Light Measurement Report

Print date: 27-11-2024
Measurement date and time: 27-11-2024 09:48:42 – Measurement no. VFR-241127-2194-MS
Measurement tracking No. and Link: VT241127-002628
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

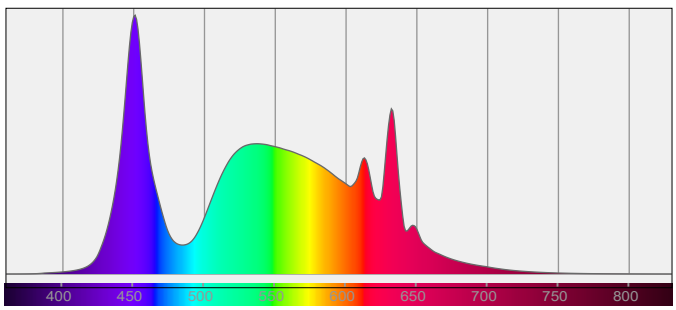
Number of C-planes and Resolution	32 planes – 11,25°
γ (gamma)-Resolution	5°
Test Distance	11,99 m
Input Power, Power and Displ. Factors	74,9 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,336 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

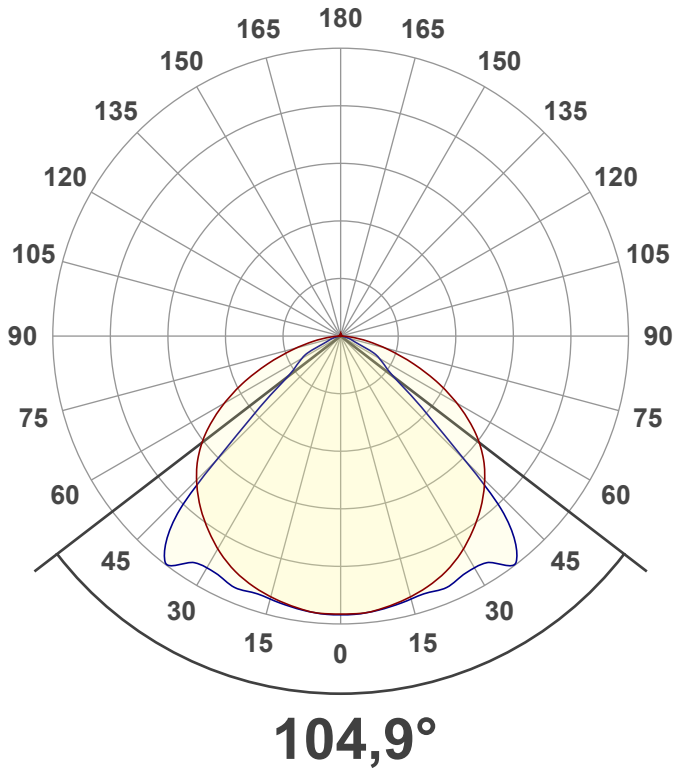
Tested Light Source

Product Name	804565-5700K
Item No. and Manufacturer	804565-5700K – Dutchfulfillment
Product Description (line 1)	LED RETROFIT MODULE | JUPITER | 57W | 90°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	11931 lm – 0,97% / 99,03%
Efficiency	159 lm/W
Peak Intensity and Beam Angle	4733 cd – 104,9°
Correlated Color Temperature, Target/Measured	CCT = 5700 K / 5798 K
Color Rendering Index	CRI 81,4
Color Rendering TM30-18	R_f 80,8 – R_g 99,2
Color Shift, CIE duv and MacAdam Steps	Duv 0,0008 – SDCM 5,8
Flicker	SVM 0,03 – PstLM 0,02





