Light Measurement Report

Print date: 8-9-2025
Measurement date and time: 8-9-2025 10:50:45 – Measurement no. VFR-250908-3011-MS
Measurement tracking No. and Link: n/a
Operator:

Laboratory and Equipment

Laboratory Owner and Location	Viso Systems, Copenhagen V, Denmark
Goniospectrometer System and Type	LabSpion – Type C, horizontal
Sensor Name, Calibr. Date and Serial No.	LabSensor Model2 – 11-1-2024 – 3130191315
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

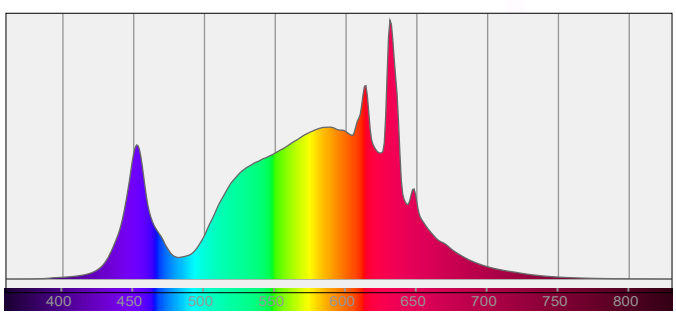
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,10 m
Input Power, Power and Displ. Factors	73,0 W – PF 0,98 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,323 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

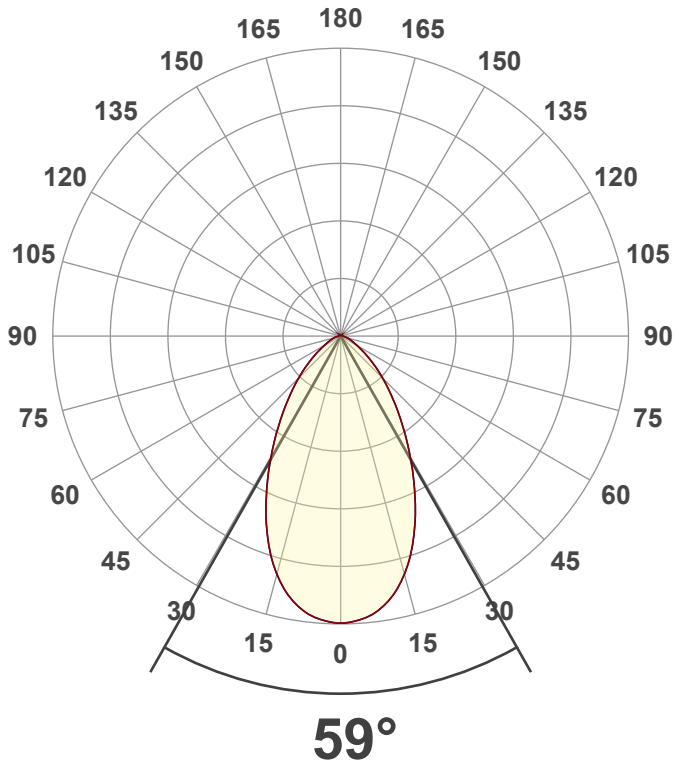
Tested Light Source

Product Name	810703-3500K
Item No. and Manufacturer	810703-3500K – Dutchfulfillment
Product Description (line 1)	LICHTLIJN MODULE | TITAN | 65-80W | 90° | CCT-SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	12672 lm – 2,89% / 97,11%
Efficiency	174 lm/W
Peak Intensity and Beam Angle	10394 cd – 59°
Correlated Color Temperature, Target/Measured	CCT = 3500 K / 3379 K
Color Rendering Index	CRI 81,6
Color Rendering TM30-18	R_f 82,6 – R_g 97,6
Color Shift, CIE duv and MacAdam Steps	Duv 0,0032 – SDCM 5,0
Flicker	SVM 0,01 – PstLM 0,01





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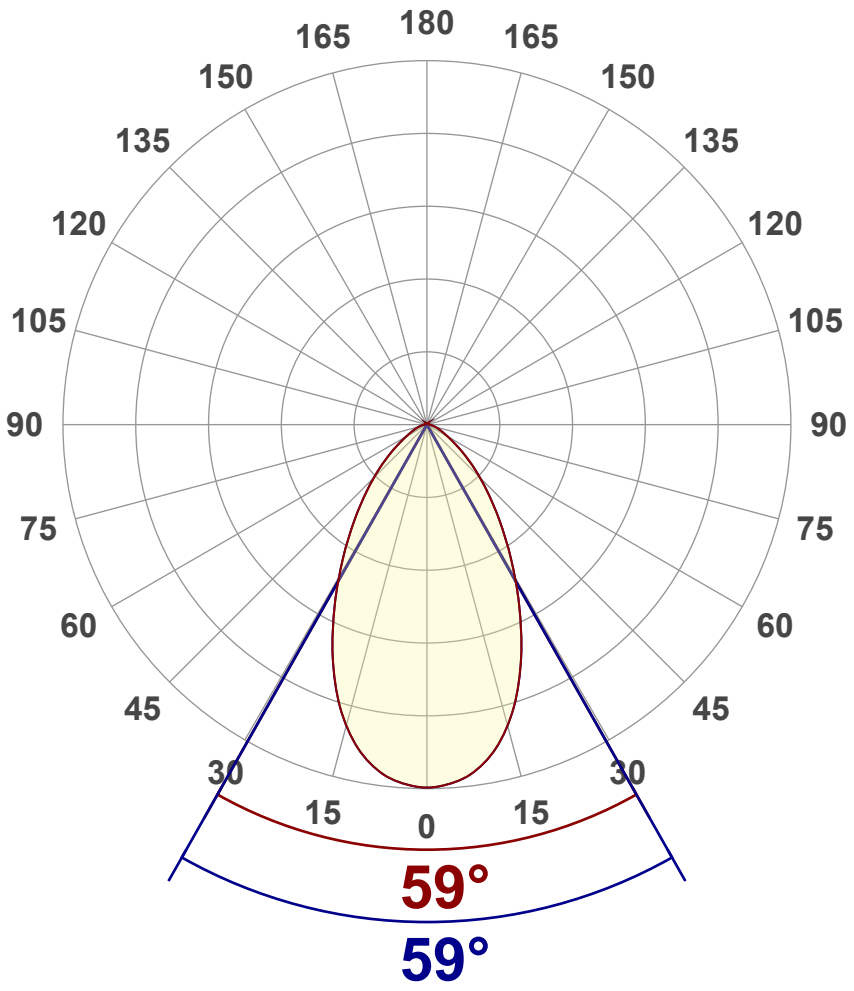
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	12672 lm
Lumen Up% / Down%	2,89% / 97,11%
Peak Intensity	10394 cd
Beam Angle (50%)	59°
Beam Angle (90%)	59°
Beam Angle (10%)	59°

