

# Light Measurement Report

Print date: 17-1-2025

Measurement date and time: 17-1-2025 16:18:00 – Measurement no. VFR-250117-3026-MS

Measurement tracking No. and Link: [VT250117-005856](https://www.viso-systems.com/VT250117-005856)

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°  
3,24 m  
100,1 W – PF 0,99 – DPF 0,99  
230 V – 0,439 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

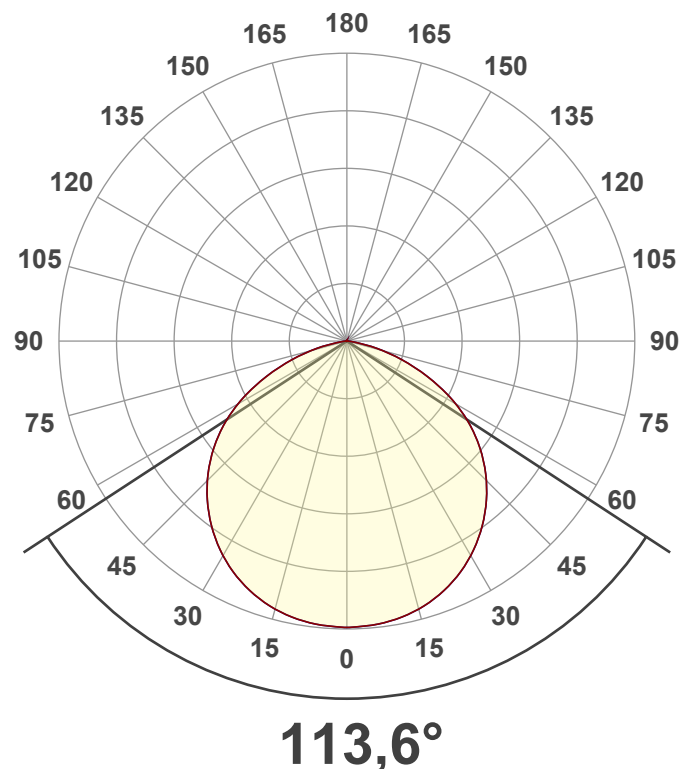
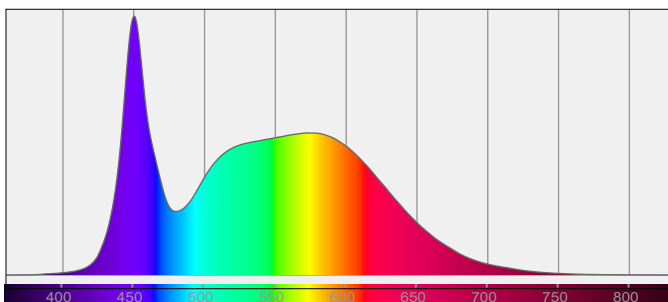
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

802615-6000K  
802615-6000K – Dutchfulfillment

## 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

14085 lm – 0,14% / 99,86%  
141 lm/W  
5045 cd – 113,6°  
CCT = 6000 K / 5788 K  
CRI 80,8  
 $R_f$  82,5 –  $R_g$  93,9  
Duv 0,0030 – SDCM 8,8  
SVM 0,01 – PstLM 0,06



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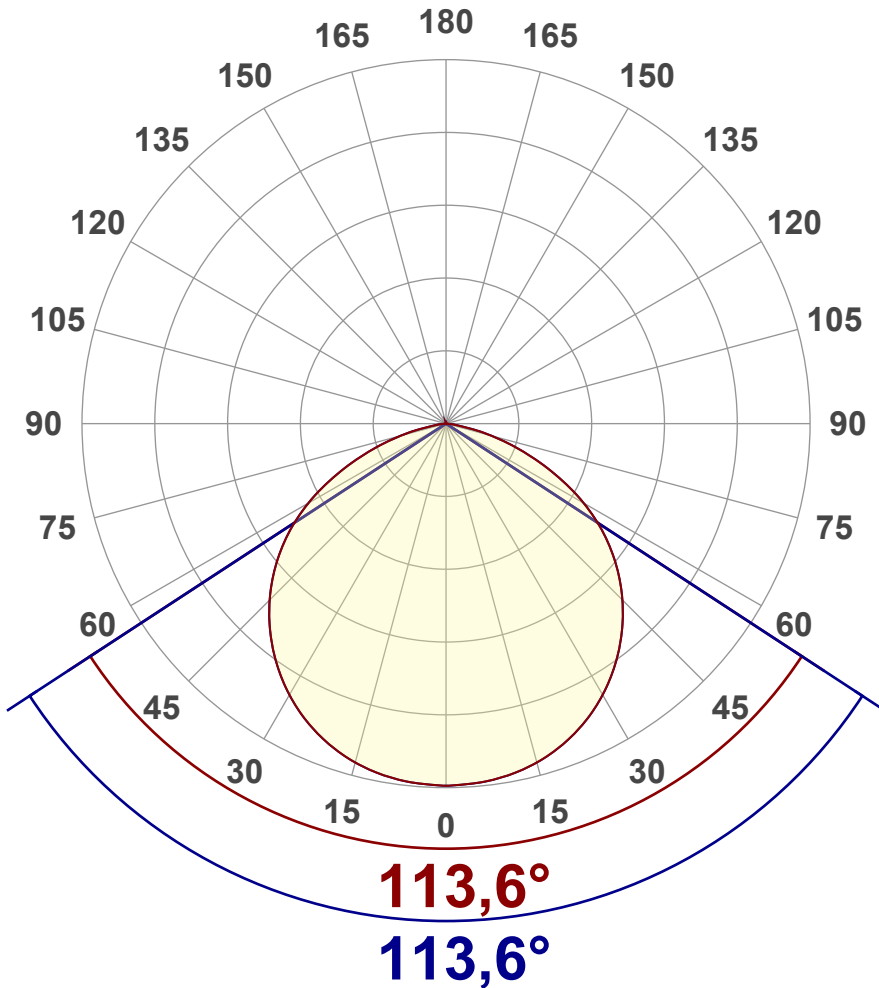
Measurement tracking No. and Link: [VT250117-005856](#)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	14085 lm
Lumen Up% / Down%	0,14% / 99,86%
Peak Intensity	5045 cd
Beam Angle (50%)	113,6°
Beam Angle (90%)	113,6°
Beam Angle (10%)	113,6°