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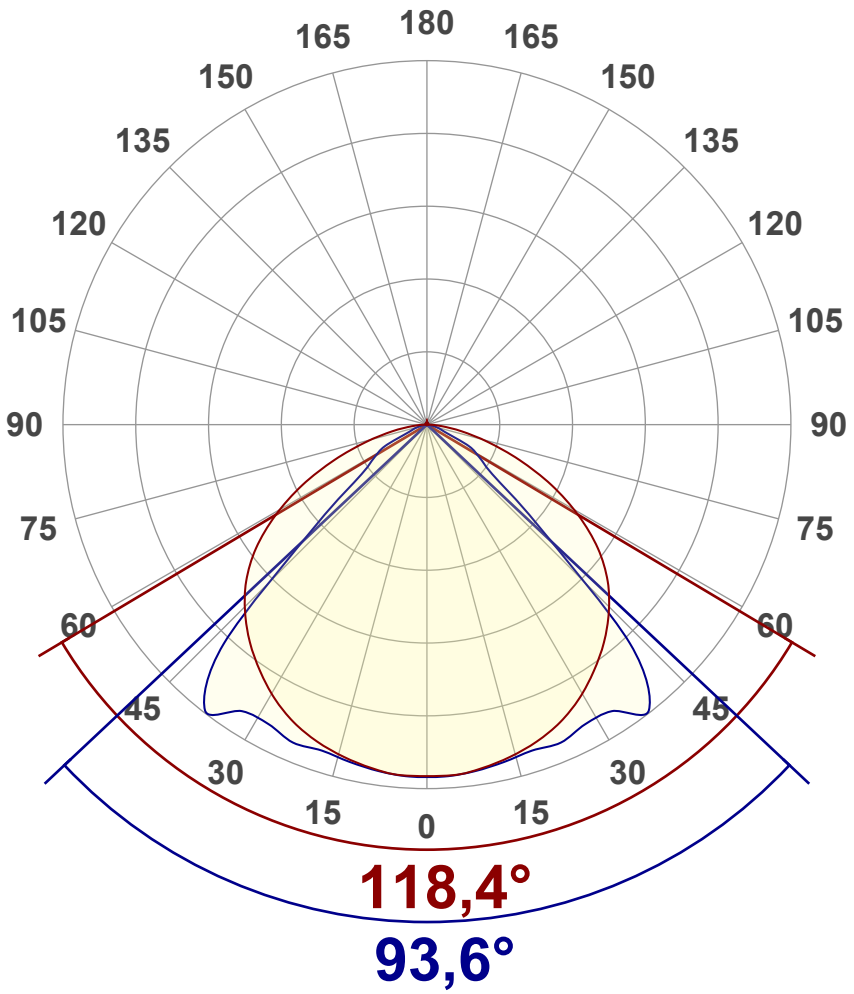
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	11931 lm
Lumen Up% / Down%	0,97% / 99,03%
Peak Intensity	4733 cd
Beam Angle (50%)	104,9°
Beam Angle (90%)	93,6°
Beam Angle (10%)	116°

