

# Light Measurement Report

Print date: 20-1-2025

Measurement date and time: 20-1-2025 16:28:24 – Measurement no. VFR-250120-3036-MS

Measurement tracking No. and Link: [VT250120-008107](https://vt250120-008107)

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°  
3,18 m  
99,7 W – PF 0,97 – DPF 0,97  
230 V – 0,448 A  
50 Hz  
Lamp stabilized in 15 min 2 sec – 2,0%

## Tested Light Source

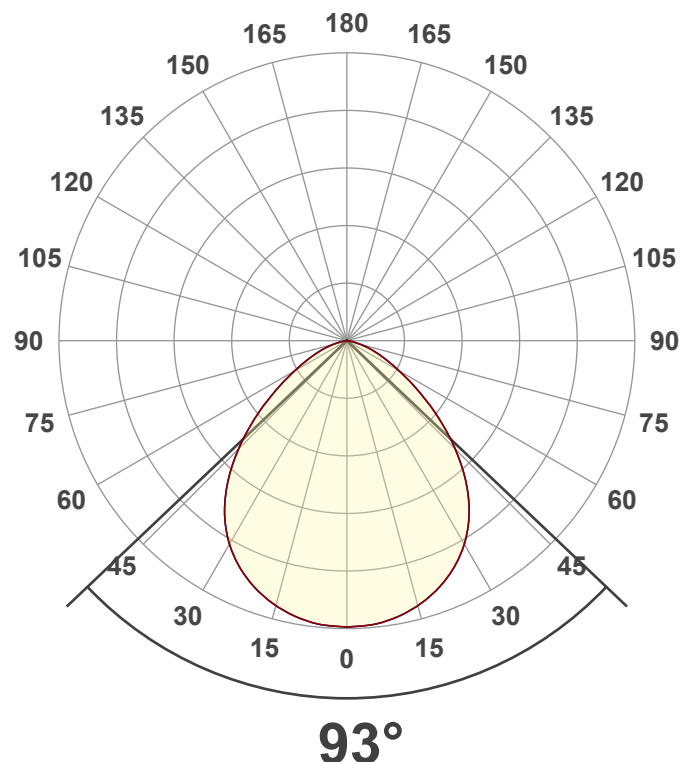
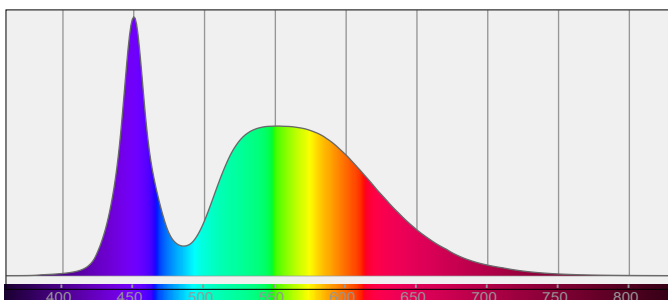
Product Name  
Item No. and Manufacturer  
Product Description (line 1)  
BEWEGINGSSENSOR

274402-5700K  
274402-5700K – Dutchfulfillment  
LED HIGHBAY | ALBIOR | 100 WATT | 90° | DIMBAAR | MET DAGLICHT- EN

## 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

15768 lm – 0,13% / 99,87%  
158 lm/W  
7429 cd – 93°  
CCT = 5700 K / 5654 K  
CRI 70,5  
 $R_f$  73,5 –  $R_g$  92,0  
Duv 0,0057 – SDCM 12,3  
SVM 0 – PstLM 0



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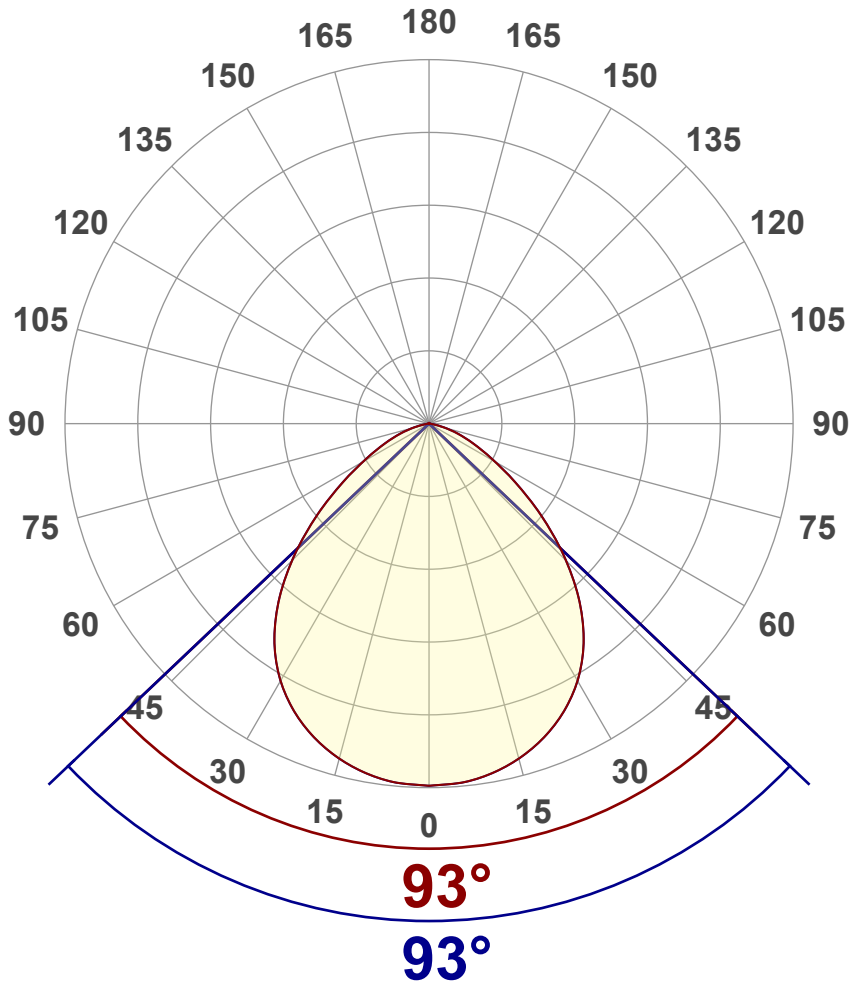
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Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	15768 lm
Lumen Up% / Down%	0,13% / 99,87%
Peak Intensity	7429 cd
Beam Angle (50%)	93°
Beam Angle (90%)	93°
Beam Angle (10%)	93°