## Cut-off Angle

Average 2,5%	165°
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## Field Angle

Average 10%	153,7°
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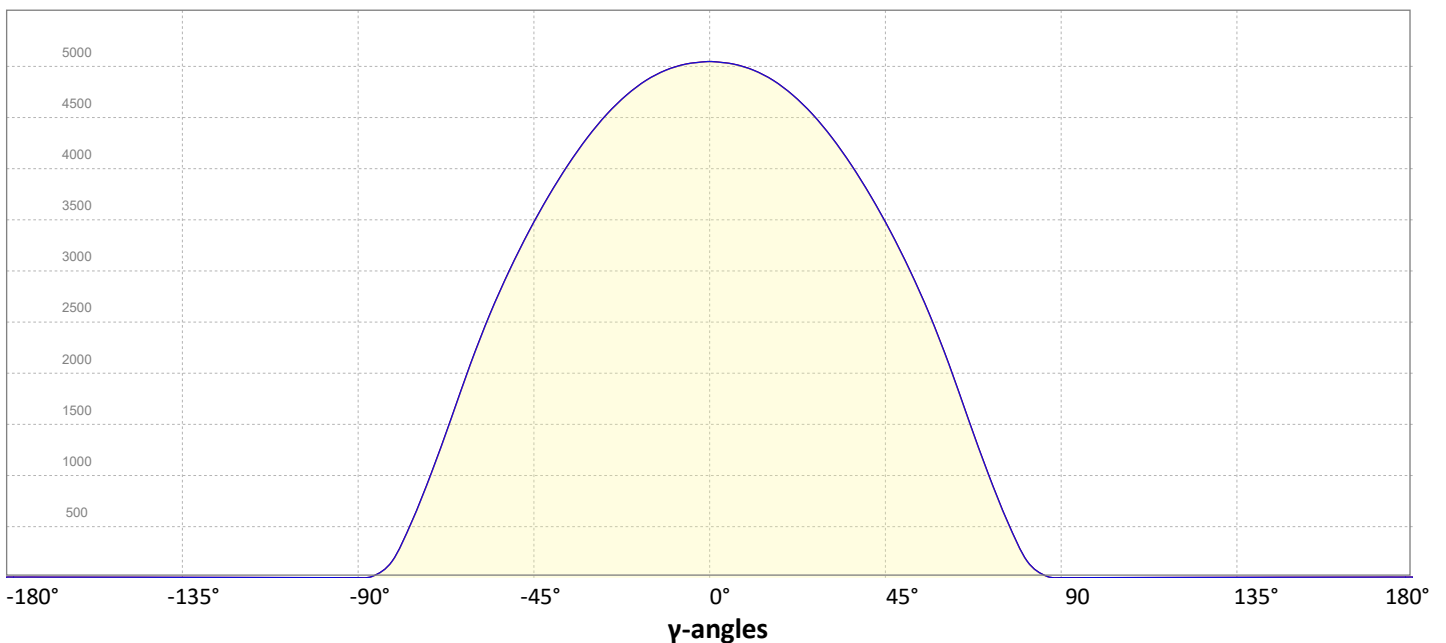
## Intensity Ratio