Cut-off Angle

Average 2,5%	148,2°

Field Angle

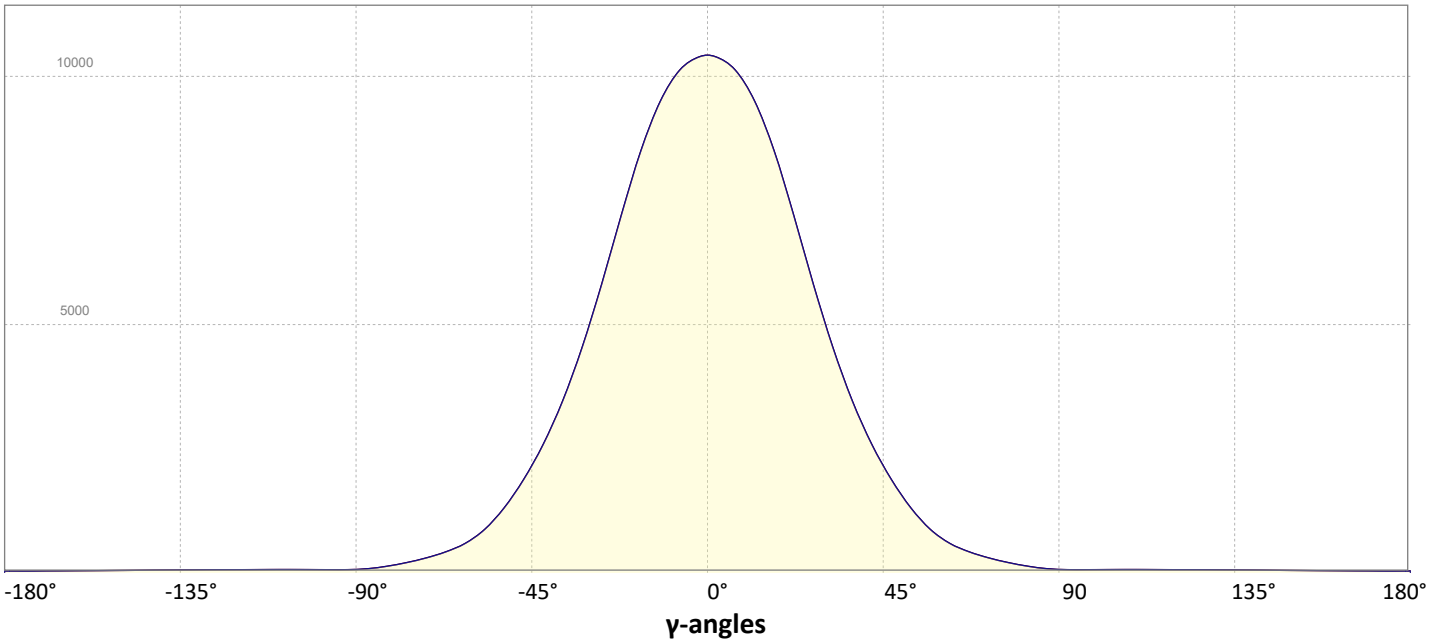
Average 10%	110,3°

Intensity Ratio

In 120° cone	90,3%
In 90° cone	77,1%

C000-C180
C090-C270

Linear distribution diagram - Intensity (candela) vs γ-angle



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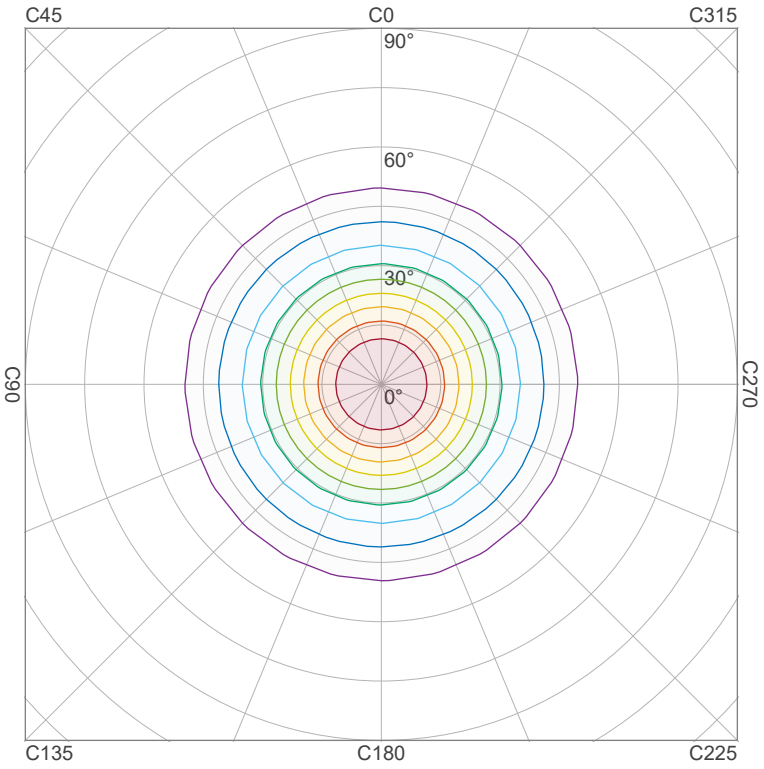
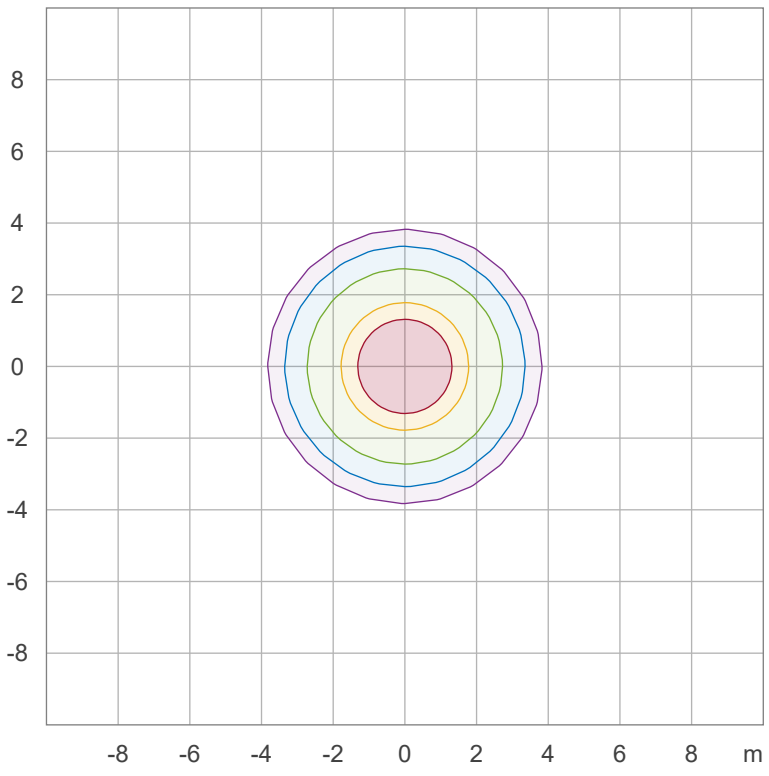
Iso-intensity Diagram (Iso-candela)



90 %	9354,6 cd
80 %	8315,2 cd
70 %	7275,8 cd
60 %	6236,4 cd
50 %	5197,0 cd
40 %	4157,6 cd
30 %	3118,2 cd
20 %	2078,8 cd
10 %	1039,4 cd