## Cut-off Angle

Average 2,5%	157,4°
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## Field Angle

Average 10%	138,4°
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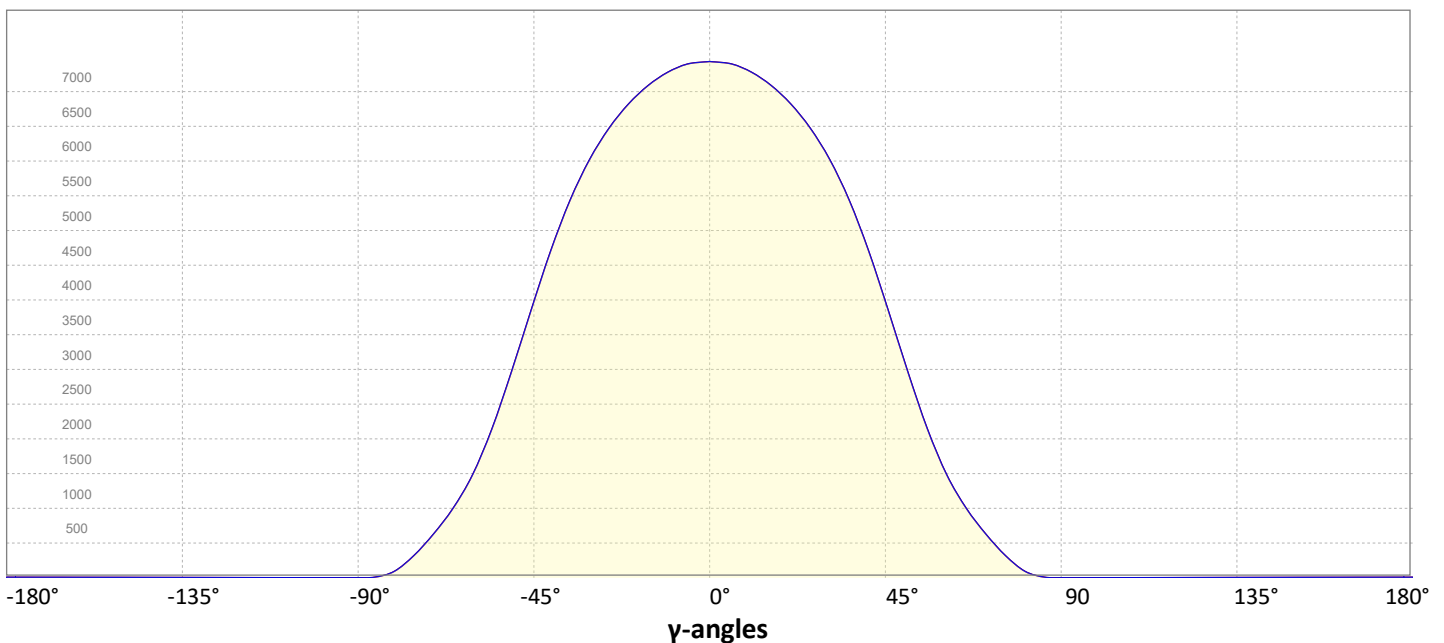
## Intensity Ratio