In 120° cone	82,4%
In 90° cone	56,0%

**C000-C180**

**C090-C270**

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



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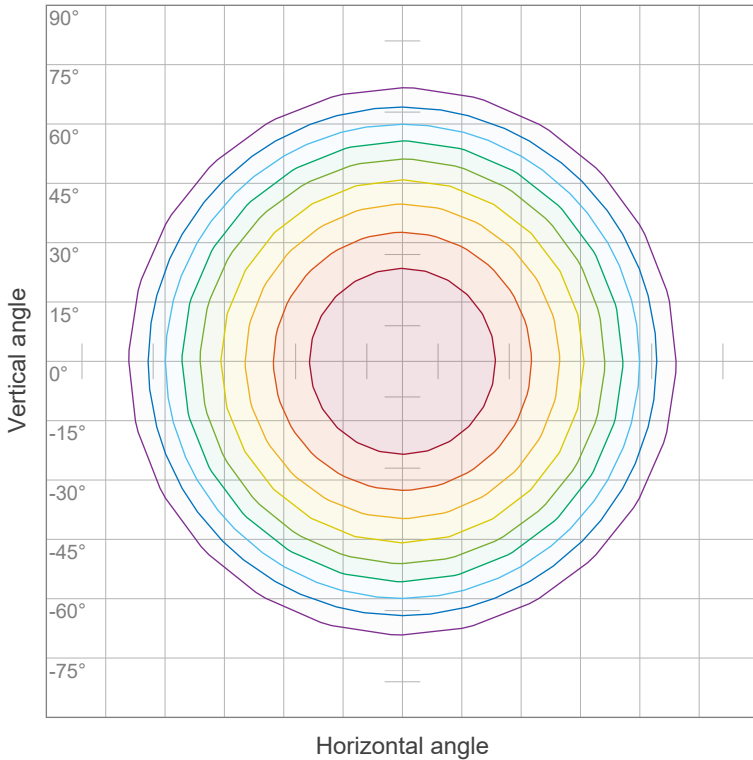
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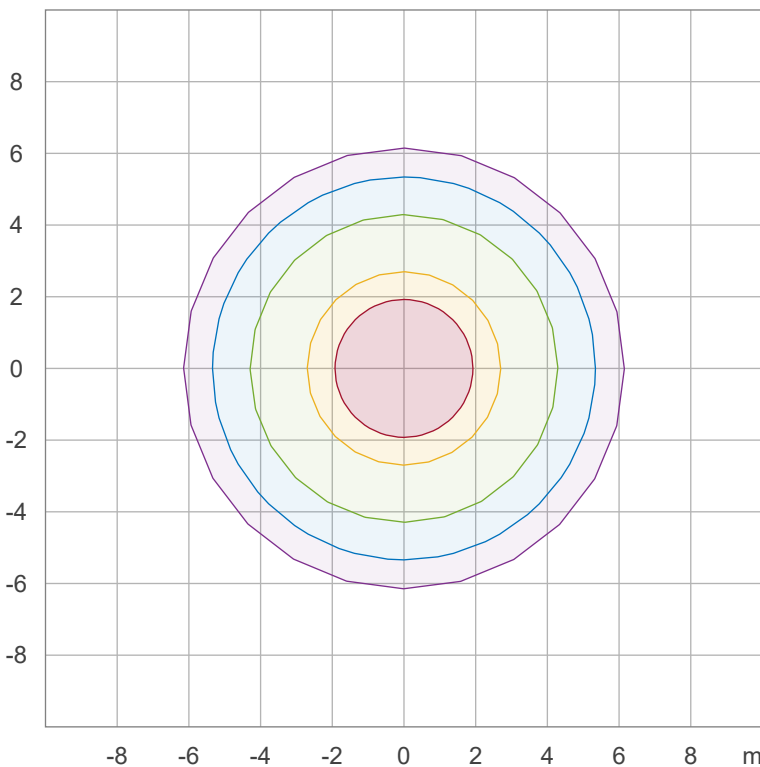
## Iso-intensity Diagram (Iso-candela)



90 %	4540,3 cd
80 %	4035,8 cd
70 %	3531,3 cd
60 %	3026,9 cd
50 %	2522,4 cd
40 %	2017,9 cd
30 %	1513,4 cd
20 %	1009,0 cd
10 %	504,5 cd

Peak intensity: 5044,8 cd  
Number of c-planes: 12

## Iso-illuminance Diagram (Iso-lux)



50,0 %	280,3 lx
30,0 %	168,2 lx
10,0 %	56,1 lx
5,0 %	28,0 lx
3,0 %	16,8 lx

Peak illuminance: 560,5 lx  
Mounting height: 3,0 m  
Number of c-planes: 12

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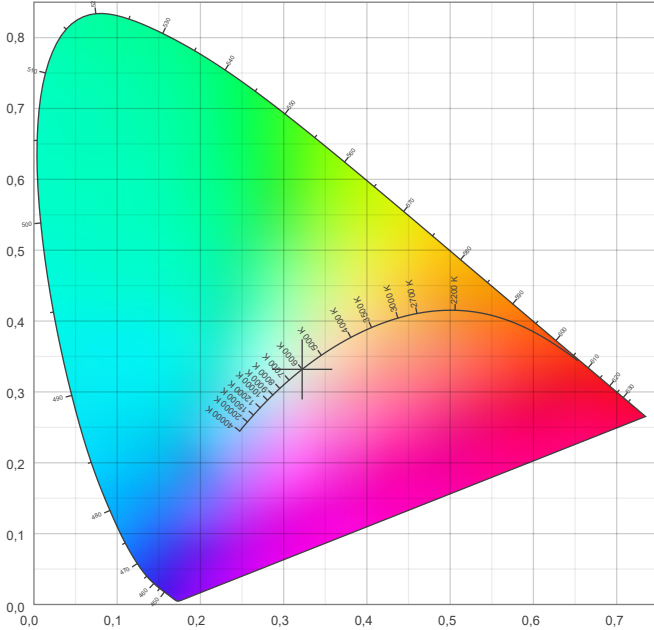


## Color details

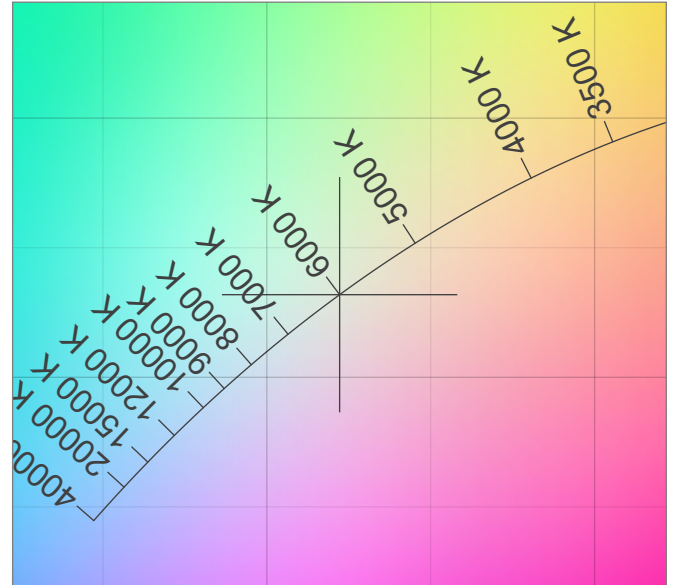
Correlated Color Temperature, Target CCT = 6000 K  
 Correlated Color Temperature, Measured CCT = 5788 K  
 Color Rendering Index CRI 80,8  
 Color Rendering Index, R9 (red component) R9 = -9,7  
 Color Rendering TM30-18  $R_f$  82,5 –  $R_g$  93,9  
 Color Quality Scale CQS = 79,6

