

# Light Measurement Report

Print date: 1-7-2025

Measurement date and time: 1-7-2025 11:31:44 – Measurement no. VFR-250701-1833-MS

Measurement tracking No. and Link: [VT250701-001993](#)

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

16 planes – 22,5°  
5°  
1,99 m  
51,6 W – PF 0,99 – DPF 1,0  
230 V – 0,226 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

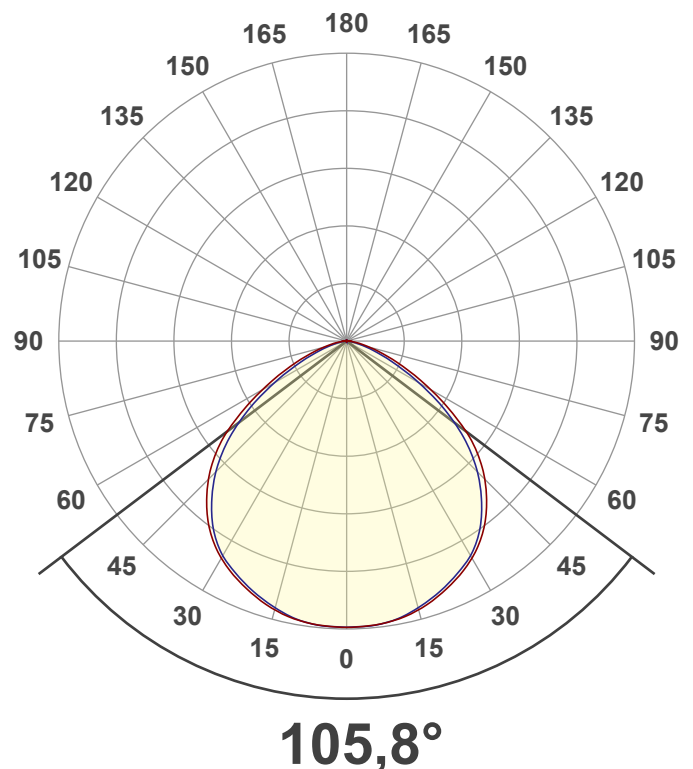
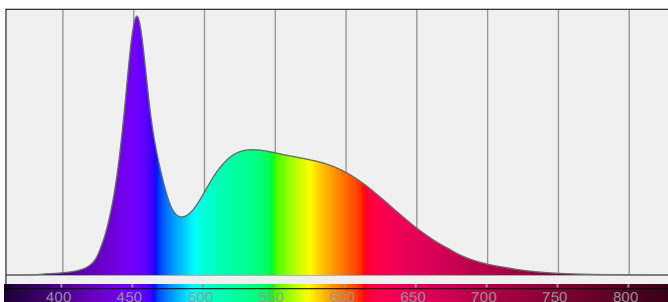
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

811518-6500K  
811518-6500K – Dutchfulfillment  
LED FLOODLIGHT ISTOS | 50W | 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

4843 lm – 0,04% / 99,96%  
94 lm/W  
1922 cd – 105,8°  
CCT = 6500 K / 6868 K  
CRI 82,9  
 $R_f$  83,0 –  $R_g$  95,1  
Duv 0,0059 – SDCM 9,2  
SVM 3,64 – PstLM 0,07



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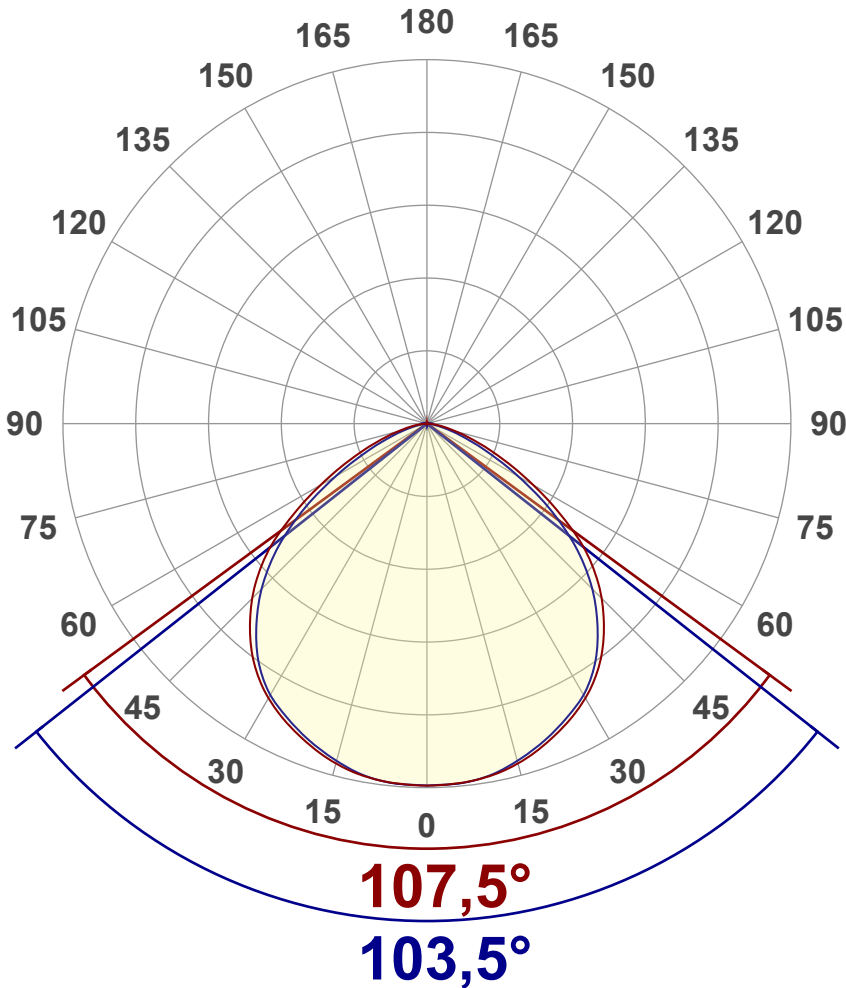
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Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	4843 lm
Lumen Up% / Down%	0,04% / 99,96%
Peak Intensity	1922 cd
Beam Angle (50%)	105,8°
Beam Angle (90%)	103,5°
Beam Angle (10%)	107,5°