Cut-off Angle

Average 2,5%	160,2°

Field Angle

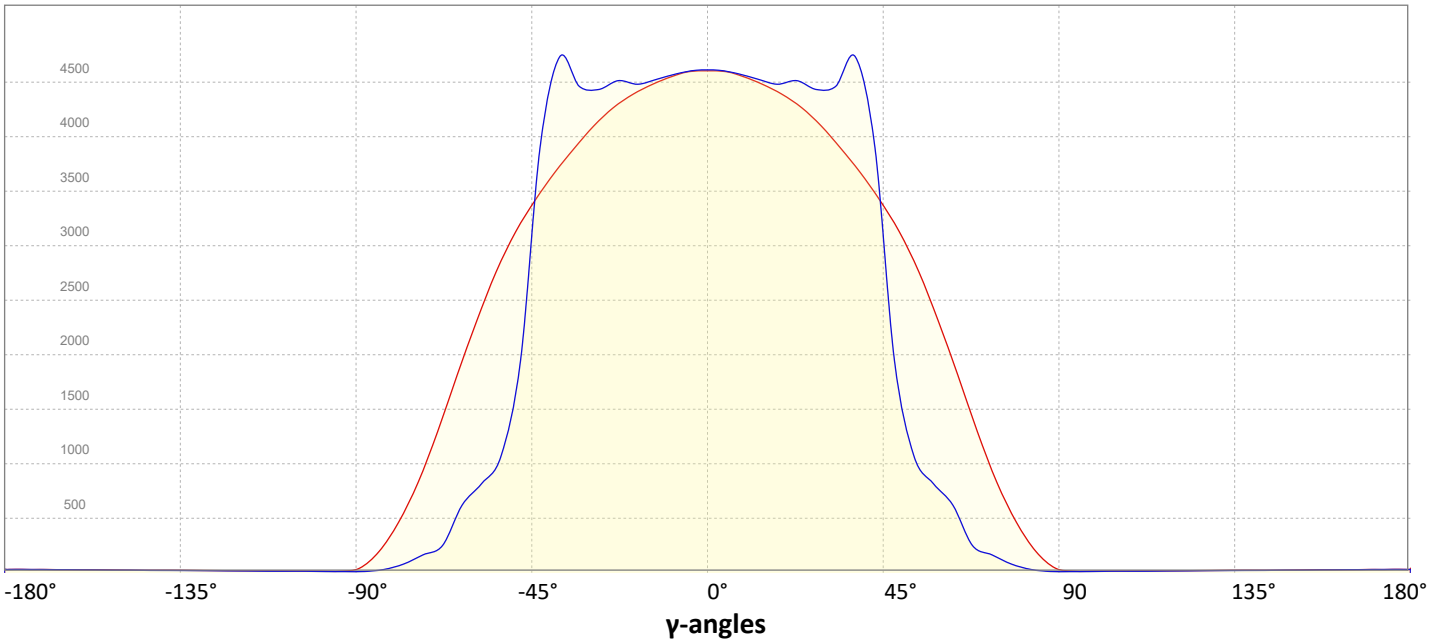
Average 10%	140°

Intensity Ratio

In 120° cone	88,7%
In 90° cone	65,0%

C000-C180
C090-C270

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



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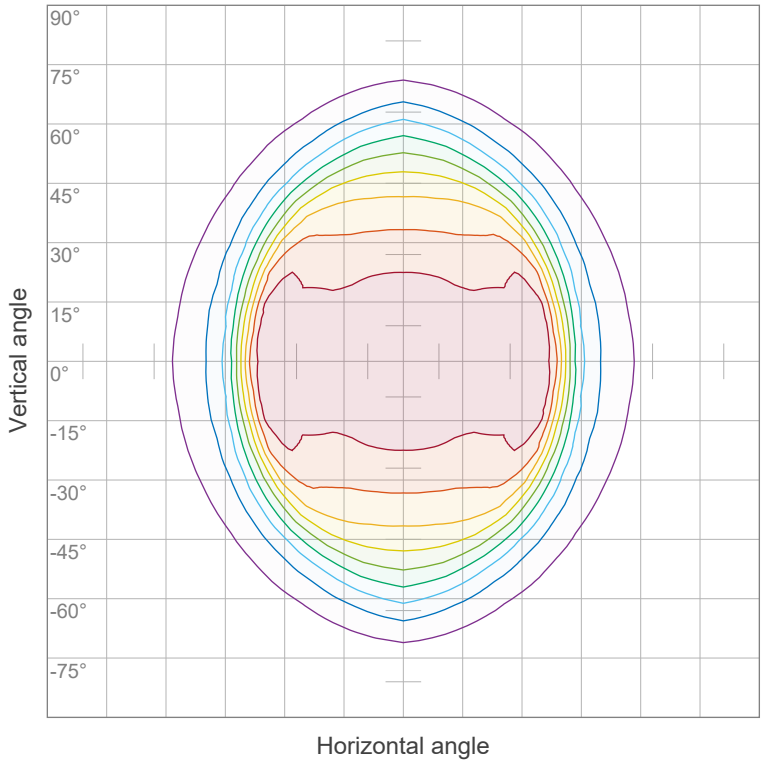
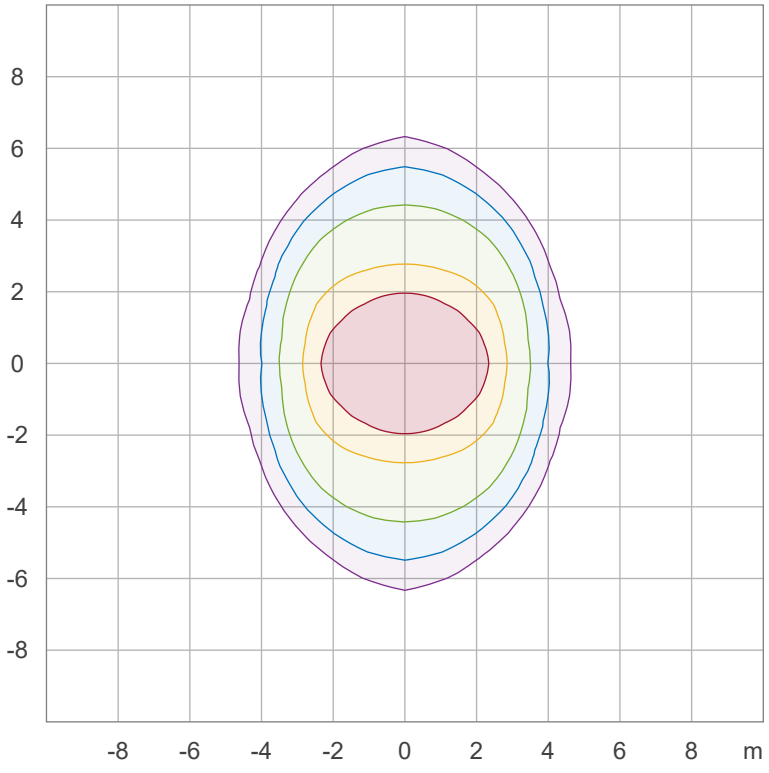
Iso-intensity Diagram (Iso-candela)



90 %	4237,5 cd
80 %	3766,6 cd
70 %	3295,8 cd
60 %	2825,0 cd
50 %	2354,1 cd
40 %	1883,3 cd
30 %	1412,5 cd
20 %	941,7 cd
10 %	470,8 cd

Peak intensity: 4708,3 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50,0 %	256,1 lx
30,0 %	153,7 lx
10,0 %	51,2 lx
5,0 %	25,6 lx
3,0 %	15,4 lx