MacAdam Steps SDCM = 8,8  
 Color coordinates CIE 1931 (x;y) = (0,322;0,332)  
 Color coordinate CIEs 1960 (u;v) = (0,203;0,314)  
 Color deviation from BBL Duv = 0,0030  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,203;0,471)

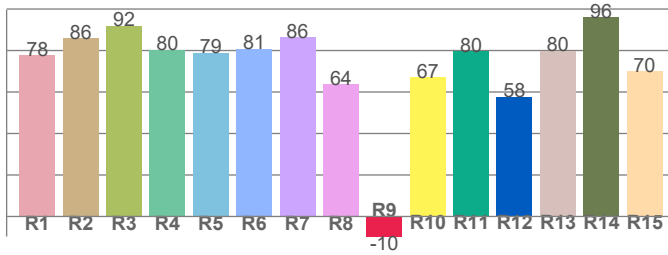
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



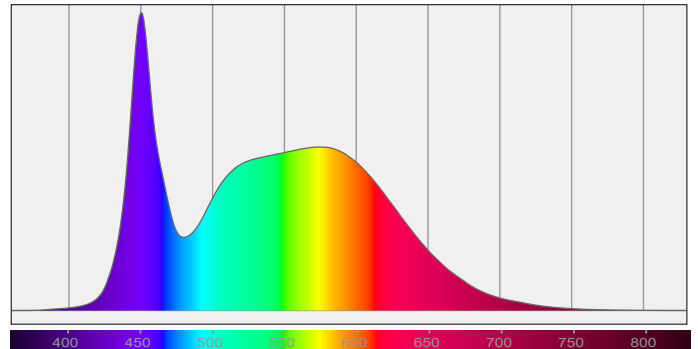
### Color Rendering Index per reference color (CIE 1995)



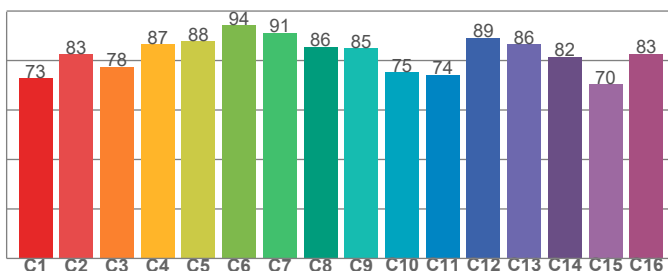
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
77,7	85,9	92,0	80,5	79,0	81,0	86,3	63,8	-9,7	67,1	79,8	57,6	79,9	95,9	70,1

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



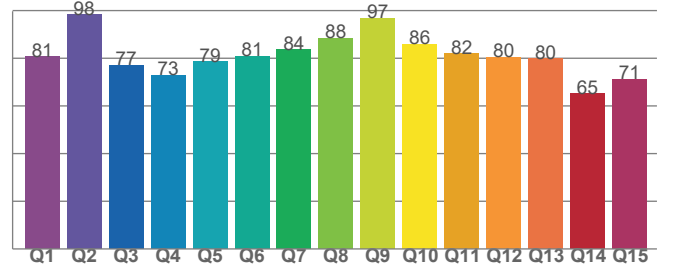
### TM30-18 Rf-values per hue bin



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
72,9	82,5	77,5	86,7	87,7	94,3	91,2	85,5	85,0	75,3	74,2	89,2	86,5	81,5	70,4	82,8

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
80,7	98,3	77,2	72,8	78,6	80,8	83,6	88,3	96,9	86,0	81,9	80,5	79,8	65,1	71,1