## Cut-off Angle

Average 2,5%	163,2°
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## Field Angle

Average 10%	143,8°
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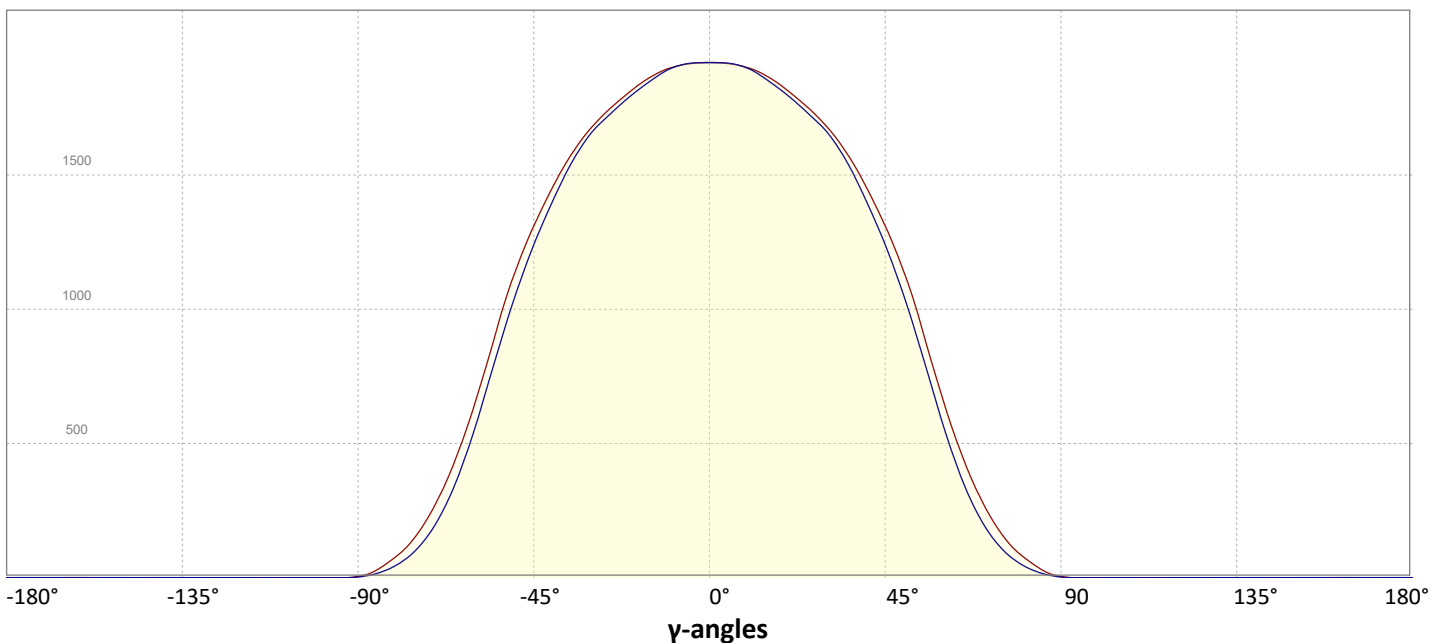
## Intensity Ratio