Peak illuminance: 512,3 lx
Mounting height: 3,0 m
Number of c-planes: 32

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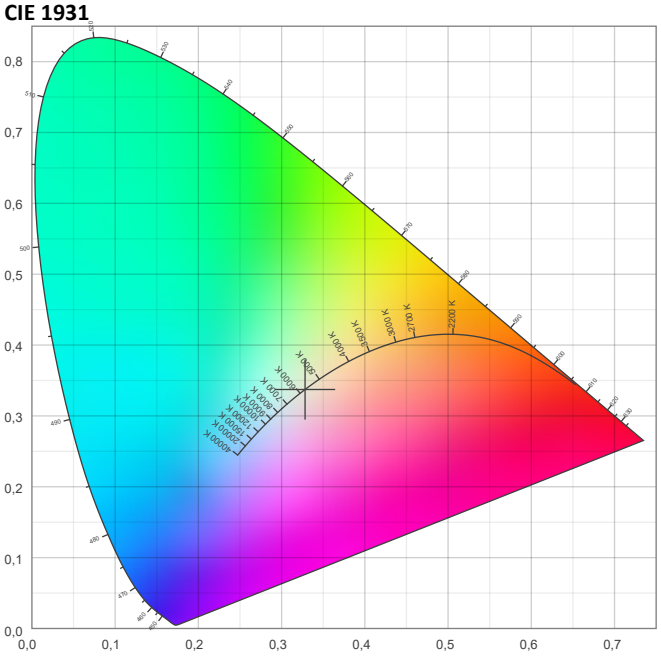
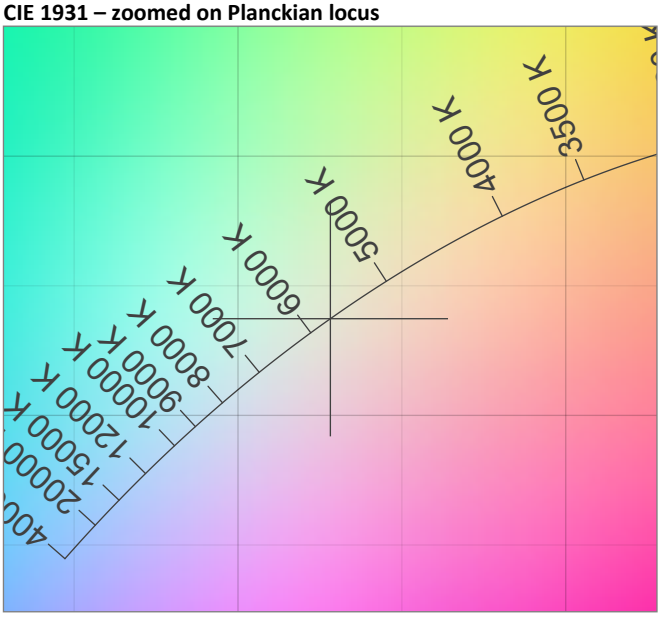
Color details

Correlated Color Temperature, Target	CCT = 5700 K
Correlated Color Temperature, Measured	CCT = 5798 K
Color Rendering Index	CRI 81,4
Color Rendering Index, R9 (red component)	R9 = 36,1
Color Rendering TM30-18	R_f 80,8 – R_g 99,2
Color Quality Scale	CQS = 80,3
MacAdam Steps	SDCM = 5,8
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 = 0,0008
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,205;0,475)

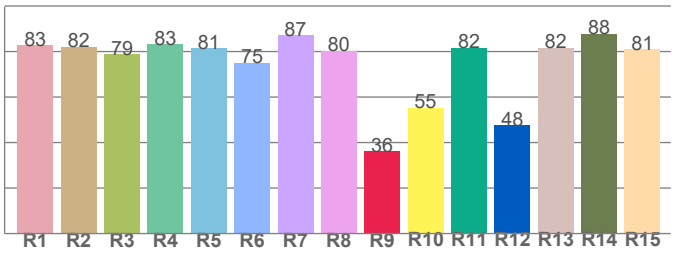
CIE 1931



CIE 1931 – zoomed on Planckian locus



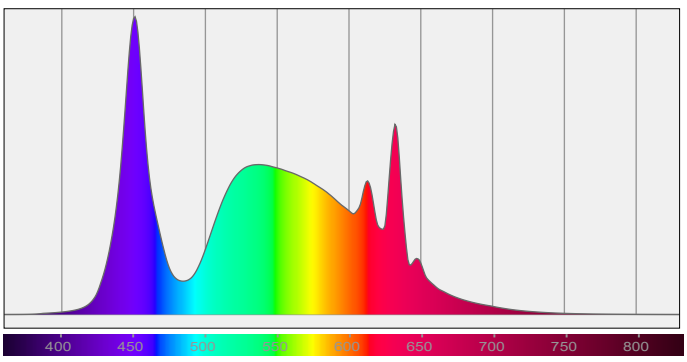
Color Rendering Index per reference color (CIE 1995)