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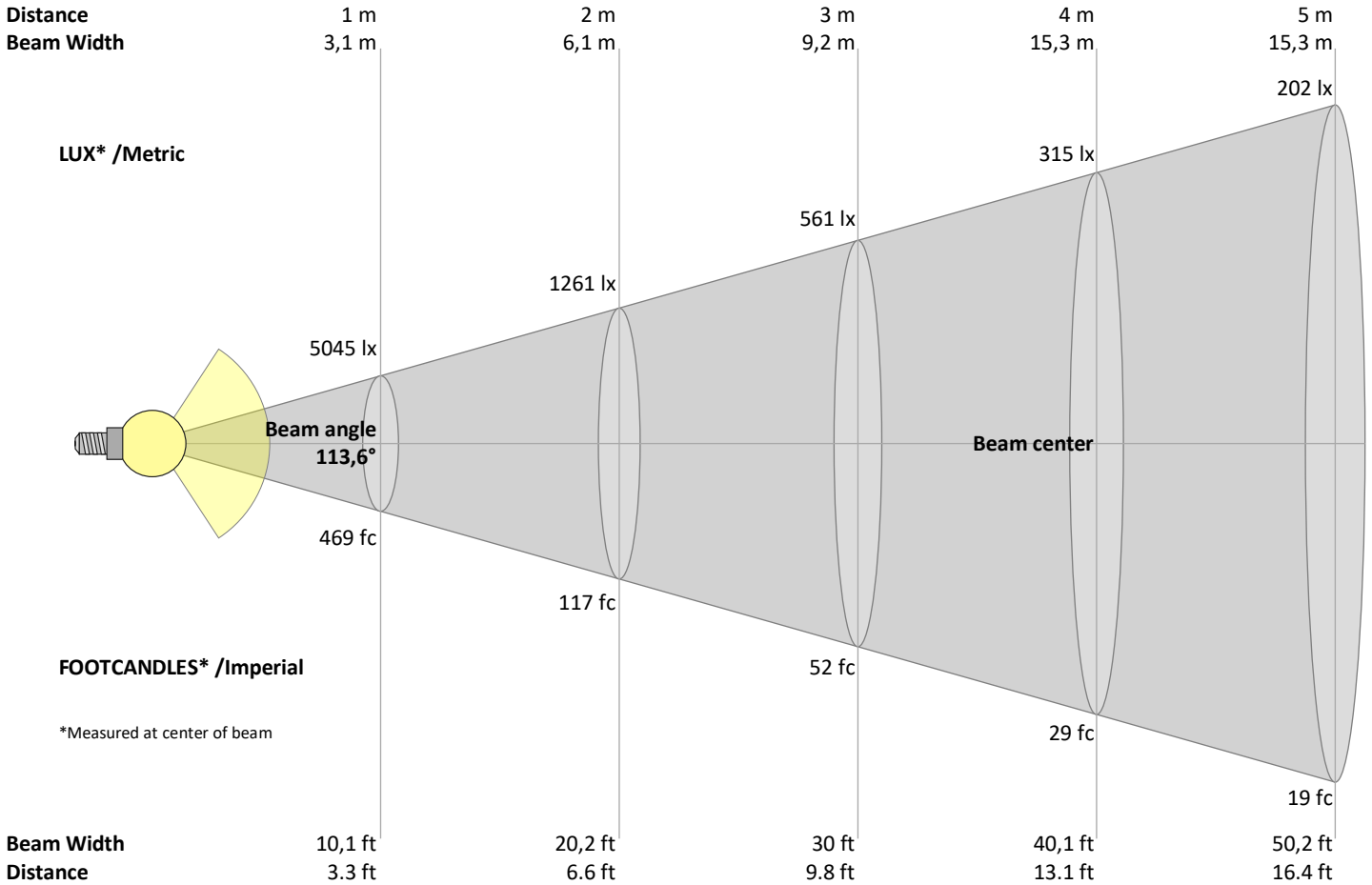
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## Beam Details



### 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
5045	1261	561	315	202	140	103	79	62	50	42	35	30	26	22	20	17	16	14	13	lux
468,7	117,2	52,1	29,3	18,7	13	9,6	7,3	5,8	4,7	3,9	3,3	2,8	2,4	2,1	1,8	1,6	1,4	1,3	1,2	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
5045	5027	4977	4888	4756	4581	4363	4104	3807	3474	3101	2685	2211	1684	1155	668	261	53	4	1	cd
100%	100%	99%	97%	94%	91%	86%	81%	75%	69%	61%	53%	44%	33%	23%	13%	5%	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
5045	5027	4977	4888	4756	4581	4363	4104	3807	3474	3101	2685	2211	1684	1155	668	261	53	4	1	cd
100%	100%	99%	97%	94%	91%	86%	81%	75%	69%	61%	53%	44%	33%	23%	13%	5%	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
5045	5027	4977	4888	4756	4581	4363	4104	3807	3474	3101	2685	2211	1684	1155	668	261	53	4	1	cd
100%	100%	99%	97%	94%	91%	86%	81%	75%	69%	61%	53%	44%	33%	23%	13%	5%	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
5045	5027	4977	4888	4756	4581	4363	4104	3807	3474	3101	2685	2211	1684	1155	668	261	53	4	1	cd
100%	100%	99%	97%	94%	91%	86%	81%	75%	69%	61%	53%	44%	33%	23%	13%	5%	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	32,4	33,6	32,6	33,9	34,1	32,4	33,6	32,6	33,9	34,1
	3H	33,4	34,6	33,8	34,9	35,1	33,4	34,6	33,8	34,9	35,1
	4H	33,7	34,9	34,1	35,1	35,4	33,7	34,9	34,1	35,1	35,4
	6H	33,9	34,9	34,2	35,2	35,5	33,9	34,9	34,2	35,2	35,5
	8H	33,8	34,8	34,2	35,1	35,6	33,8	34,8	34,2	35,1	35,6
	12H	33,8	34,8	34,2	35,1	35,6	33,8	34,8	34,2	35,1	35,6
4H	2H	32,9	34,0	33,3	34,3	34,6	32,9	34,0	33,3	34,3	34,6
	3H	34,2	35,1	34,5	35,5	35,9	34,2	35,1	34,5	35,5	35,9
	4H	34,5	35,3	34,9	35,8	36,3	34,5	35,3	34,9	35,8	36,3
	6H	34,6	35,4	35,1	35,8	36,2	34,6	35,4	35,1	35,8	36,2
	8H	34,6	35,4	35,1	35,7	36,1	34,6	35,4	35,1	35,7	36,1
	12H	34,6	35,2	35,1	35,6	36,1	34,6	35,2	35,1	35,6	36,1
8H	4H	34,6	35,3	35,1	35,7	36,1	34,6	35,3	35,1	35,7	36,1
	6H	34,8	35,4	35,3	35,8	36,4	34,8	35,4	35,3	35,8	36,4
	8H	34,8	35,3	35,3	35,8	36,5	34,8	35,3	35,3	35,8	36,5
	12H	34,8	35,2	35,4	35,7	36,3	34,8	35,2	35,4	35,7	36,3
12H	4H	34,5	35,2	35,0	35,6	36,1	34,5	35,2	35,0	35,6	36,1
	6H	34,8	35,3	35,3	35,8	36,4	34,8	35,3	35,3	35,8	36,4
	8H	34,8	35,2	35,4	35,7	36,3	34,8	35,2	35,4	35,7	36,3