In 120° cone	88,2%
In 90° cone	62,5%

**C000-C180**

**C090-C270**

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



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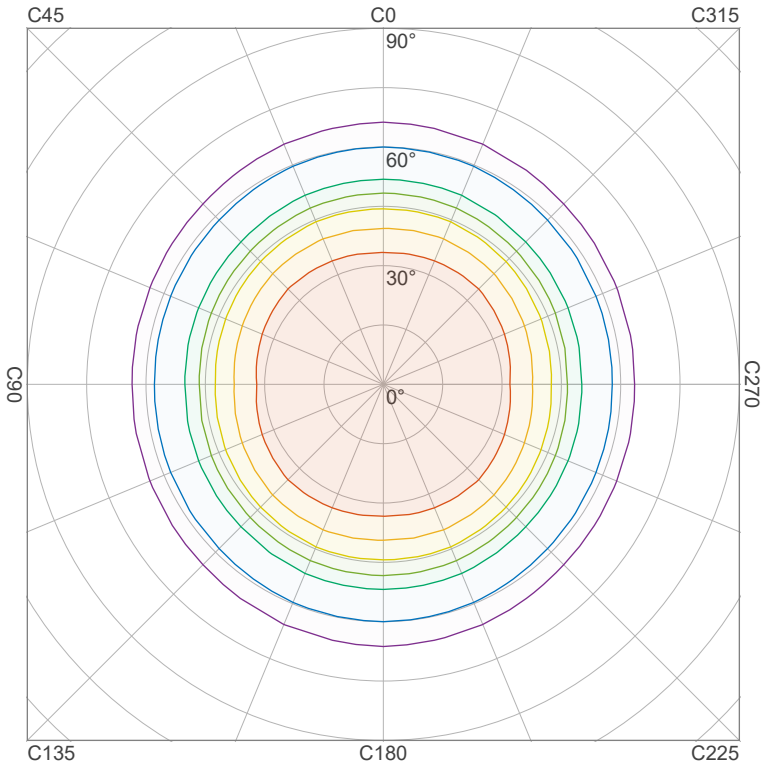
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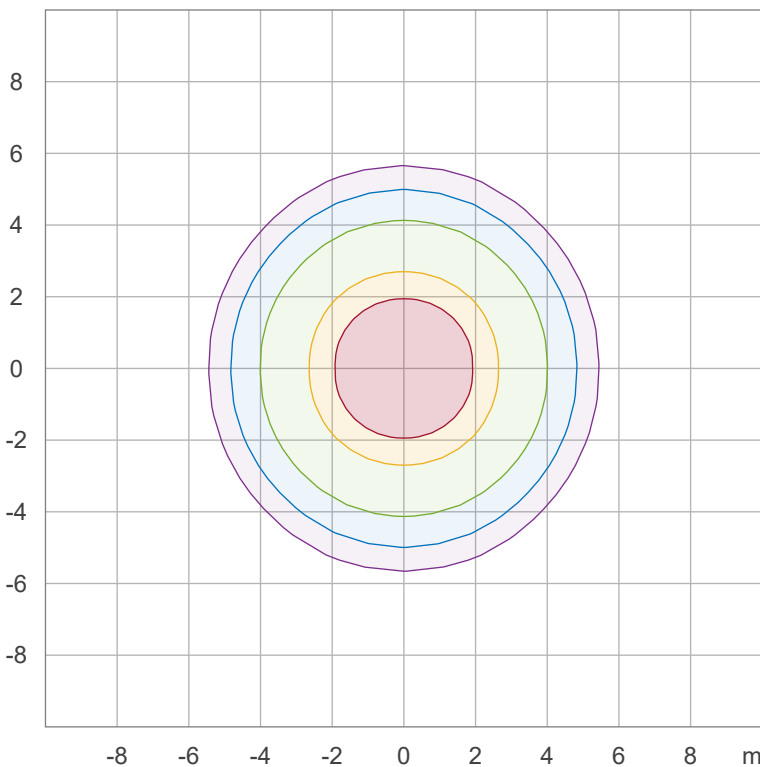
## Iso-intensity Diagram (Iso-candela)



90 %	1729,5 cd
80 %	1537,3 cd
70 %	1345,1 cd
60 %	1153,0 cd
50 %	960,8 cd
40 %	768,6 cd
30 %	576,5 cd
20 %	384,3 cd
10 %	192,2 cd

Peak intensity: 1921,6 cd  
Number of c-planes: 16

## Iso-illuminance Diagram (Iso-lux)



50,0 %	106,7 lx
30,0 %	64,0 lx
10,0 %	21,3 lx
5,0 %	10,7 lx
3,0 %	6,4 lx

Peak illuminance: 213,4 lx  
Mounting height: 3,0 m  
Number of c-planes: 16

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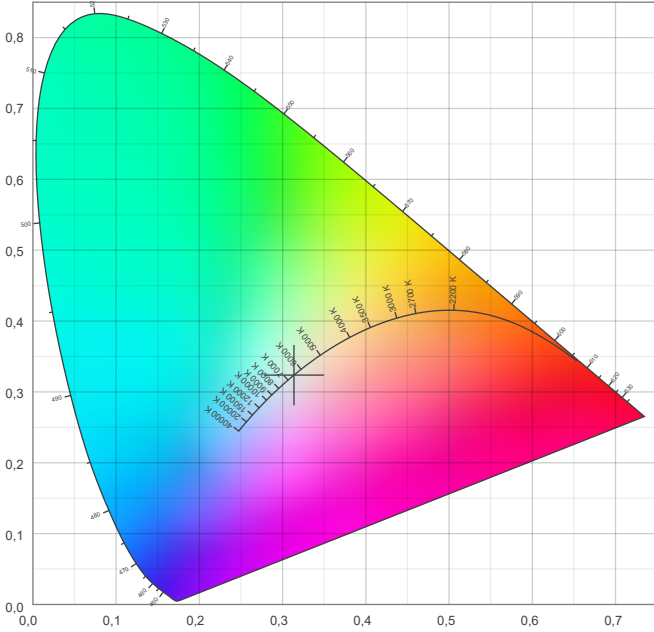


## Color details

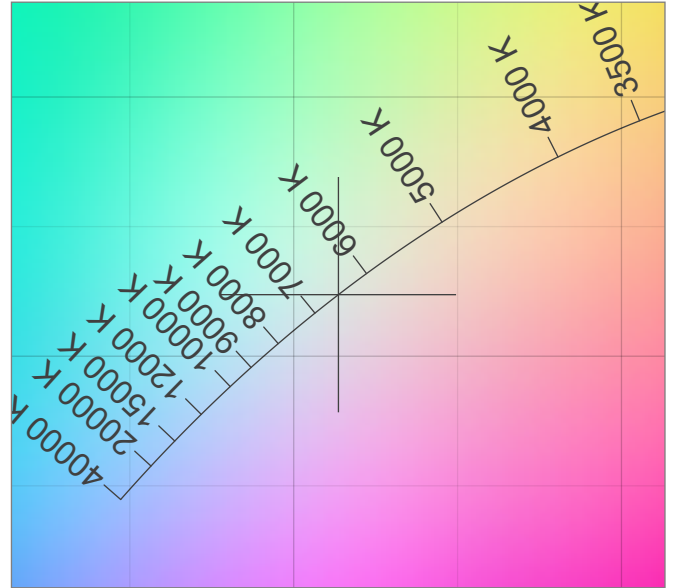
Correlated Color Temperature, Target CCT = 6500 K  
 Correlated Color Temperature, Measured CCT = 6868 K  
 Color Rendering Index CRI 82,9  
 Color Rendering Index, R9 (red component) R9 = 9,6  
 Color Rendering TM30-18 R<sub>f</sub> 83,0 – R<sub>g</sub> 95,1  
 Color Quality Scale CQS = 81,3