In 120° cone	90,3%
In 90° cone	68,3%

**C000-C180**

**C090-C270**

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



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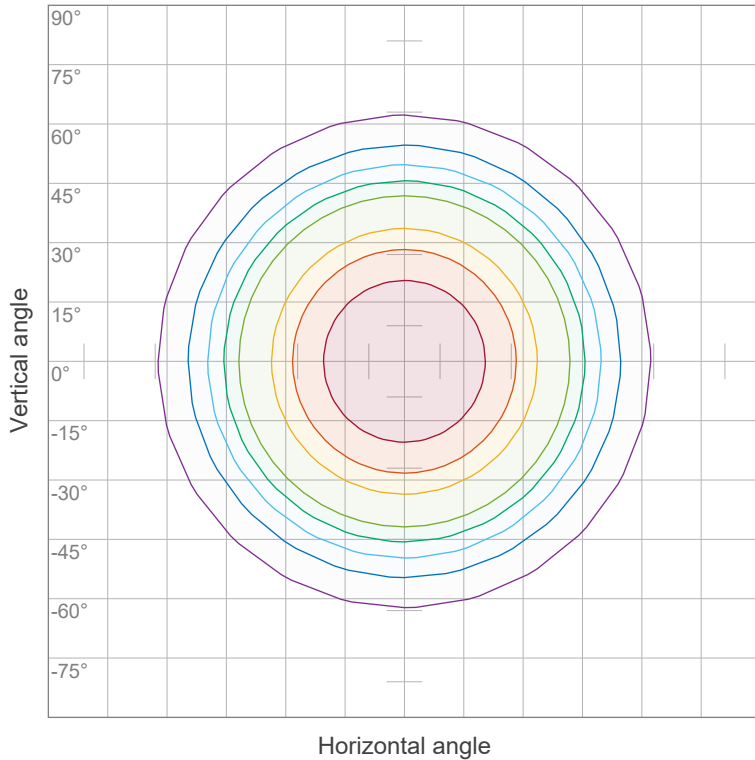
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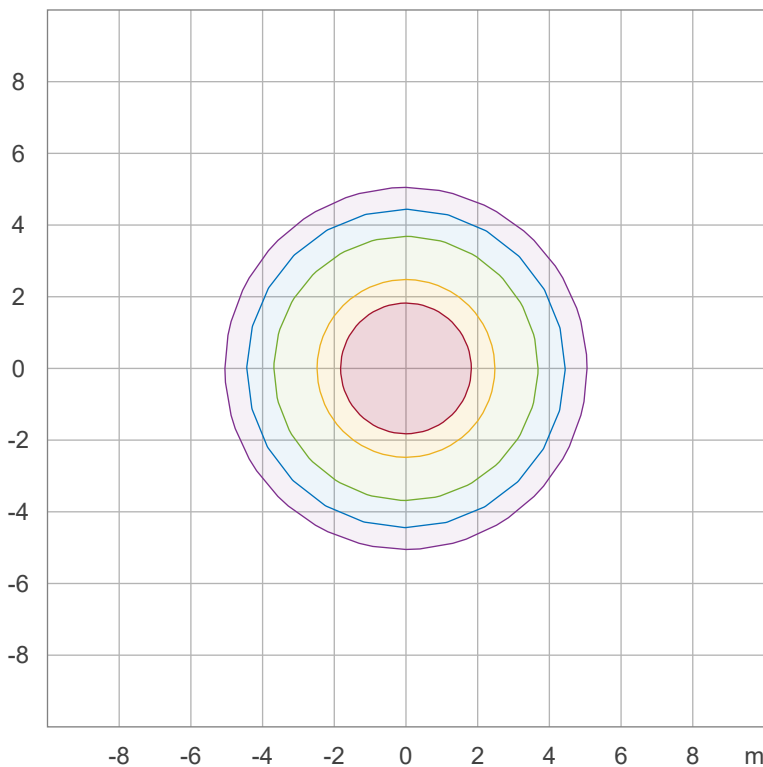
## Iso-intensity Diagram (Iso-candela)



90 %	6685,9 cd
80 %	5943,0 cd
70 %	5200,1 cd
60 %	4457,2 cd
50 %	3714,4 cd
40 %	2971,5 cd
30 %	2228,6 cd
20 %	1485,7 cd
10 %	742,9 cd

Peak intensity: 7428,7 cd  
Number of c-planes: 12

## Iso-illuminance Diagram (Iso-lux)



50,0 %	412,7 lx
30,0 %	247,6 lx
10,0 %	82,5 lx
5,0 %	41,3 lx
3,0 %	24,8 lx

Peak illuminance: 825,4 lx  
Mounting height: 3,0 m  
Number of c-planes: 12

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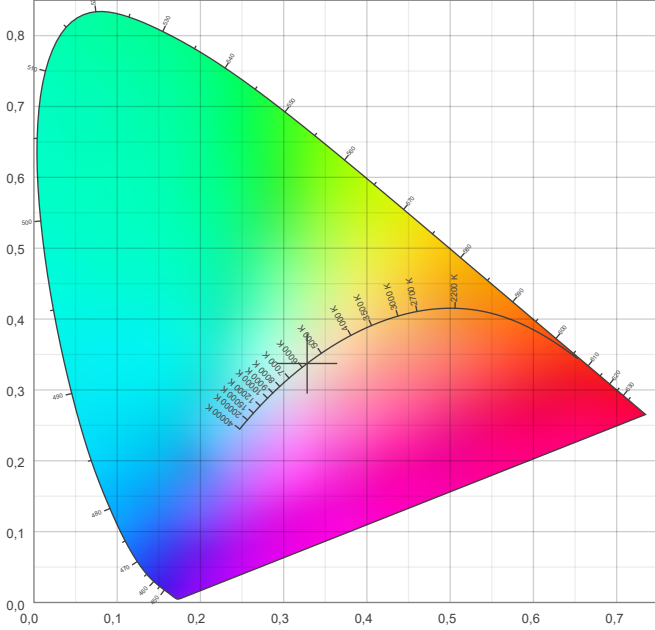


## Color details

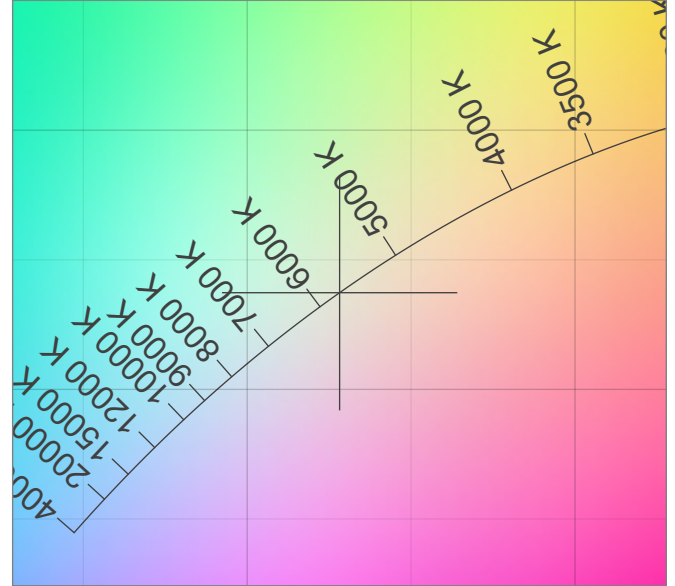
Correlated Color Temperature, Target CCT = 5700 K  
 Correlated Color Temperature, Measured CCT = 5654 K  
 Color Rendering Index CRI 70,5  
 Color Rendering Index, R9 (red component) R9 = -42,5  
 Color Rendering TM30-18 R<sub>f</sub> 73,5 – R<sub>g</sub> 92,0  
 Color Quality Scale CQS = 70,4