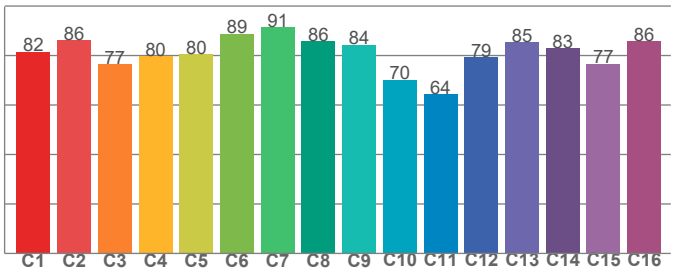
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,7	82,2	78,9	83,2	81,4	75,1	87,3	80,4	36,1	55,3	81,6	47,6	81,7	87,8	81,1

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



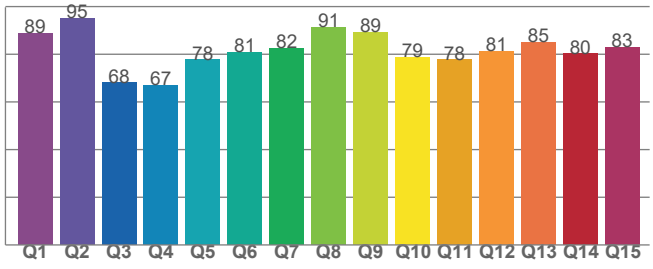
TM30-18 Rf-values per hue bin



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
81,5	86,1	76,5	79,6	80,4	88,8	91,3	85,8	84,3	70,3	64,4	79,4	85,5	82,9	76,7	85,8

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88,9	95,1	68,0	67,0	77,7	80,9	82,5	91,3	89,2	78,7	77,8	81,4	85,0	80,1	83,1

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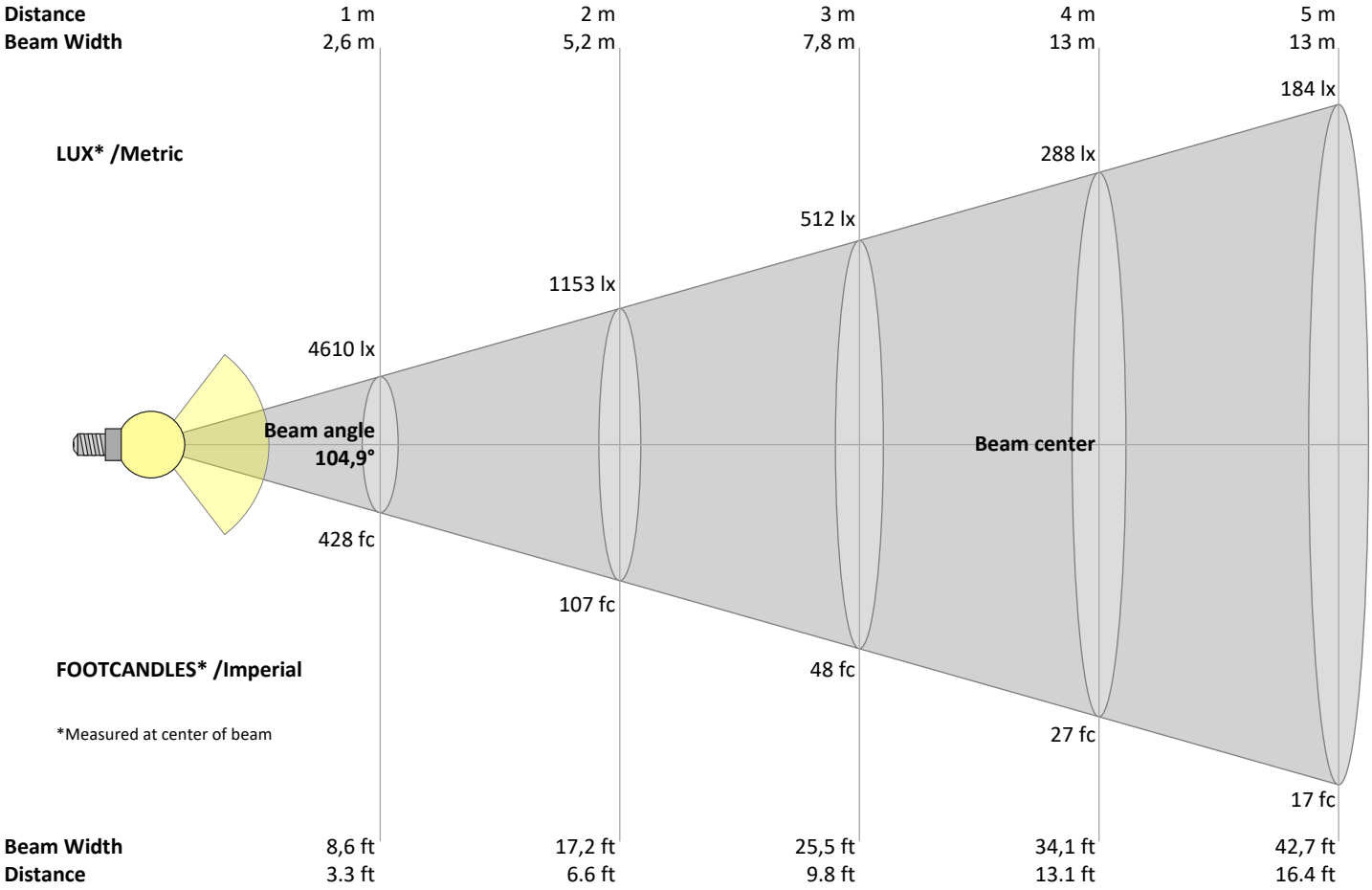
Beam Details