MacAdam Steps  
 Color coordinates CIE 1931 (x;y) = (0,314;0,324)  
 Color coordinate CIEs 1960 (u;v) = (0,200;0,310)  
 Color deviation from BBL Duv = 0,0059  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,200;0,466)  
 SDCM = 9,2

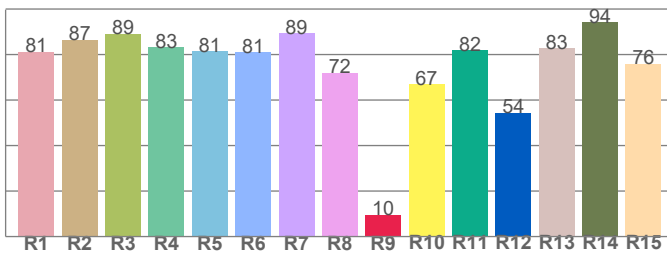
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



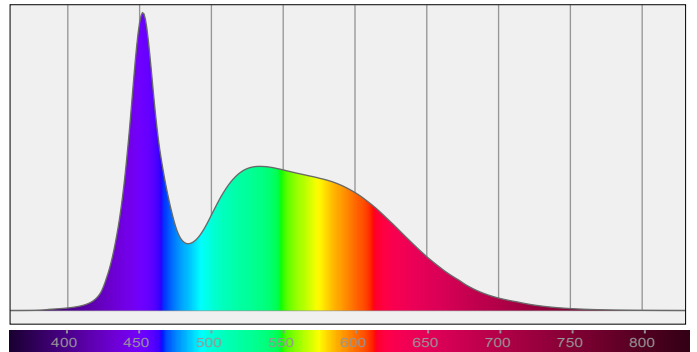
### Color Rendering Index per reference color (CIE 1995)



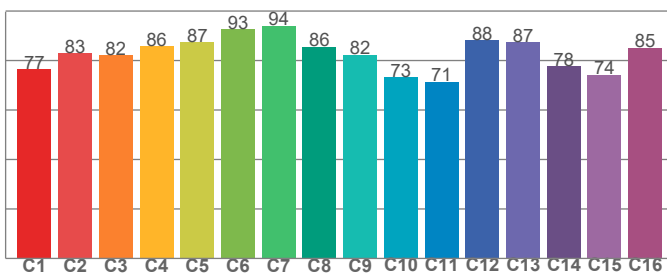
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,2	86,5	89,1	83,1	81,3	81,0	89,4	71,9	9,6	67,0	82,0	54,4	82,9	94,2	75,9

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



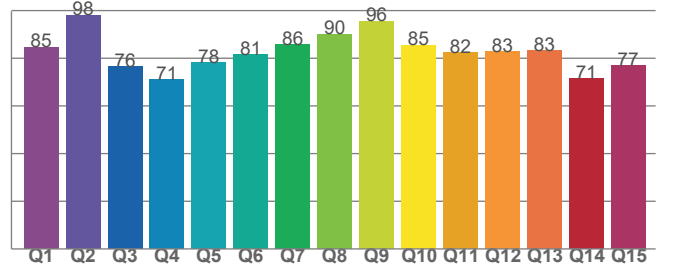
### TM30-18 R<sub>f</sub>-values per hue bin



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
76,6	82,8	82,2	85,7	87,3	92,7	94,0	85,5	82,3	73,1	71,5	88,1	87,3	77,6	74,2	85,2

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
84,6	98,1	76,5	71,0	78,2	81,5	85,7	90,2	95,5	85,4	82,4	82,7	83,1	71,4	76,8

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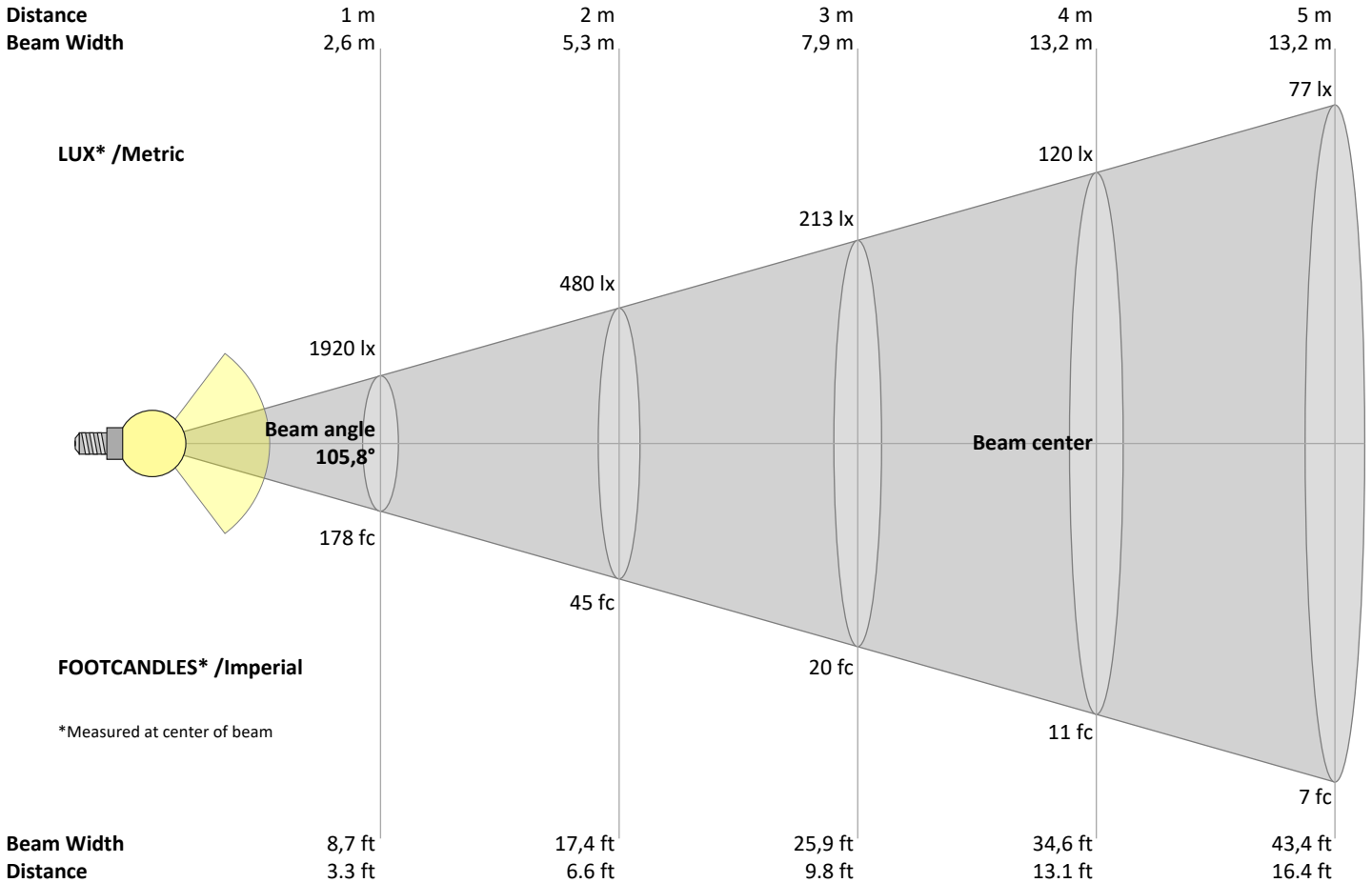
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## Beam Details