Peak intensity: 10394,0 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	577,4 lx
30,0 %	346,5 lx
10,0 %	115,5 lx
5,0 %	57,7 lx
3,0 %	34,6 lx

Peak illuminance: 1154,9 lx
Mounting height: 3,0 m
Number of c-planes: 12

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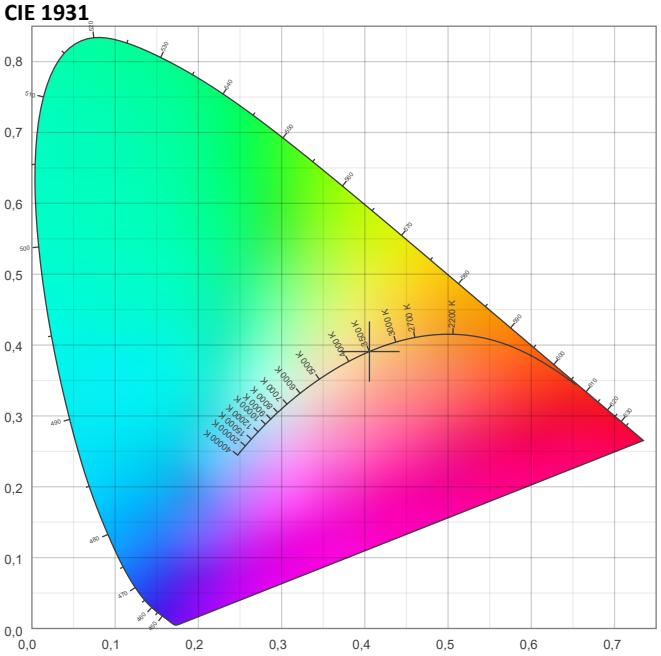
Color details

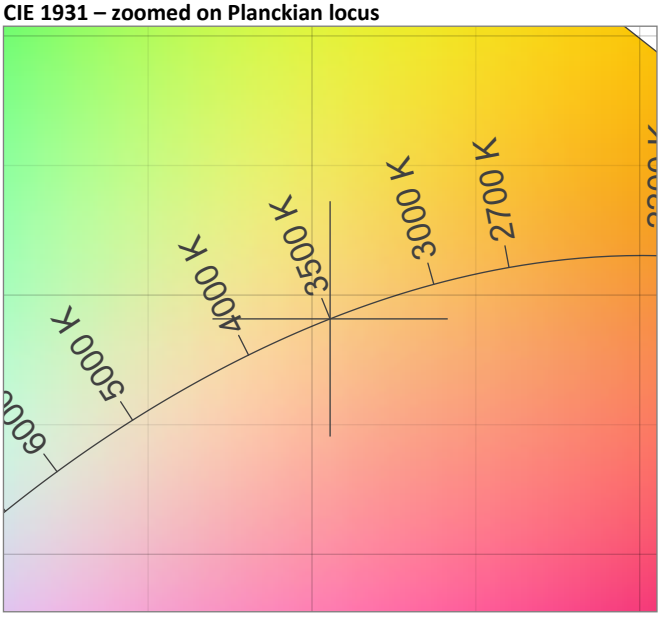
Correlated Color Temperature, Target	CCT = 3500 K
Correlated Color Temperature, Measured	CCT = 3379 K
Color Rendering Index	CRI 81,6
Color Rendering Index, R9 (red component)	R9 = 18,2
Color Rendering TM30-18	R_f 82,6 – R_g 97,6
Color Quality Scale	CQS = 81,4