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
4610	1153	512	288	184	128	94	72	57	46	38	32	27	24	20	18	16	14	13	12	lux
428,3	107,1	47,6	26,8	17,1	11,9	8,7	6,7	5,3	4,3	3,5	3	2,5	2,2	1,9	1,7	1,5	1,3	1,2	1,1	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
4610	4591	4539	4463	4366	4236	4062	3854	3626	3366	3063	2680	2220	1720	1211	763	415	168	37	15	cd
100%	100%	98%	97%	95%	92%	88%	84%	79%	73%	66%	58%	48%	37%	26%	17%	9%	4%	1%	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
4610	4595	4556	4507	4495	4479	4445	4578	4377	3067	1574	962	732	460	213	128	58	22	11	11	cd
100%	100%	99%	98%	97%	97%	96%	99%	95%	67%	34%	21%	16%	10%	5%	3%	1%	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
4610	4591	4539	4463	4366	4236	4062	3854	3626	3366	3063	2680	2220	1720	1211	763	415	168	37	15	cd
100%	100%	98%	97%	95%	92%	88%	84%	79%	73%	66%	58%	48%	37%	26%	17%	9%	4%	1%	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
4610	4595	4556	4507	4495	4479	4445	4578	4377	3067	1574	962	732	460	213	128	58	22	11	11	cd
100%	100%	99%	98%	97%	97%	96%	99%	95%	67%	34%	21%	16%	10%	5%	3%	1%	0%	0%	0%	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	28,3	29,4	28,5	29,7	29,9	24,7	25,8	24,9	26,1	26,3
	3H	29,3	30,4	29,7	30,7	30,9	24,6	25,8	25,1	26,0	26,3
	4H	29,7	30,7	30,1	31,0	31,3	24,6	25,7	25,0	26,0	26,2
	6H	30,0	30,9	30,3	31,2	31,6	24,6	25,5	24,9	25,8	26,2
	8H	30,1	31,0	30,4	31,3	31,7	24,6	25,5	24,9	25,8	26,2
	12H	30,1	30,9	30,5	31,3	31,8	24,5	25,4	24,9	25,7	26,2
4H	2H	28,2	29,2	28,6	29,5	29,8	25,0	26,1	25,4	26,3	26,6
	3H	29,4	30,2	29,7	30,6	31,0	25,1	26,0	25,5	26,3	26,8
	4H	29,7	30,5	30,2	30,9	31,5	25,0	25,8	25,5	26,3	26,8
	6H	30,0	30,8	30,6	31,2	31,6	25,0	25,8	25,5	26,1	26,5
	8H	30,2	30,8	30,7	31,2	31,6	25,0	25,7	25,5	26,0	26,4
	12H	30,2	30,8	30,7	31,2	31,7	24,9	25,5	25,4	25,9	26,4
8H	4H	29,6	30,3	30,2	30,7	31,1	25,1	25,8	25,6	26,2	26,6
	6H	30,0	30,5	30,5	31,0	31,5	25,1	25,6	25,6	26,1	26,6
	8H	30,2	30,6	30,7	31,1	31,8	25,1	25,5	25,6	26,0	26,7
	12H	30,2	30,6	30,8	31,1	31,8	25,0	25,4	25,6	25,9	26,5
12H	4H	29,6	30,2	30,1	30,6	31,1	25,1	25,6	25,6	26,1	26,6
	6H	30,0	30,4	30,5	31,0	31,6	25,1	25,5	25,6	26,1	26,7
	8H	30,1	30,5	30,7	31,0	31,6	25,1	25,4	25,7	25,9	26,6

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,1 / -0,2	1,5 / -2,4
S = 1.5H	0,8 / -1,3	3,0 / -3,7
S = 2.0H	1,8 / -2,7	4,5 / -5,6