### 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
1920	480	213	120	77	53	39	30	24	19	16	13	11	10	9	8	7	6	5	5	lux
178,4	44,6	19,8	11,2	7,1	5	3,6	2,8	2,2	1,8	1,5	1,2	1,1	0,9	0,8	0,7	0,6	0,6	0,5	0,4	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
1920	1914	1897	1864	1813	1752	1678	1581	1456	1307	1125	897	657	448	284	164	85	34	7	1	cd
100%	100%	99%	97%	94%	91%	87%	82%	76%	68%	59%	47%	34%	23%	15%	9%	4%	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
1920	1915	1895	1851	1796	1732	1660	1552	1407	1239	1038	805	562	356	206	108	50	18	3	0	cd
100%	100%	99%	96%	94%	90%	86%	81%	73%	64%	54%	42%	29%	19%	11%	6%	3%	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
1920	1914	1897	1864	1813	1752	1678	1581	1456	1307	1125	897	657	448	284	164	85	34	7	1	cd
100%	100%	99%	97%	94%	91%	87%	82%	76%	68%	59%	47%	34%	23%	15%	9%	4%	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
1920	1915	1895	1851	1796	1732	1660	1552	1407	1239	1038	805	562	356	206	108	50	18	3	0	cd
100%	100%	99%	96%	94%	90%	86%	81%	73%	64%	54%	42%	29%	19%	11%	6%	3%	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	29,2	30,3	29,4	30,6	30,8	28,6	29,7	28,8	30,0	30,2
	3H	29,7	30,9	30,1	31,2	31,4	28,9	30,1	29,3	30,4	30,6
	4H	29,9	31,0	30,3	31,3	31,5	29,0	30,1	29,4	30,4	30,6
	6H	30,1	31,0	30,4	31,3	31,7	29,1	30,0	29,4	30,3	30,7
	8H	30,1	31,0	30,4	31,3	31,7	29,1	30,0	29,4	30,3	30,7
	12H	30,1	30,9	30,4	31,3	31,7	29,0	29,9	29,4	30,3	30,7
4H	2H	29,4	30,5	29,8	30,7	31,0	28,9	30,0	29,3	30,2	30,5
	3H	30,2	31,1	30,6	31,4	31,9	29,5	30,4	29,8	30,7	31,1
	4H	30,4	31,2	30,8	31,6	32,1	29,5	30,3	30,0	30,8	31,3
	6H	30,5	31,3	31,0	31,6	32,0	29,6	30,4	30,1	30,7	31,1
	8H	30,5	31,2	31,0	31,6	32,0	29,5	30,3	30,1	30,6	31,0
	12H	30,5	31,1	31,0	31,5	32,0	29,5	30,1	30,0	30,5	31,0
8H	4H	30,4	31,1	30,9	31,4	31,8	29,6	30,3	30,1	30,6	31,0
	6H	30,5	31,1	31,1	31,5	32,1	29,6	30,2	30,2	30,6	31,2
	8H	30,6	31,1	31,1	31,6	32,2	29,7	30,1	30,2	30,7	31,3
	12H	30,7	31,0	31,2	31,5	32,1	29,7	30,0	30,2	30,5	31,2
12H	4H	30,3	30,9	30,8	31,3	31,8	29,5	30,1	30,0	30,5	31,0
	6H	30,6	31,0	31,1	31,5	32,2	29,7	30,1	30,2	30,6	31,3
	8H	30,6	31,0	31,2	31,5	32,1	29,7	30,0	30,3	30,6	31,2