MacAdam Steps	SDCM = 5,0
Color coordinates CIE 1931	(x;y) = (0,406;0,391)
Color coordinate CIEs 1960	(u;v) = (0,236;0,341)
Color deviation from BBL	Duv = 0,0032
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,236;0,511)

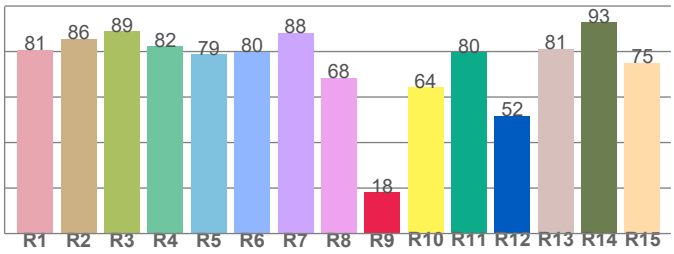
CIE 1931



CIE 1931 – zoomed on Planckian locus



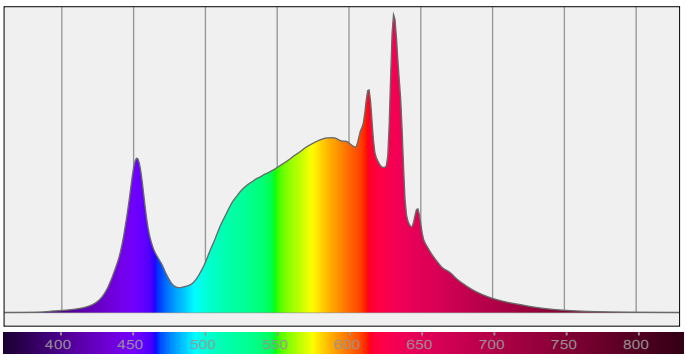
Color Rendering Index per reference color (CIE 1995)



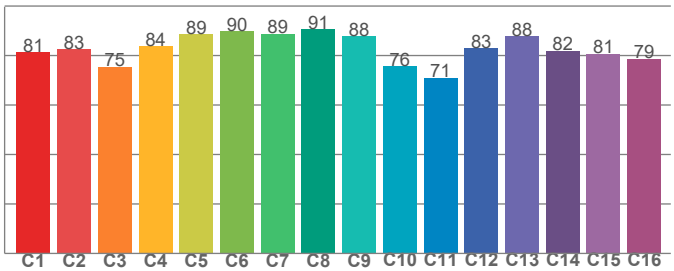
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,8	85,6	88,8	82,2	78,7	80,0	88,2	68,5	18,2	64,4	79,7	51,7	81,2	92,9	75,1

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



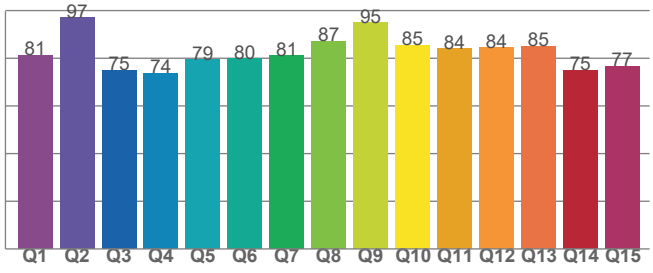
TM30-18 Rf-values per hue bin



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
81,3	82,6	75,5	83,8	88,5	89,7	88,8	90,5	87,7	75,7	71,1	83,0	87,9	82,0	80,7	78,7

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
81,2	97,1	75,1	73,7	79,4	79,8	81,0	87,2	94,9	85,4	84,0	84,4	85,0	75,0	76,7

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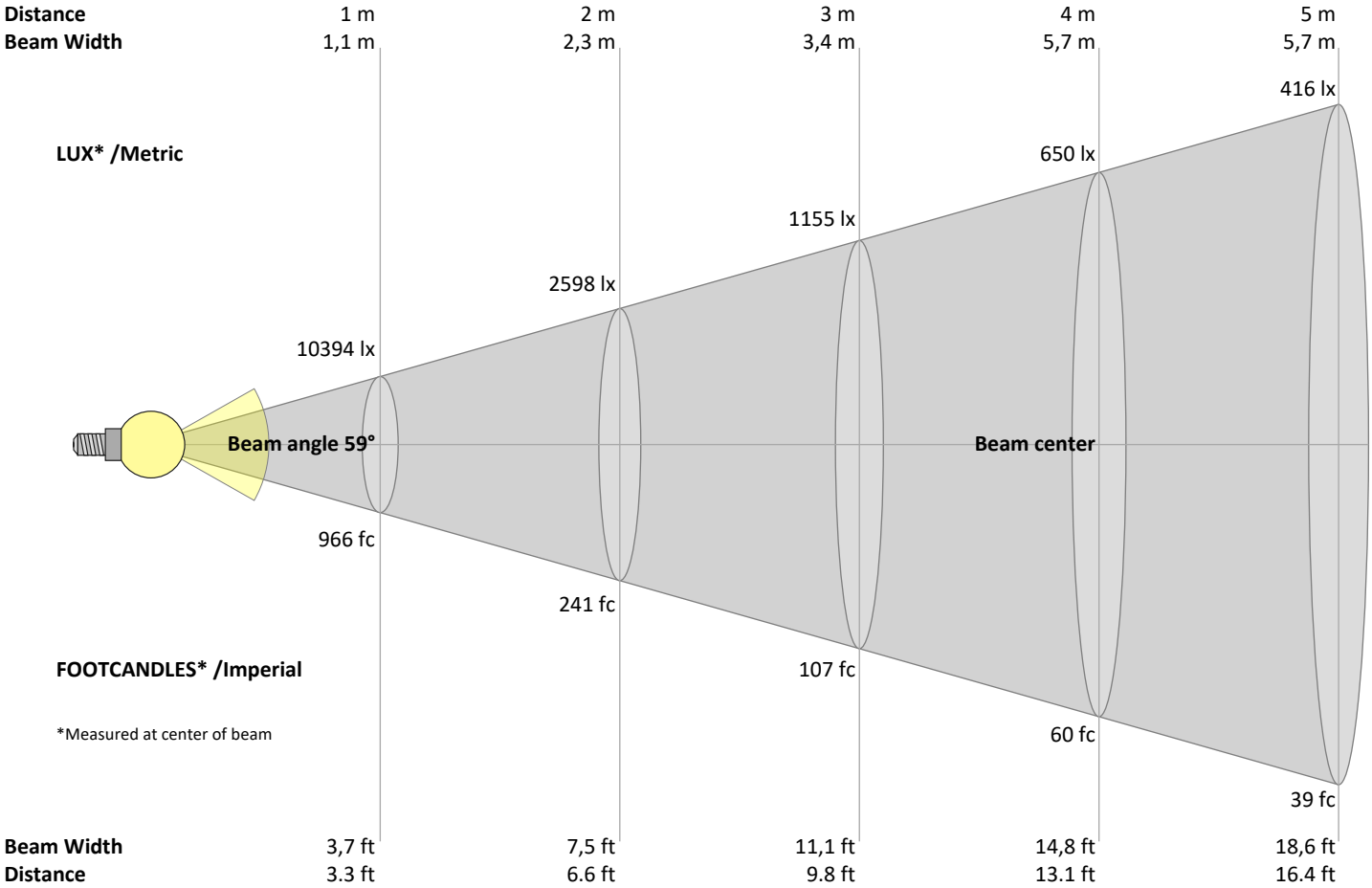
Beam Details



