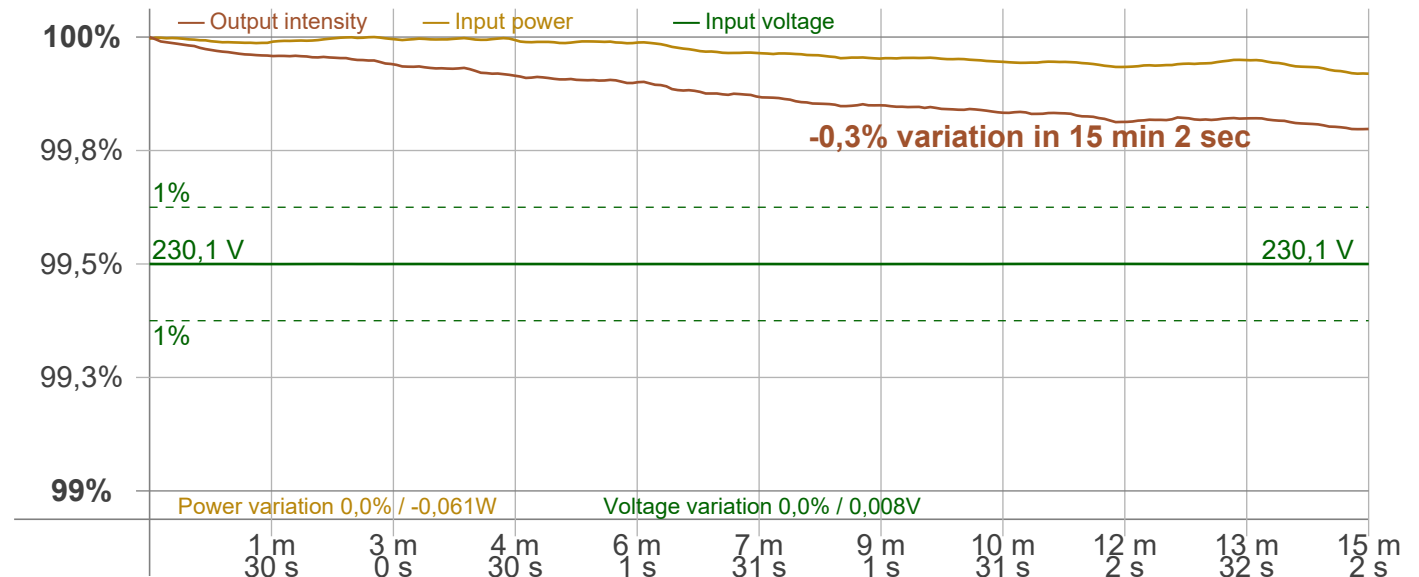
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	-0,3%

### Output Change

Output start	11894 lm
Output change	-25 lm
Output end	11869 lm

### Stabilization Curve



# Light Measurement Report

Print date: 14-4-2025

Measurement date and time: 3-4-2025 11:00:56 – Measurement no. VFR-250403-0555-MS

Measurement tracking No. and Link: [VT250403-006892](https://www.viso-systems.com/VT250403-006892)

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 Hz  
 Percent Flicker 0,85 %  
 Flicker index 0

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

JA8/10 40 Hz 0,03 %  
 JA8/10 90 Hz 0,03 %  
 JA8/10 200 Hz 0,83 %  
 JA8/10 400 Hz 0,85 %  
 JA8/10 1000 Hz 0,85 %

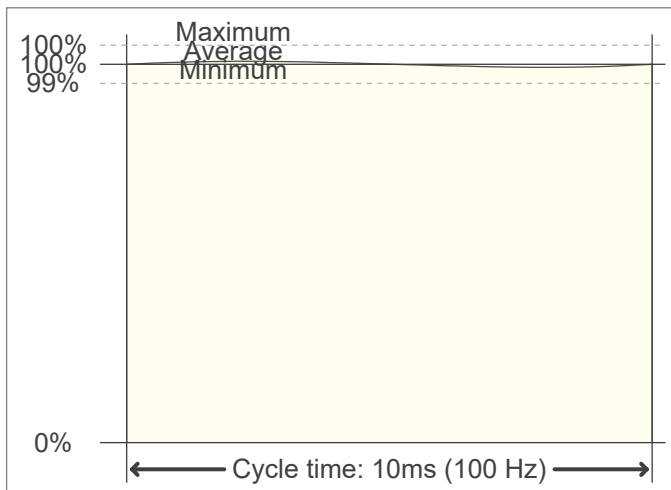
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,02  
 SVM value (80 < F < 2000 Hz) 0,03

### 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