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

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

## 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	111	106	106	106	102	102	102	100
1	110	106	103	99	108	104	101	98	100	97	95	96	94	92	92	91	89	87
2	101	94	88	83	99	92	87	82	89	84	80	86	82	78	83	79	77	75
3	93	84	76	70	91	82	75	70	79	73	68	76	71	67	74	70	66	64
4	86	75	67	60	83	73	66	60	71	64	59	69	63	58	66	62	58	56
5	79	67	59	52	77	66	58	52	64	57	52	62	56	51	60	55	51	49
6	73	61	52	46	71	60	52	46	58	51	45	56	50	45	55	49	45	43
7	68	55	47	41	66	54	46	41	53	46	40	51	45	40	50	44	40	38
8	63	50	42	37	62	50	42	36	48	41	36	47	41	36	46	40	36	34
9	59	46	38	33	58	46	38	33	44	38	33	43	37	32	42	37	32	31
10	55	43	35	30	54	42	35	30	41	34	30	40	34	30	39	34	29	28

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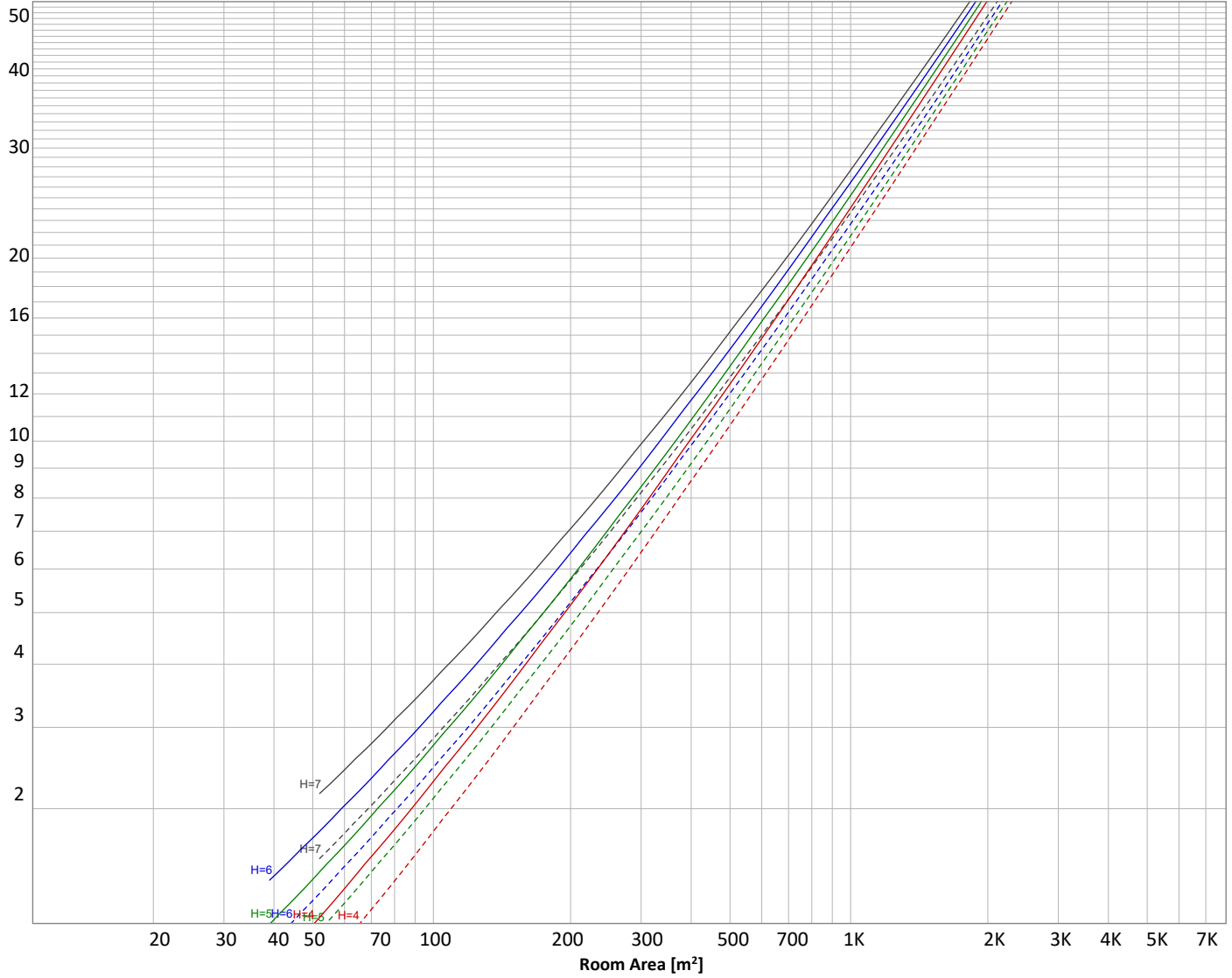
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 4843 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°
182 lm	527 lm	814 lm	994 lm	994 lm	763 lm	398 lm	141 lm	28,0 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,360 lm	0,098 lm	0,170 lm	0,287 lm	0,320 lm	0,263 lm	0,222 lm	0,146 lm	0,048 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	182 lm	3,8%
10-20°	527 lm	10,9%
20-30°	814 lm	16,8%
30-40°	994 lm	20,5%
40-50°	994 lm	20,5%
50-60°	763 lm	15,7%
60-70°	398 lm	8,2%
70-80°	141 lm	2,9%
80-90°	28 lm	0,6%
90-100°	0 lm	0,0%
100-110°	0 lm	0,0%
110-120°	0 lm	0,0%
120-130°	0 lm	0,0%
130-140°	0 lm	0,0%
140-150°	0 lm	0,0%
150-160°	0 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
<b>Total</b>	<b>4843 lm</b>	<b>100,0%</b>

### Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1524 lm	31,5%
0-40°	2517 lm	52,0%
0-60°	4274 lm	88,2%
60-90°	568 lm	11,7%
70-100°	170 lm	3,5%
90-120°	1 lm	0,0%
0-90°	4841 lm	100,0%
90-180°	2 lm	0,0%
0-180°	4843 lm	100,0%