MacAdam Steps SDCM = 12,3  
 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 = 0,0057  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,205;0,475)

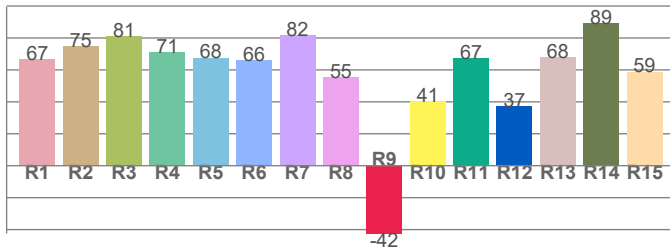
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



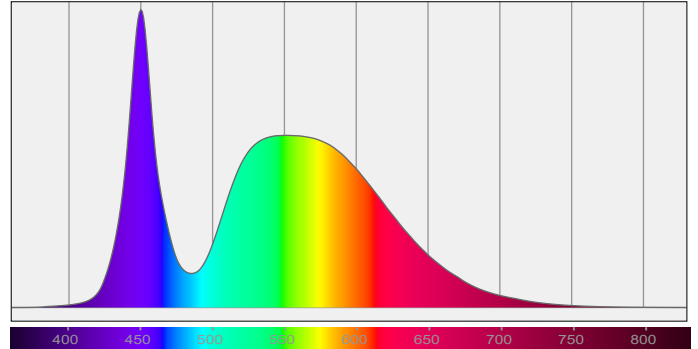
### Color Rendering Index per reference color (CIE 1995)



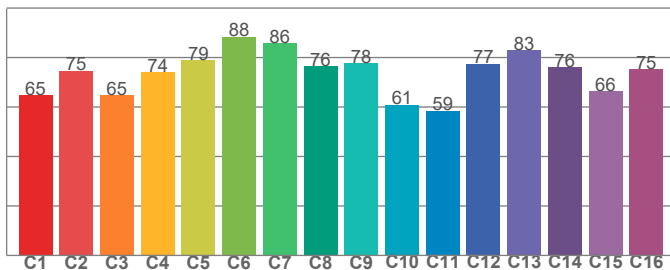
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
66,5	74,9	81,0	71,0	67,5	66,2	81,6	55,3	-42,5	40,5	67,3	37,1	67,9	89,4	58,7

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



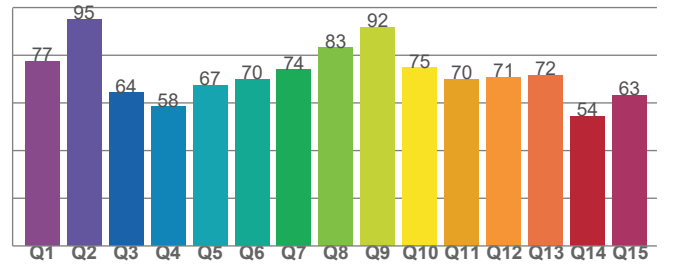
### TM30-18 Rf-values per hue bin



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
64,7	74,6	64,7	74,1	78,9	88,5	85,8	76,5	77,6	60,8	58,5	77,4	82,9	76,1	66,3	75,1

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
77,4	95,2	64,2	58,4	67,3	69,9	74,0	83,2	91,9	74,8	70,0	70,7	71,7	54,4	63,3