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
10394	2598	1155	650	416	289	212	162	128	104	86	72	62	53	46	41	36	32	29	26	lux
965,6	241,4	107,3	60,4	38,6	26,8	19,7	15,1	11,9	9,7	8	6,7	5,7	4,9	4,3	3,8	3,3	3	2,7	2,4	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
10,4K	10,2K	9,8K	8,9K	7,7K	6,4K	5,1K	3,9K	3,0K	2,2K	1,5K	1,1K	0,7K	0,5K	0,3K	0,2K	0,2K	0,1K	0,1K	0,1K	cd
100%	99%	94%	86%	74%	62%	49%	38%	28%	21%	15%	10%	7%	5%	3%	2%	2%	1%	1%	1%	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
10,4K	10,2K	9,8K	8,9K	7,7K	6,4K	5,1K	3,9K	3,0K	2,2K	1,5K	1,1K	0,7K	0,5K	0,3K	0,2K	0,2K	0,1K	0,1K	0,1K	cd
100%	99%	94%	86%	74%	62%	49%	38%	28%	21%	15%	10%	7%	5%	3%	2%	2%	1%	1%	1%	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
10,4K	10,2K	9,8K	8,9K	7,7K	6,4K	5,1K	3,9K	3,0K	2,2K	1,5K	1,1K	0,7K	0,5K	0,3K	0,2K	0,2K	0,1K	0,1K	0,1K	cd
100%	99%	94%	86%	74%	62%	49%	38%	28%	21%	15%	10%	7%	5%	3%	2%	2%	1%	1%	1%	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
10,4K	10,2K	9,8K	8,9K	7,7K	6,4K	5,1K	3,9K	3,0K	2,2K	1,5K	1,1K	0,7K	0,5K	0,3K	0,2K	0,2K	0,1K	0,1K	0,1K	cd
100%	99%	94%	86%	74%	62%	49%	38%	28%	21%	15%	10%	7%	5%	3%	2%	2%	1%	1%	1%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
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 H = mounting height above eye level		**Viewed Crosswise** (Viewing direction orthogonal to lamp length axis)					**Viewed Endwise** (Viewing direction parallel to lamp length axis)				
X	**Y**										
2H	2H	21,1	21,9	21,3	22,2	22,5	21,2	22,1	21,5	22,4	22,7
	3H	21,4	22,3	21,8	22,6	22,8	21,6	22,5	22,0	22,8	23,1
	4H	21,6	22,4	22,0	22,7	23,0	21,8	22,7	22,2	23,0	23,3
	6H	21,8	22,5	22,1	22,9	23,3	22,1	22,8	22,4	23,2	23,6
	8H	21,8	22,6	22,2	22,9	23,4	22,1	22,9	22,5	23,2	23,7
	12H	21,8	22,6	22,2	23,0	23,4	22,2	22,9	22,6	23,3	23,8
4H	2H	21,1	22,0	21,6	22,3	22,6	21,3	22,2	21,7	22,5	22,8
	3H	21,7	22,5	22,1	22,9	23,3	21,9	22,7	22,3	23,0	23,5
	4H	21,9	22,6	22,4	23,1	23,6	22,2	22,9	22,6	23,3	23,9
	6H	22,2	22,9	22,7	23,2	23,7	22,5	23,1	23,0	23,5	23,9
	8H	22,3	22,9	22,8	23,3	23,7	22,6	23,2	23,2	23,6	24,0
	12H	22,4	22,9	22,9	23,3	23,8	22,8	23,2	23,3	23,7	24,2
8H	4H	22,0	22,6	22,6	23,0	23,4	22,2	22,8	22,8	23,2	23,7
	6H	22,4	22,8	22,9	23,3	23,9	22,7	23,1	23,2	23,6	24,2
	8H	22,6	22,9	23,1	23,5	24,2	22,9	23,3	23,5	23,8	24,5
	12H	22,7	23,0	23,4	23,6	24,2	23,1	23,5	23,8	24,0	24,6
12H	4H	22,0	22,5	22,5	22,9	23,5	22,2	22,7	22,7	23,2	23,7
	6H	22,4	22,8	23,0	23,4	24,0	22,7	23,1	23,3	23,6	24,3
	8H	22,6	22,9	23,3	23,5	24,1	23,0	23,3	23,6	23,8	24,5