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

S = 1.0H	0,1 / -0,2	0,1 / -0,2
S = 1.5H	0,3 / -0,5	0,3 / -0,5
S = 2.0H	0,9 / -1,2	0,9 / -1,2

## 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	102	102	102	100	100	
1	110	105	101	98	107	103	99	96	99	96	93	95	92	90	91	89	87	85	85
2	100	92	86	80	97	90	84	79	87	82	77	83	79	75	80	77	74	72	72
3	91	81	73	67	89	79	72	66	76	70	65	74	68	64	71	67	63	61	61
4	84	72	63	57	81	70	62	56	68	61	55	66	60	55	63	58	54	52	52
5	77	64	55	49	75	63	55	48	61	54	48	59	52	47	57	51	47	45	45
6	71	58	49	43	69	57	48	42	55	48	42	53	47	42	52	46	41	39	39
7	66	52	44	38	64	51	43	37	50	43	37	48	42	37	47	41	37	35	35
8	61	48	39	33	60	47	39	33	46	38	33	44	38	33	43	37	33	31	31
9	57	44	36	30	56	43	35	30	42	35	30	41	34	30	40	34	29	28	28
10	53	40	32	27	52	40	32	27	39	32	27	38	31	27	37	31	27	25	25

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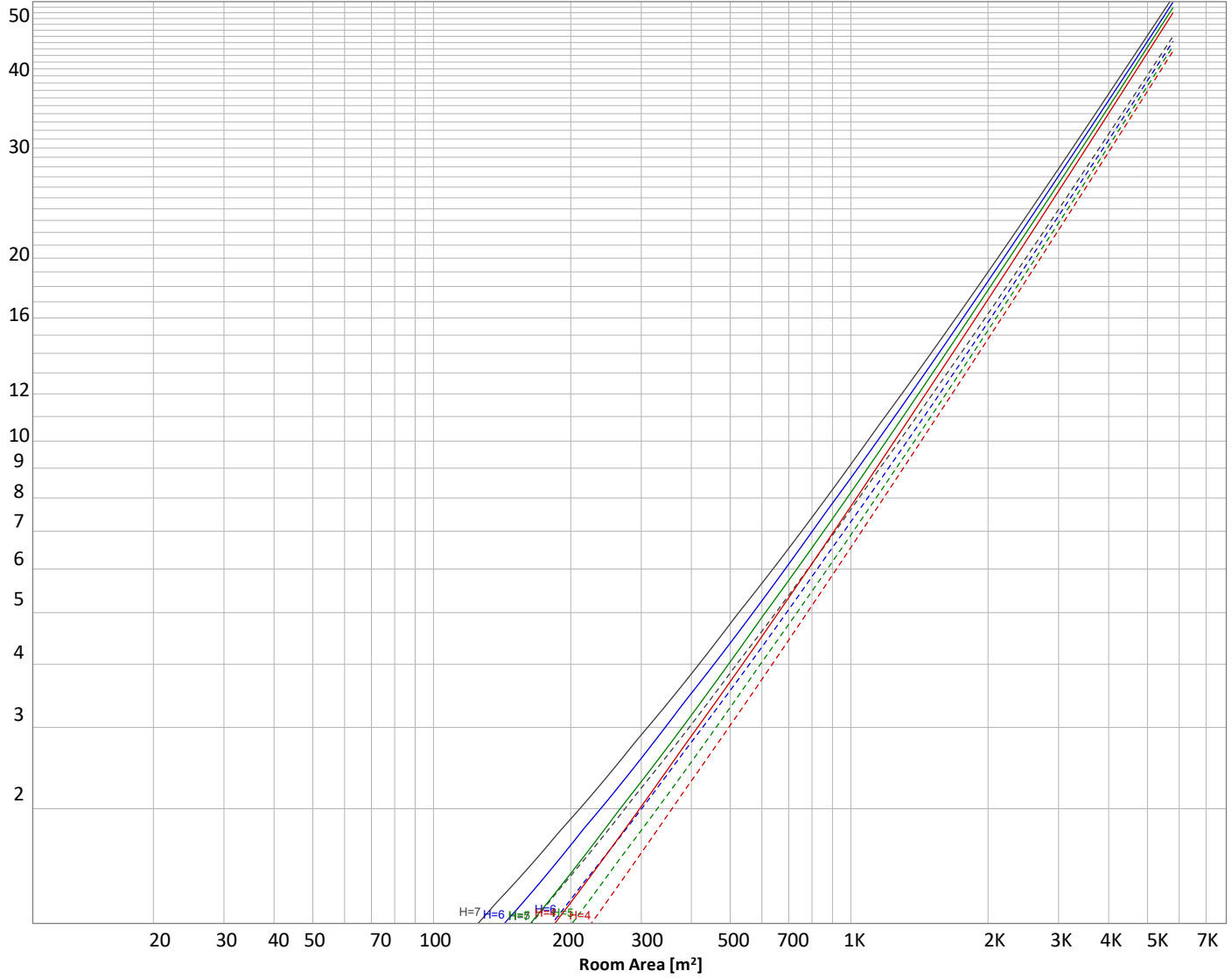
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 14085 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°
478 lm	1381 lm	2112 lm	2568 lm	2678 lm	2393 lm	1666 lm	715 lm	74,9 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
1,02 lm	1,64 lm	2,53 lm	3,12 lm	3,26 lm	3,11 lm	2,52 lm	1,66 lm	0,598 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	478 lm	3,4%
10-20°	1381 lm	9,8%
20-30°	2112 lm	15,0%
30-40°	2568 lm	18,2%
40-50°	2678 lm	19,0%
50-60°	2393 lm	17,0%
60-70°	1666 lm	11,8%
70-80°	715 lm	5,1%
80-90°	75 lm	0,5%
90-100°	1 lm	0,0%
100-110°	2 lm	0,0%
110-120°	3 lm	0,0%
120-130°	3 lm	0,0%
130-140°	3 lm	0,0%
140-150°	3 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>14085 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	5045 cd
Intensity, 90°	4 cd
Intensity, 0°	5045 cd