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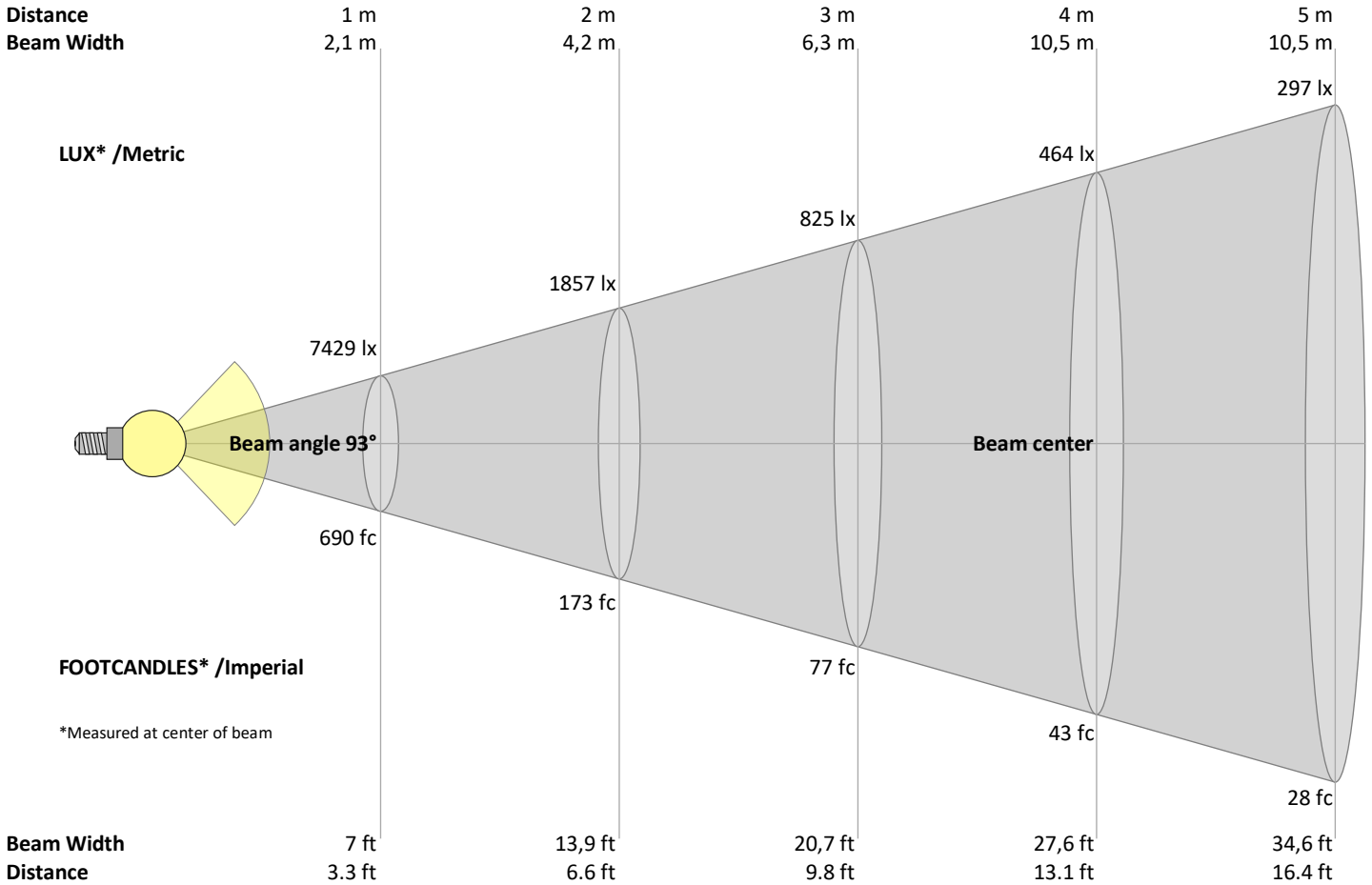
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## Beam Details



### 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
7429	1857	825	464	297	206	152	116	92	74	61	52	44	38	33	29	26	23	21	19	lux
690,2	172,5	76,7	43,1	27,6	19,2	14,1	10,8	8,5	6,9	5,7	4,8	4,1	3,5	3,1	2,7	2,4	2,1	1,9	1,7	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
7429	7401	7295	7116	6863	6526	6089	5522	4809	3974	3097	2266	1577	1068	682	364	126	21	2	1	cd
100%	100%	98%	96%	92%	88%	82%	74%	65%	53%	42%	31%	21%	14%	9%	5%	2%	0%	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
7429	7401	7295	7116	6863	6526	6089	5522	4809	3974	3097	2266	1577	1068	682	364	126	21	2	1	cd
100%	100%	98%	96%	92%	88%	82%	74%	65%	53%	42%	31%	21%	14%	9%	5%	2%	0%	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
7429	7401	7295	7116	6863	6526	6089	5522	4809	3974	3097	2266	1577	1068	682	364	126	21	2	1	cd
100%	100%	98%	96%	92%	88%	82%	74%	65%	53%	42%	31%	21%	14%	9%	5%	2%	0%	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
7429	7401	7295	7116	6863	6526	6089	5522	4809	3974	3097	2266	1577	1068	682	364	126	21	2	1	cd
100%	100%	98%	96%	92%	88%	82%	74%	65%	53%	42%	31%	21%	14%	9%	5%	2%	0%	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	29,2	30,3	29,4	30,5	30,8	29,2	30,3	29,4	30,5	30,8
	3H	29,6	30,7	30,0	31,0	31,2	29,6	30,7	30,0	31,0	31,2
	4H	29,7	30,8	30,1	31,0	31,3	29,7	30,8	30,1	31,0	31,3
	6H	29,8	30,7	30,1	31,0	31,4	29,8	30,7	30,1	31,0	31,4
	8H	29,8	30,6	30,1	30,9	31,4	29,8	30,6	30,1	30,9	31,4
	12H	29,7	30,6	30,1	30,9	31,3	29,7	30,6	30,1	30,9	31,3
4H	2H	29,4	30,4	29,8	30,7	30,9	29,4	30,4	29,8	30,7	30,9
	3H	30,1	30,9	30,4	31,2	31,7	30,1	30,9	30,4	31,2	31,7
	4H	30,2	30,9	30,6	31,4	31,9	30,2	30,9	30,6	31,4	31,9
	6H	30,2	30,9	30,7	31,3	31,7	30,2	30,9	30,7	31,3	31,7
	8H	30,2	30,9	30,7	31,2	31,6	30,2	30,9	30,7	31,2	31,6
	12H	30,1	30,7	30,6	31,1	31,6	30,1	30,7	30,6	31,1	31,6
8H	4H	30,2	30,9	30,7	31,2	31,6	30,2	30,9	30,7	31,2	31,6
	6H	30,2	30,7	30,7	31,2	31,7	30,2	30,7	30,7	31,2	31,7
	8H	30,3	30,7	30,8	31,2	31,8	30,3	30,7	30,8	31,2	31,8
	12H	30,2	30,6	30,8	31,1	31,7	30,2	30,6	30,8	31,1	31,7
12H	4H	30,1	30,7	30,6	31,1	31,6	30,1	30,7	30,6	31,1	31,6
	6H	30,2	30,7	30,8	31,2	31,8	30,2	30,7	30,8	31,2	31,8
	8H	30,2	30,6	30,8	31,1	31,7	30,2	30,6	30,8	31,1	31,7