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	101	101	101	99
1	110	106	103	99	108	104	101	98	100	97	94	96	93	91	92	90	89	87
2	102	94	88	83	99	92	87	82	89	84	80	86	82	78	82	79	77	75
3	93	84	77	71	91	82	76	70	79	74	69	77	72	68	74	70	66	64
4	86	75	67	61	84	74	66	61	71	65	60	69	63	59	67	62	58	56
5	79	68	59	53	77	66	59	53	64	57	52	62	56	52	60	55	51	49
6	74	61	53	47	72	60	52	47	58	51	46	57	50	46	55	49	45	43
7	68	56	47	41	67	55	47	41	53	46	41	52	45	41	50	45	40	38
8	64	51	43	37	62	50	42	37	49	42	37	47	41	36	46	40	36	34
9	59	47	39	33	58	46	38	33	45	38	33	44	37	33	43	37	33	31
10	56	43	35	30	54	42	35	30	41	35	30	40	34	30	39	34	30	28

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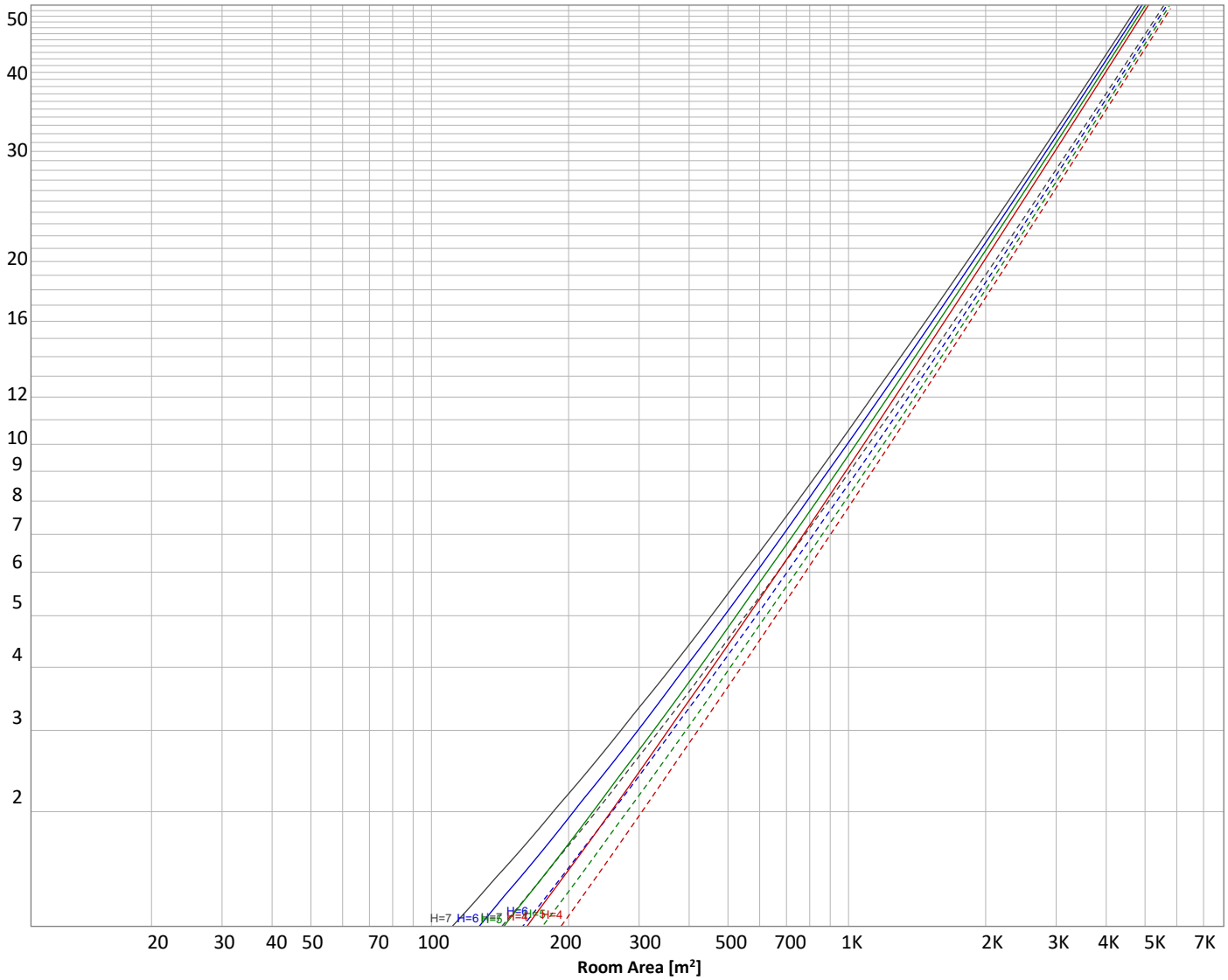
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 11931 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°
437 lm	1267 lm	2000 lm	2620 lm	2641 lm	1620 lm	836 lm	324 lm	70,9 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
13,9 lm	15,4 lm	16,5 lm	16,8 lm	16,0 lm	14,4 lm	11,8 lm	7,91 lm	2,82 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	437 lm	3,7%
10-20°	1267 lm	10,6%
20-30°	2000 lm	16,8%
30-40°	2620 lm	22,0%
40-50°	2641 lm	22,1%
50-60°	1620 lm	13,6%
60-70°	836 lm	7,0%
70-80°	324 lm	2,7%
80-90°	71 lm	0,6%
90-100°	14 lm	0,1%
100-110°	15 lm	0,1%
110-120°	17 lm	0,1%
120-130°	17 lm	0,1%
130-140°	16 lm	0,1%
140-150°	14 lm	0,1%
150-160°	12 lm	0,1%
160-170°	8 lm	0,1%
170-180°	3 lm	0,0%
Total	11931 lm	100,0%