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,5 / -0,7	0,5 / -0,6
S = 1.5H	1,4 / -1,3	1,3 / -1,2
S = 2.0H	2,5 / -1,9	2,4 / -1,7

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	118	118	118	118	115	115	115	115	110	110	110	104	104	104	99	99	99	97
1	111	107	104	101	108	105	102	99	100	98	96	96	94	92	92	91	89	87
2	104	98	92	88	101	95	91	87	92	88	84	88	85	82	85	82	80	78
3	97	89	83	78	95	87	81	77	84	79	75	81	77	74	78	75	72	70
4	91	81	75	69	88	80	74	69	77	72	68	75	70	66	73	69	65	63
5	85	75	68	63	83	74	67	62	71	66	61	69	64	60	67	63	60	58
6	80	69	62	57	78	68	61	56	66	60	56	64	59	55	63	58	55	53
7	75	64	57	52	73	63	57	52	62	56	51	60	55	51	59	54	50	49
8	71	60	53	48	69	59	52	48	58	52	47	56	51	47	55	50	46	45
9	67	56	49	44	66	55	49	44	54	48	44	53	47	43	52	47	43	42
10	63	52	46	41	62	52	45	41	51	45	41	50	44	41	49	44	40	39

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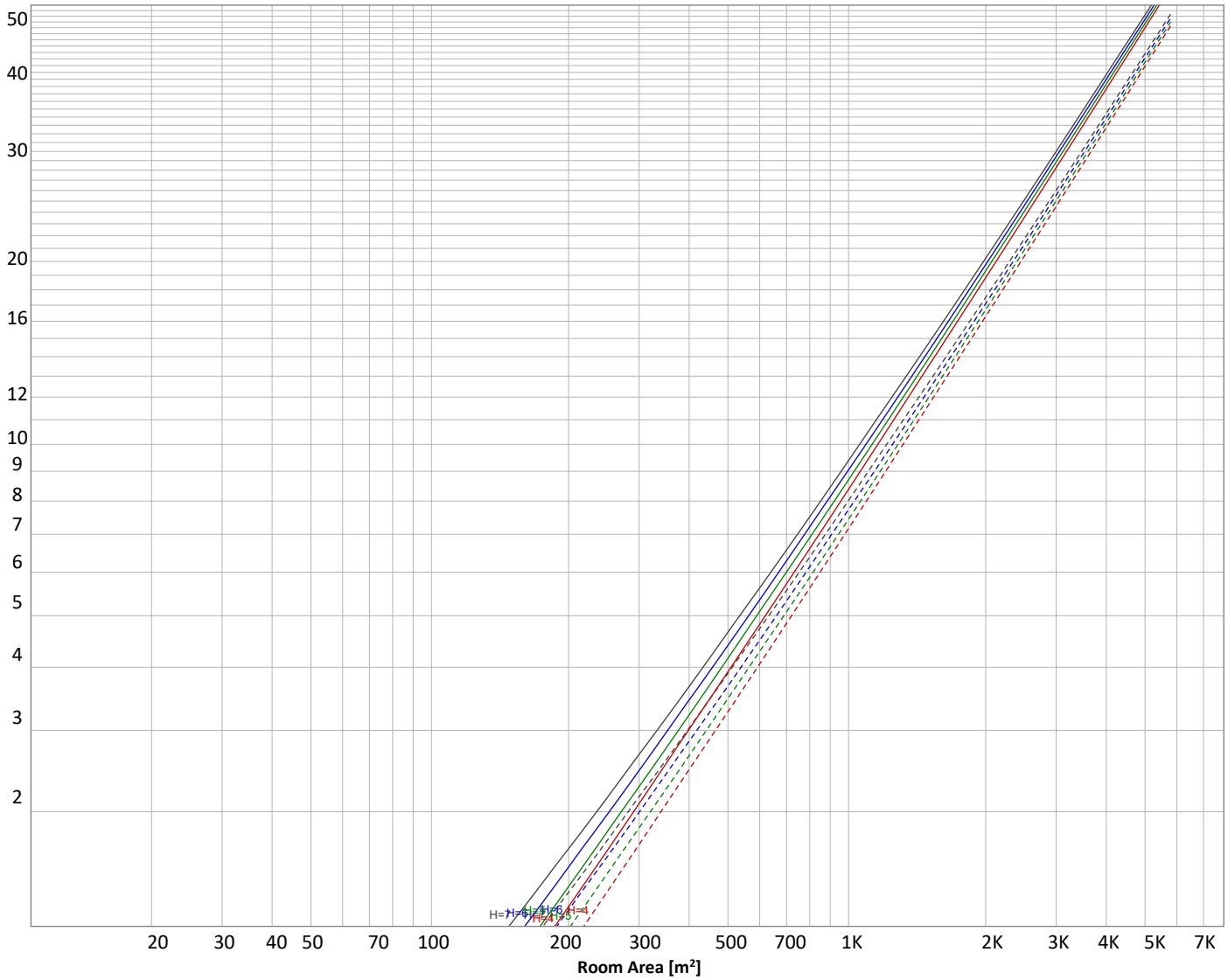
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 12672 lm		ρ(%)		
H_{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H_{work} = Work area height from floor =	0.00 m	----------	70	50	30
E_{work} = 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°
967 lm	2495 lm	2927 lm	2440 lm	1674 lm	944 lm	487 lm	258 lm	113 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
68,6 lm	68,7 lm	63,5 lm	55,0 lm	43,9 lm	31,9 lm	20,2 lm	10,7 lm	3,22 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	967 lm	7,6%
10-20°	2495 lm	19,7%
20-30°	2927 lm	23,1%
30-40°	2440 lm	19,3%
40-50°	1674 lm	13,2%
50-60°	944 lm	7,5%
60-70°	487 lm	3,8%
70-80°	258 lm	2,0%
80-90°	113 lm	0,9%
90-100°	69 lm	0,5%
100-110°	69 lm	0,5%
110-120°	64 lm	0,5%
120-130°	55 lm	0,4%
130-140°	44 lm	0,3%
140-150°	32 lm	0,3%
150-160°	20 lm	0,2%
160-170°	11 lm	0,1%
170-180°	3 lm	0,0%
Total	12672 lm	100,0%