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

S = 1.0H	0,4 / -0,6	0,4 / -0,6
S = 1.5H	1,0 / -1,6	1,0 / -1,6
S = 2.0H	2,0 / -2,7	2,0 / -2,7

## 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	111	106	106	106	102	102	102	100
1	111	107	104	100	108	105	102	99	101	98	96	97	95	93	93	92	90	88
2	102	96	90	85	100	94	88	84	90	86	82	87	83	80	84	81	78	76
3	95	85	78	73	92	84	77	72	81	76	71	78	74	70	76	72	69	67
4	87	77	69	63	85	76	68	63	73	67	62	71	66	61	69	64	60	58
5	81	69	61	56	79	68	61	55	66	60	55	64	59	54	63	58	54	52
6	75	63	55	49	73	62	55	49	60	54	49	59	53	48	57	52	48	46
7	70	58	50	44	68	57	49	44	55	49	44	54	48	43	53	47	43	41
8	65	53	45	40	64	52	45	40	51	44	39	50	44	39	49	43	39	37
9	61	49	41	36	60	48	41	36	47	40	36	46	40	36	45	39	35	34
10	58	45	38	33	56	45	38	33	44	37	33	43	37	33	42	36	32	31

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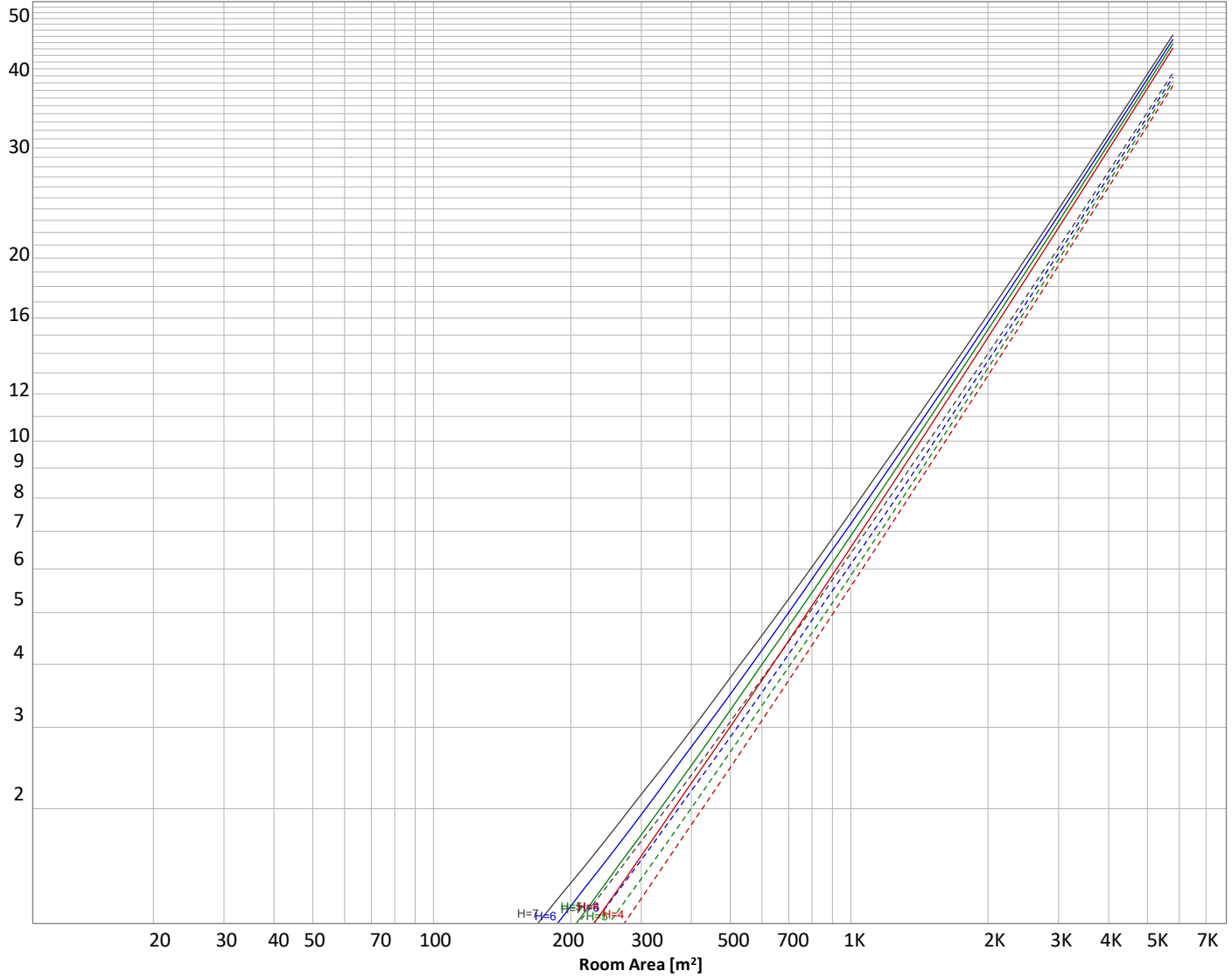
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 15768 lm			
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%)
H <sub>work</sub> = Work area height from floor =	0.00 m		Wall reflectance	Floor reflectance
E <sub>work</sub> = Average lux on work area =	100 lx	-----	70	50
		—————	50	30
				20

### Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
703 lm	2006 lm	3000 lm	3434 lm	3052 lm	2042 lm	1073 lm	398 lm	37,4 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,766 lm	1,31 lm	2,12 lm	3,09 lm	3,67 lm	3,60 lm	3,08 lm	2,09 lm	0,757 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	703 lm	4,5%
10-20°	2006 lm	12,7%
20-30°	3000 lm	19,0%
30-40°	3434 lm	21,8%
40-50°	3052 lm	19,4%
50-60°	2042 lm	13,0%
60-70°	1073 lm	6,8%
70-80°	398 lm	2,5%
80-90°	37 lm	0,2%
90-100°	1 lm	0,0%
100-110°	1 lm	0,0%
110-120°	2 lm	0,0%
120-130°	3 lm	0,0%
130-140°	4 lm	0,0%
140-150°	4 lm	0,0%
150-160°	3 lm	0,0%
160-170°	2 lm	0,0%
170-180°	1 lm	0,0%
<b>Total</b>	<b>15768 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	7429 cd
Intensity, 90°	2 cd
Intensity, 0°	7429 cd

### Zonal Lumen summary

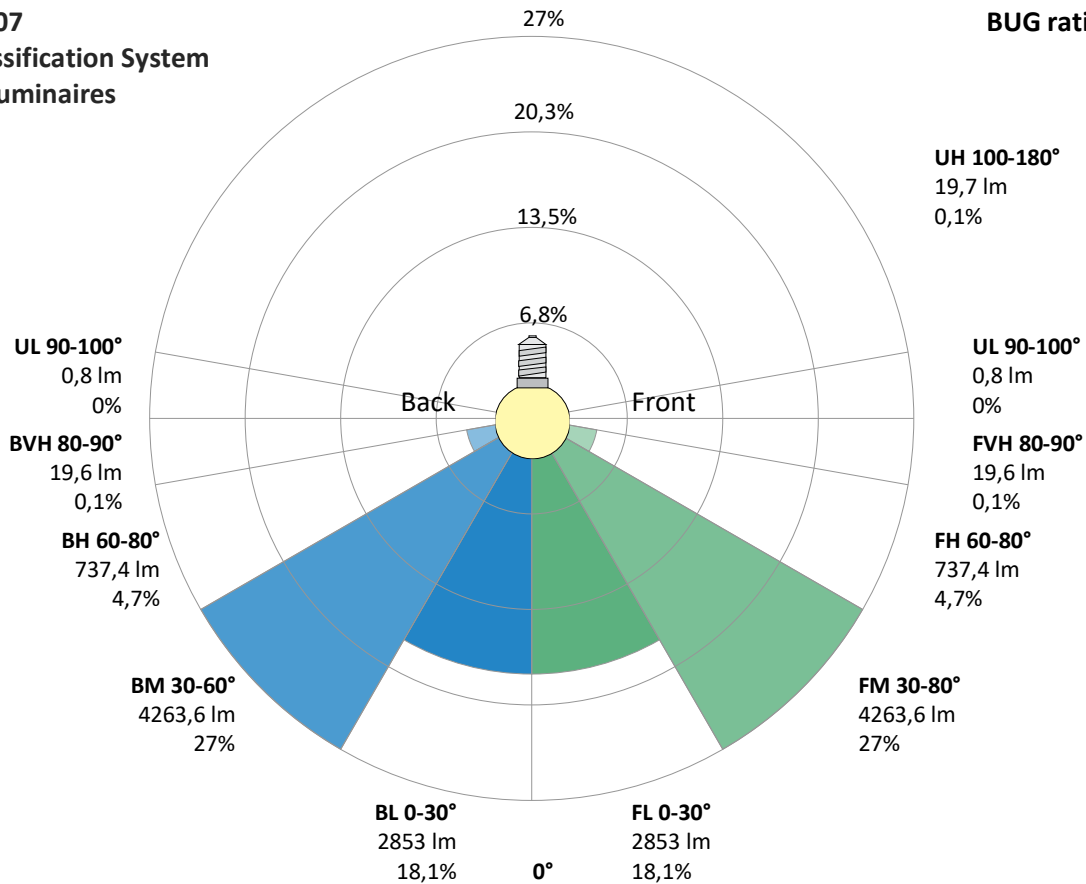
Zone (γ)	Lumen	% Total
0-30°	5709 lm	36,2%
0-40°	9143 lm	58,0%
0-60°	14238 lm	90,3%
60-90°	1509 lm	9,6%
70-100°	437 lm	2,8%
90-120°	4 lm	0,0%
0-90°	15747 lm	99,9%
90-180°	20 lm	0,1%
0-180°	15768 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2853 lm	18,1%
Medium(30-60°)	4264 lm	27,0%
High(60-80°)	737 lm	4,7%
Very high(80-90°)	20 lm	0,1%
<b>Back light</b>		
Low(0-30°)	2853 lm	18,1%
Medium(30-60°)	4264 lm	27,0%
High(60-80°)	737 lm	4,7%
Very high(80-90°)	20 lm	0,1%
<b>Uplight</b>		
Low(90-100°)	1 lm	0,0%
High(100-180°)	20 lm	0,1%

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

BUG rating B4 U2 G1



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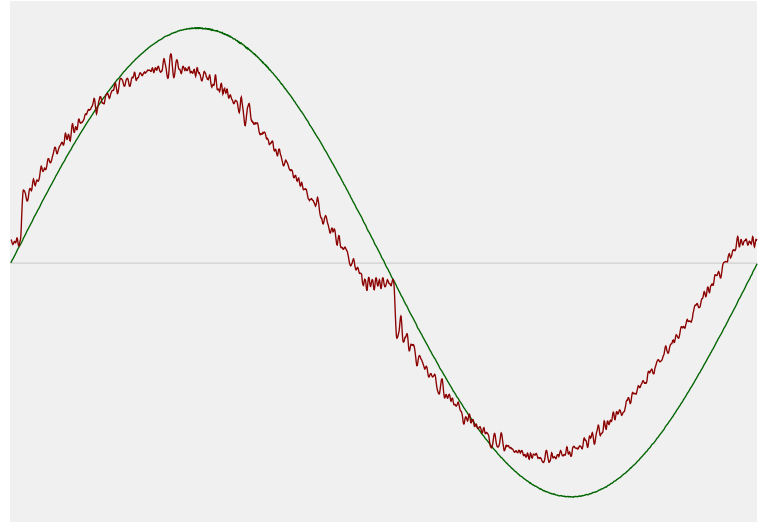