### Zonal Lumen summary

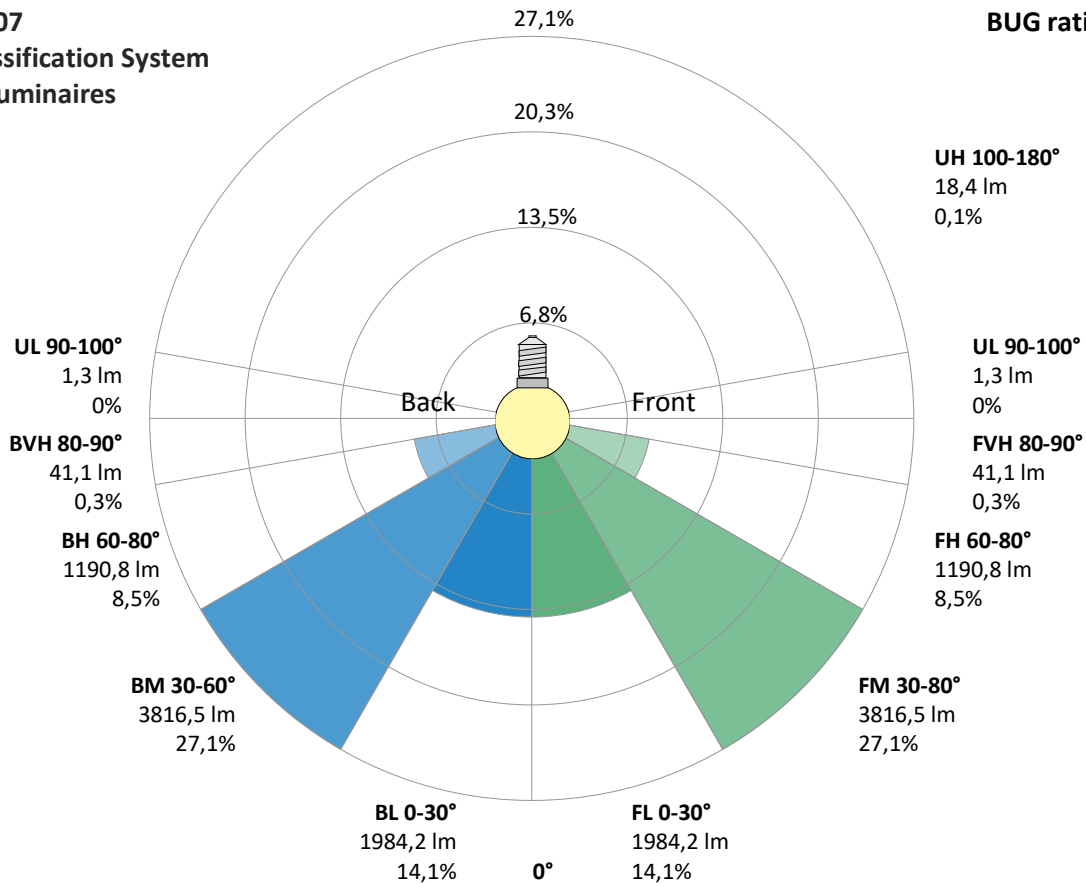
Zone (γ)	Lumen	% Total
0-30°	3971 lm	28,2%
0-40°	6539 lm	46,4%
0-60°	11610 lm	82,4%
60-90°	2455 lm	17,4%
70-100°	791 lm	5,6%
90-120°	5 lm	0,0%
0-90°	14066 lm	99,9%
90-180°	19 lm	0,1%
0-180°	14085 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1984 lm	14,1%
Medium(30-60°)	3817 lm	27,1%
High(60-80°)	1191 lm	8,5%
Very high(80-90°)	41 lm	0,3%
<b>Back light</b>		
Low(0-30°)	1984 lm	14,1%
Medium(30-60°)	3817 lm	27,1%
High(60-80°)	1191 lm	8,5%
Very high(80-90°)	41 lm	0,3%
<b>Uplight</b>		
Low(90-100°)	1 lm	0,0%
High(100-180°)	18 lm	0,1%

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

BUG rating B3 U2 G1



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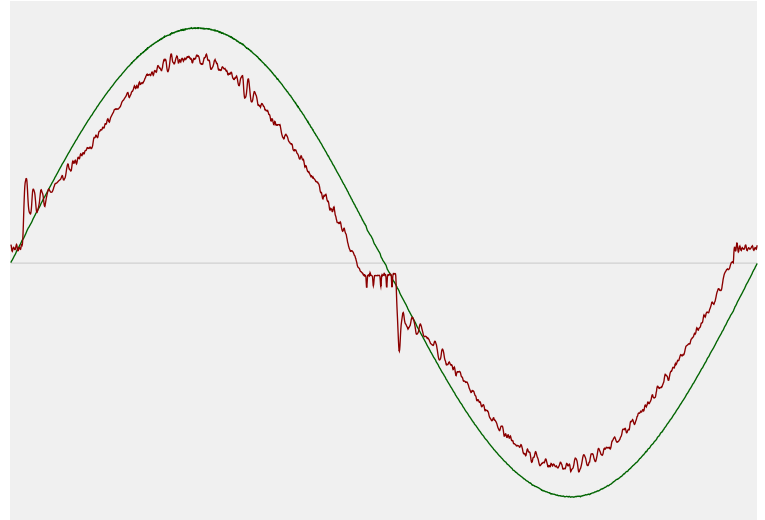