### BUG rating

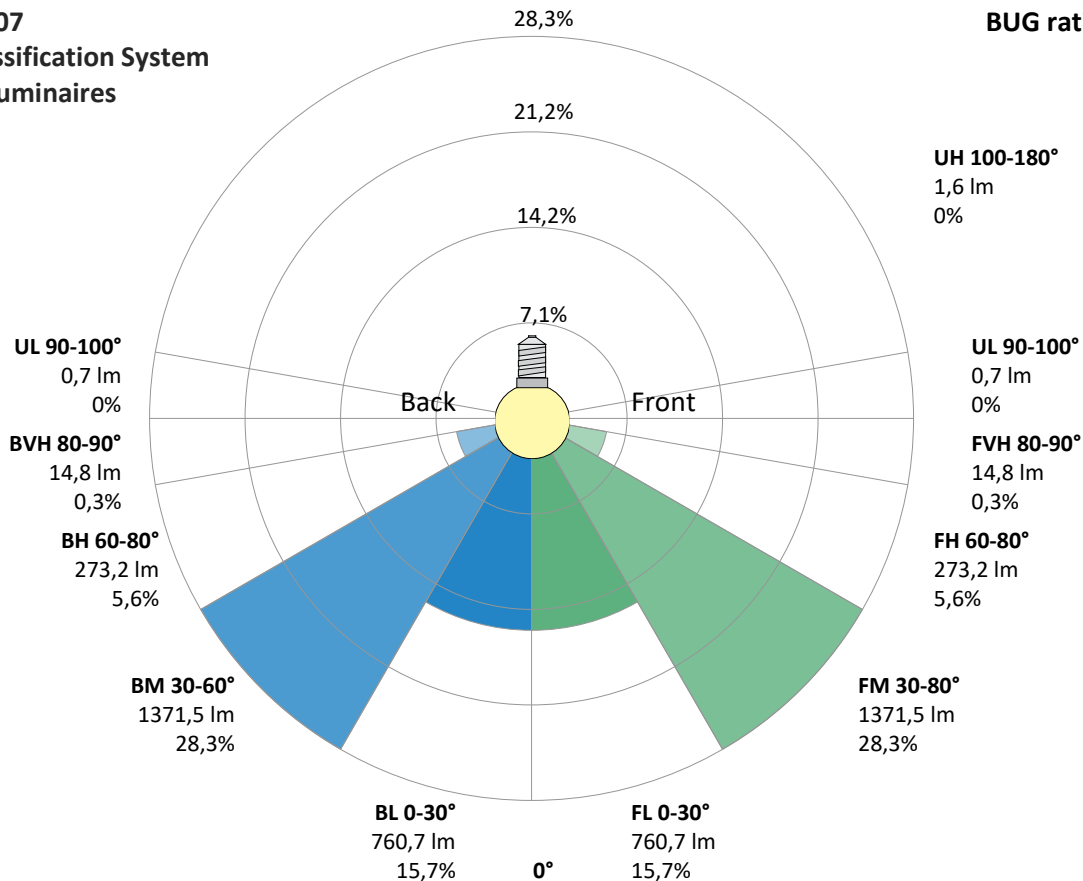
	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	761 lm	15,7%
Medium(30-60°)	1372 lm	28,3%
High(60-80°)	273 lm	5,6%
Very high(80-90°)	15 lm	0,3%
<b>Back light</b>		
Low(0-30°)	761 lm	15,7%
Medium(30-60°)	1372 lm	28,3%
High(60-80°)	273 lm	5,6%
Very high(80-90°)	15 lm	0,3%
<b>Uplight</b>		
Low(90-100°)	1 lm	0,0%
High(100-180°)	2 lm	0,0%

### Intensity peaks

Max intensity	1922 cd
Intensity, 90°	7 cd
Intensity, 0°	1920 cd

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

**BUG rating B2 U1 G1**



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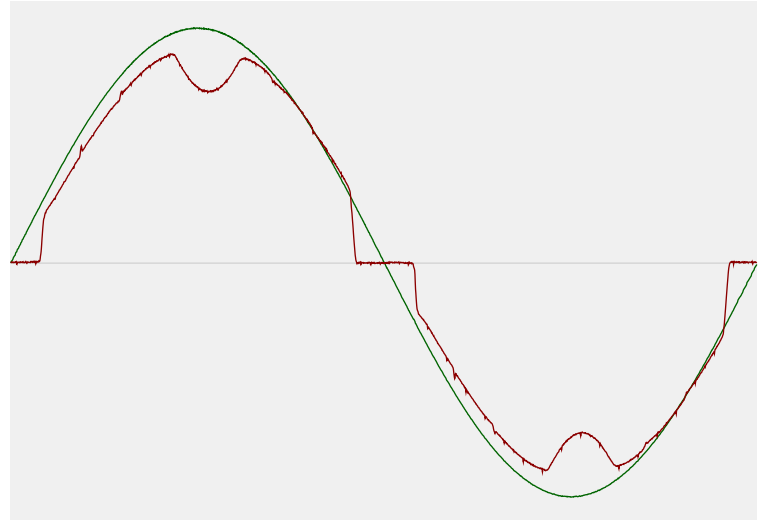


## Power Details

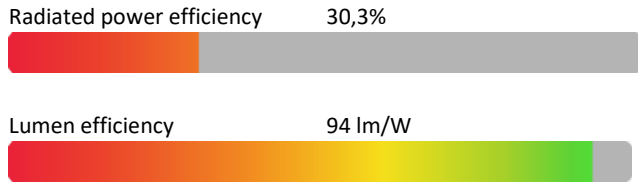
### Input Power

Power feed to light source	51,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,226 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	52,02 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,99
Total harmonic distortion of the current	12,02%
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	6497 K
CCT shift	+3 K
CCT end	6500 K