Intensity peaks

Max intensity	10394 cd
Intensity, 90°	71 cd
Intensity, 0°	10394 cd

Zonal Lumen summary

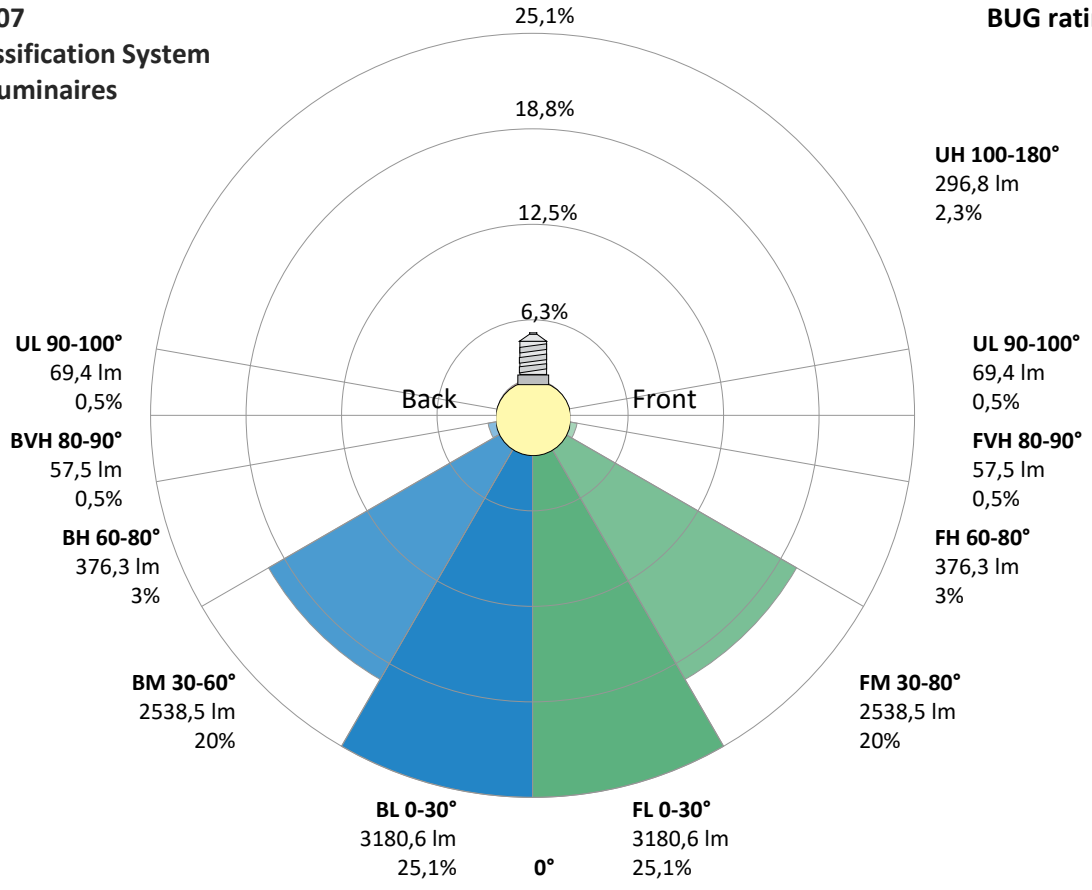
Zone (γ)	Lumen	% Total
0-30°	6390 lm	50,4%
0-40°	8830 lm	69,7%
0-60°	11449 lm	90,3%
60-90°	857 lm	6,8%
70-100°	439 lm	3,5%
90-120°	201 lm	1,6%
0-90°	12306 lm	97,1%
90-180°	366 lm	2,9%
0-180°	12672 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	3181 lm	25,1%
Medium(30-60°)	2538 lm	20,0%
High(60-80°)	376 lm	3,0%
Very high(80-90°)	57 lm	0,5%
Back light		
Low(0-30°)	3181 lm	25,1%
Medium(30-60°)	2538 lm	20,0%
High(60-80°)	376 lm	3,0%
Very high(80-90°)	57 lm	0,5%
Uplight		
Low(90-100°)	69 lm	0,5%
High(100-180°)	297 lm	2,3%

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

BUG rating B4 U3 G1



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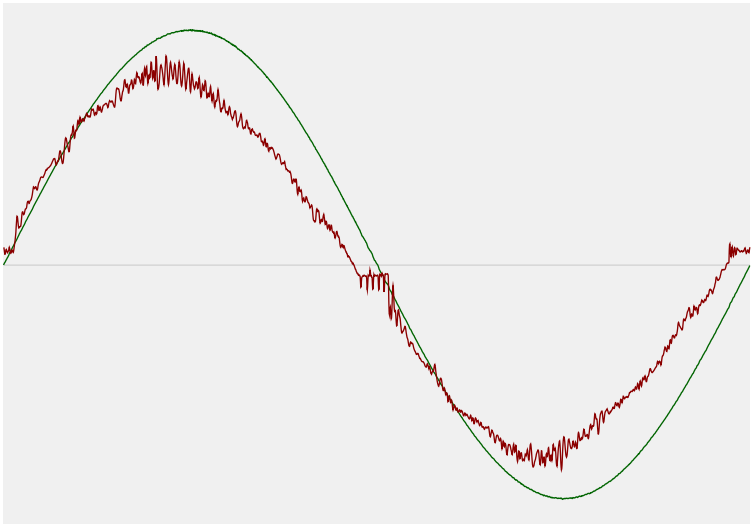
Power Details