## Power Details

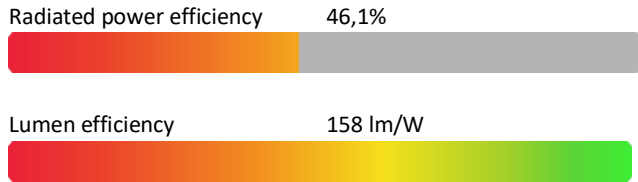
### Input Power

Power feed to light source	99,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,448 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	102,99 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	5,26%
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	5661 K
CCT shift	+39 K
CCT end	5700 K

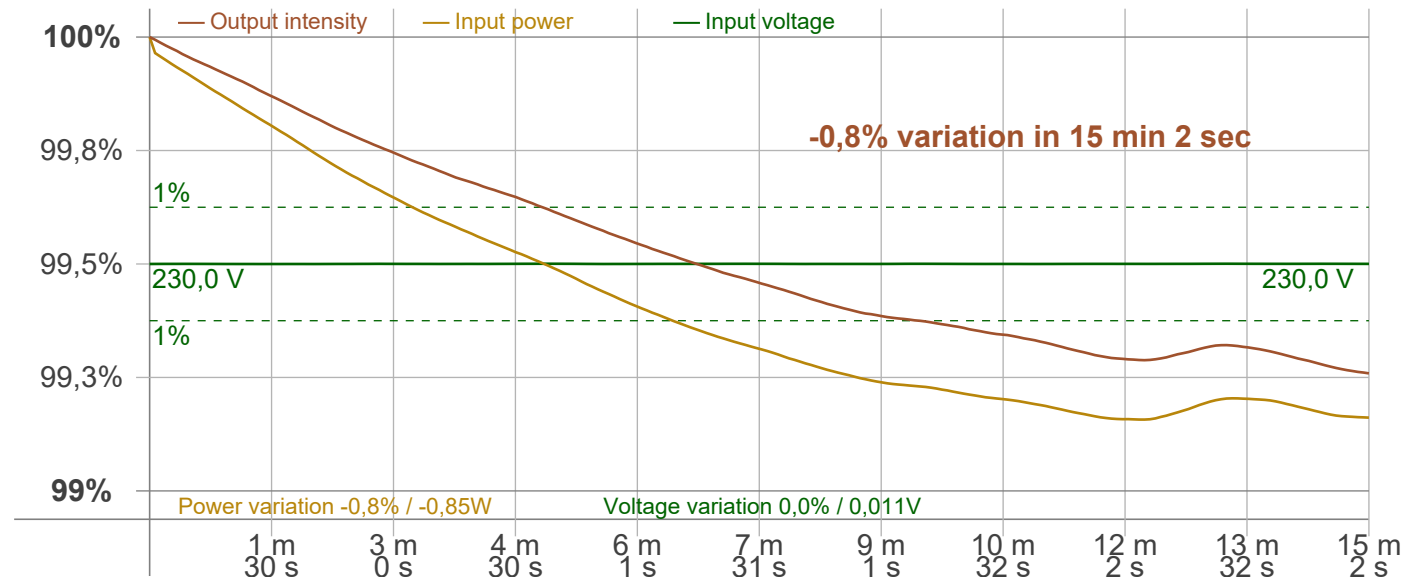
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	-0,8%

### Output Change

Output start	15886 lm
Output change	-118 lm
Output end	15768 lm

## Stabilization Curve



# Light Measurement Report

Print date: 20-1-2025

Measurement date and time: 20-1-2025 16:28:24 – Measurement no. VFR-250120-3036-MS

Measurement tracking No. and Link: [VT250120-008107](https://www.viso-systems.com/VT250120-008107)

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: 101,01 Hz  
 Percent Flicker: 0,09 %  
 Flicker index: 0

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

JA8/10 40 Hz: 0,01 %  
 JA8/10 90 Hz: 0,01 %  
 JA8/10 200 Hz: 0,09 %  
 JA8/10 400 Hz: 0,09 %  
 JA8/10 1000 Hz: 0,09 %

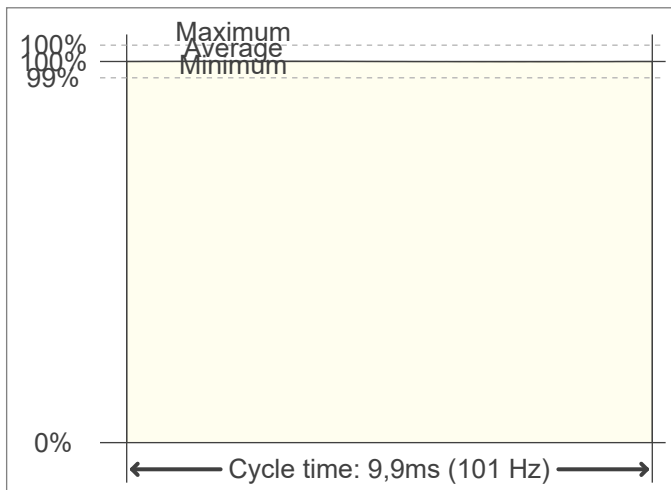
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0  
 SVM value (80 < F < 2000 Hz): 0

### 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