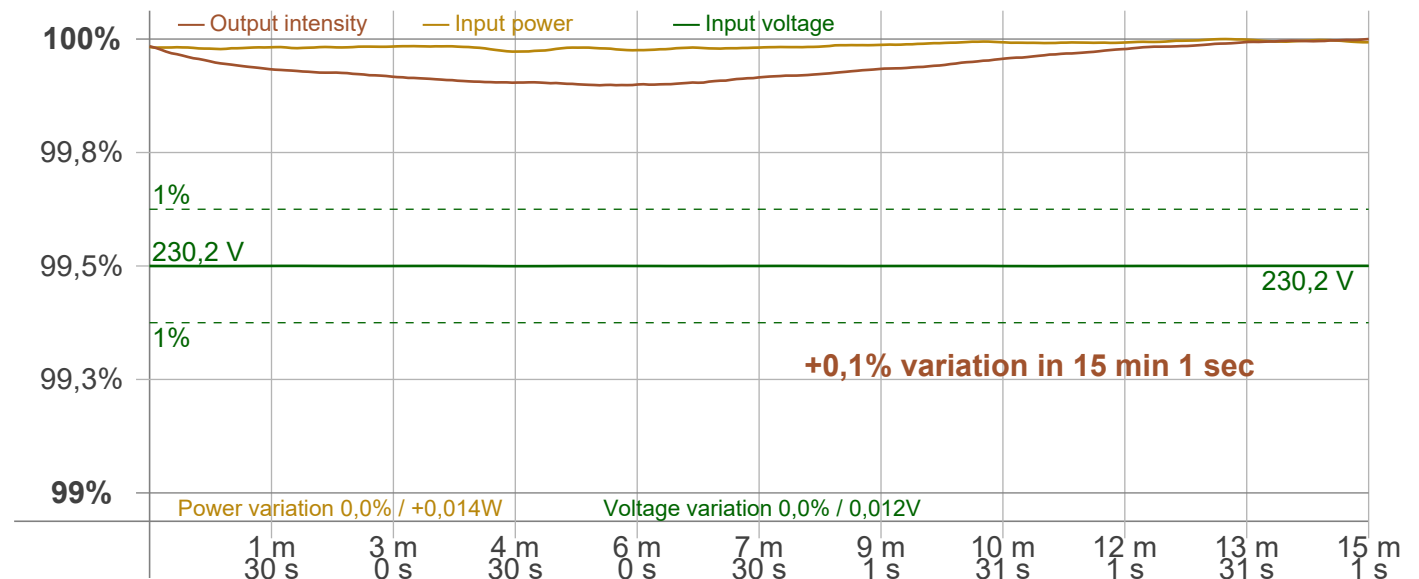
### Warmup Result

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

### Output Change

Output start	4843 lm
Output change	lm
Output end	4843 lm

### Stabilization Curve



# Light Measurement Report

Print date: 1-7-2025

Measurement date and time: 1-7-2025 11:31:44 – Measurement no. VFR-250701-1833-MS

Measurement tracking No. and Link: [VT250701-001993](https://www.viso-systems.com/VT250701-001993)

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: 99,94 %  
 Flicker index: 0,31

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

JA8/10 40 Hz: 0,2 %  
 JA8/10 90 Hz: 0,83 %  
 JA8/10 200 Hz: 102,98 %  
 JA8/10 400 Hz: 101,62 %  
 JA8/10 1000 Hz: 102,06 %

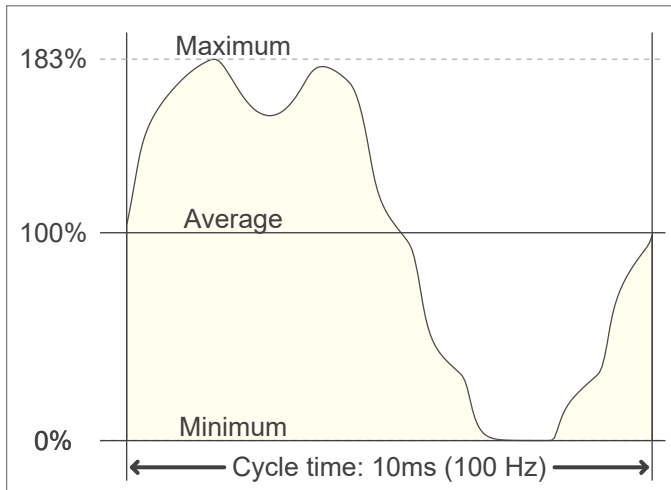
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,07  
 SVM value (80 < F < 2000 Hz): 3,64

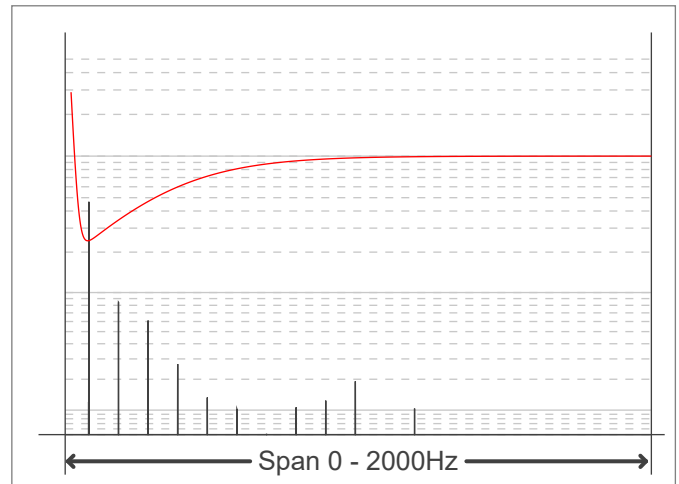
### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,03

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



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



### IEEE 1789 Frequency/modulation plot