## Power Details

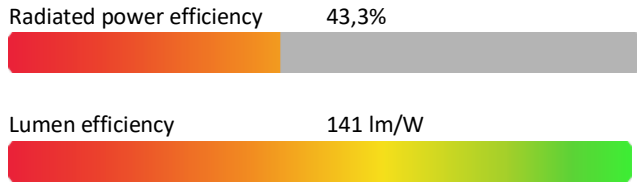
### Input Power

Power feed to light source	100,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,439 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	101,08 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,99
Total harmonic distortion of the current	8,07%
Total harmonic distortion of the voltage	0,09%

### 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	5963 K
CCT shift	+37 K
CCT end	6000 K

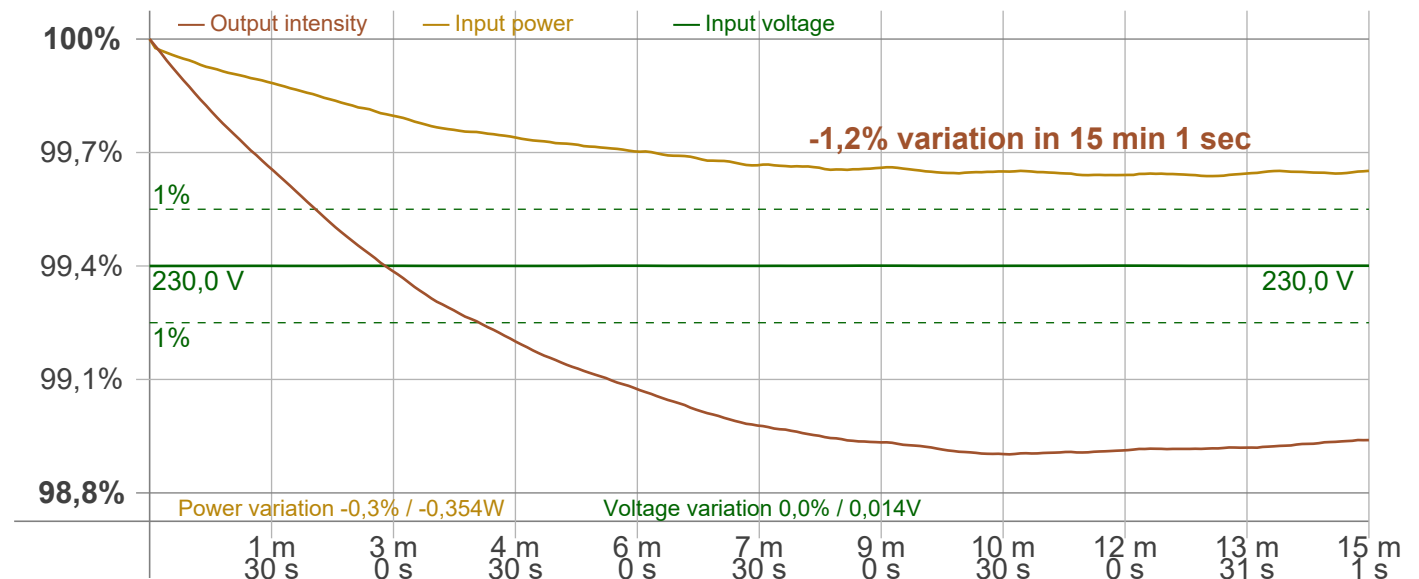
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-1,2%

### Output Change

Output start	14241 lm
Output change	-156 lm
Output end	14085 lm

## Stabilization Curve



# Light Measurement Report

Print date: 17-1-2025

Measurement date and time: 17-1-2025 16:18:00 – Measurement no. VFR-250117-3026-MS

Measurement tracking No. and Link: [VT250117-005856](https://www.viso-systems.com/VT250117-005856)

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 0,42 %  
 Flicker index 0

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

JA8/10 40 Hz 0,07 %  
 JA8/10 90 Hz 0,12 %  
 JA8/10 200 Hz 0,35 %  
 JA8/10 400 Hz 0,38 %  
 JA8/10 1000 Hz 0,4 %

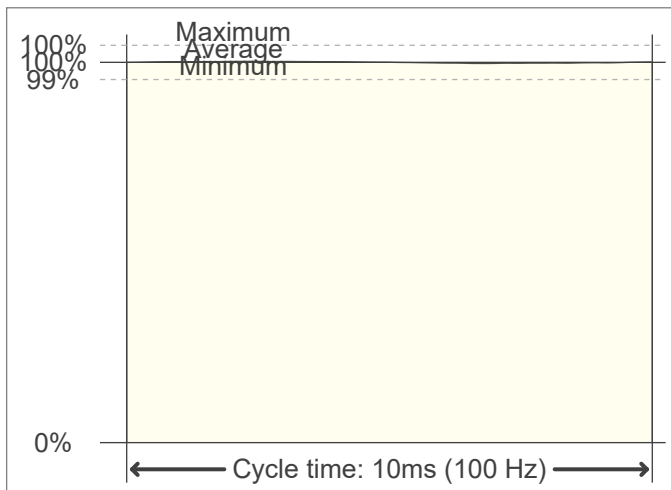
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,06  
 SVM value (80 < F < 2000 Hz) 0,01

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

Perception metric, Assist Mp 0,04

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