Input Power

Power feed to light source	73,0 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,323 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	74,4 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	6,26%
Total harmonic distortion of the voltage	0,07%

Input Power Curve



Efficiency

Radiated power efficiency 49,0%

Lumen efficiency 174 lm/W

Stabilization Details

Warmup Conditions

Stable period	15 min
Stable change max	2,0%
Minimum time	15 min

Color Temperature Change

CCT start	3505 K
CCT shift	-5 K
CCT end	3500 K

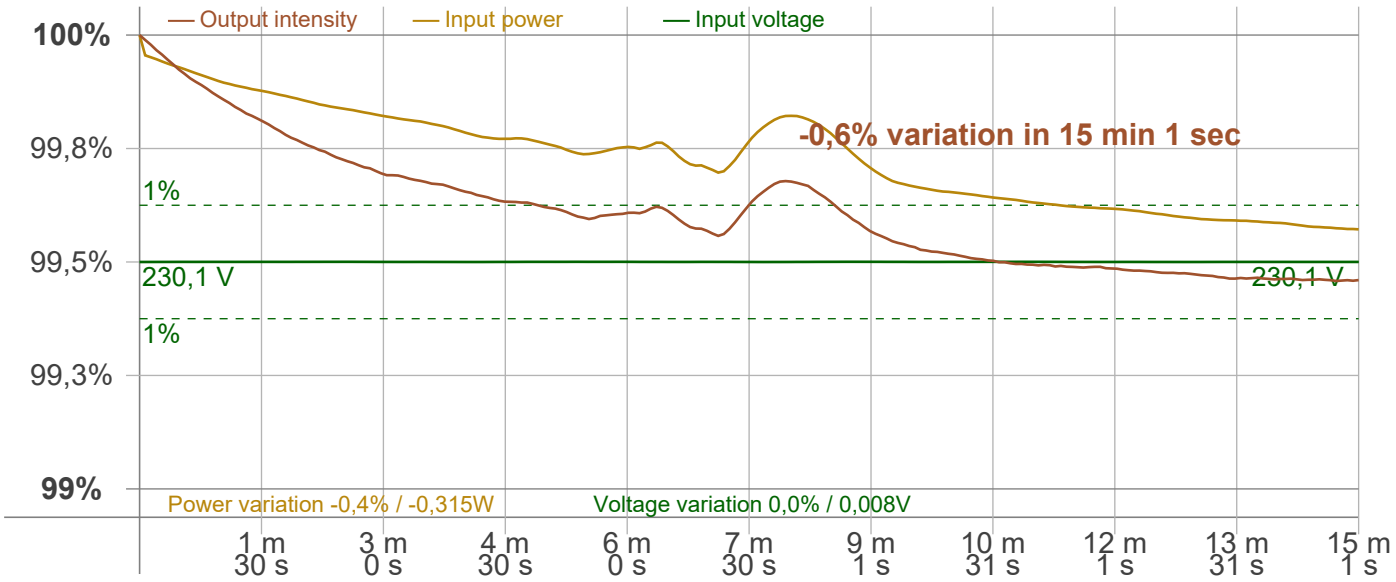
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,6%

Output Change

Output start	12746 lm
Output change	-74 lm
Output end	12672 lm

Stabilization Curve



Light Measurement Report

Print date: 8-9-2025
Measurement date and time: 8-9-2025 10:50:45 – Measurement no. VFR-250908-3011-MS
Measurement tracking No. and Link: n/a
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	99,5 Hz
Percent Flicker	0,17 %
Flicker index	0

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

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,16 %
JA8/10 400 Hz	0,16 %
JA8/10 1000 Hz	0,16 %

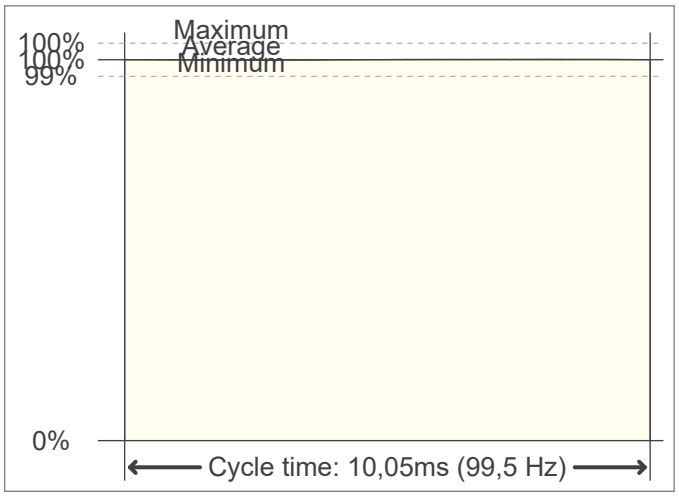
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

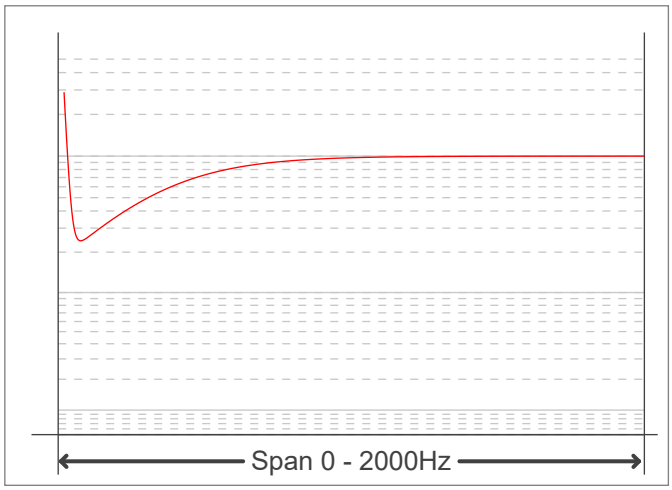
Flicker indices according to Lighting Research Center (2015)

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