Intensity peaks

Max intensity	4733 cd
Intensity, 90°	37 cd
Intensity, 0°	4610 cd

Zonal Lumen summary

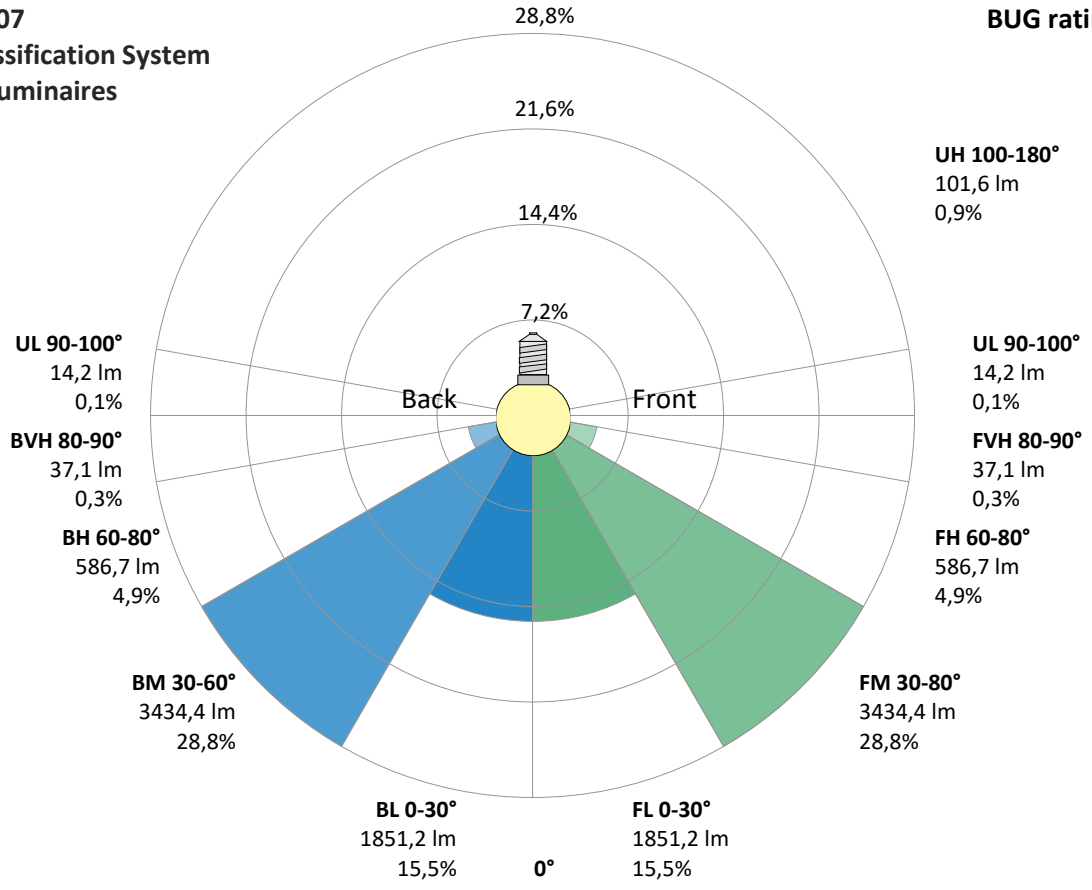
Zone (γ)	Lumen	% Total
0-30°	3705 lm	31,0%
0-40°	6325 lm	53,0%
0-60°	10585 lm	88,7%
60-90°	1230 lm	10,3%
70-100°	408 lm	3,4%
90-120°	46 lm	0,4%
0-90°	11815 lm	99,0%
90-180°	116 lm	1,0%
0-180°	11931 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1851 lm	15,5%
Medium(30-60°)	3434 lm	28,8%
High(60-80°)	587 lm	4,9%
Very high(80-90°)	37 lm	0,3%
Back light		
Low(0-30°)	1851 lm	15,5%
Medium(30-60°)	3434 lm	28,8%
High(60-80°)	587 lm	4,9%
Very high(80-90°)	37 lm	0,3%
Uplight		
Low(90-100°)	14 lm	0,1%
High(100-180°)	102 lm	0,9%

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

BUG rating B3 U3 G1



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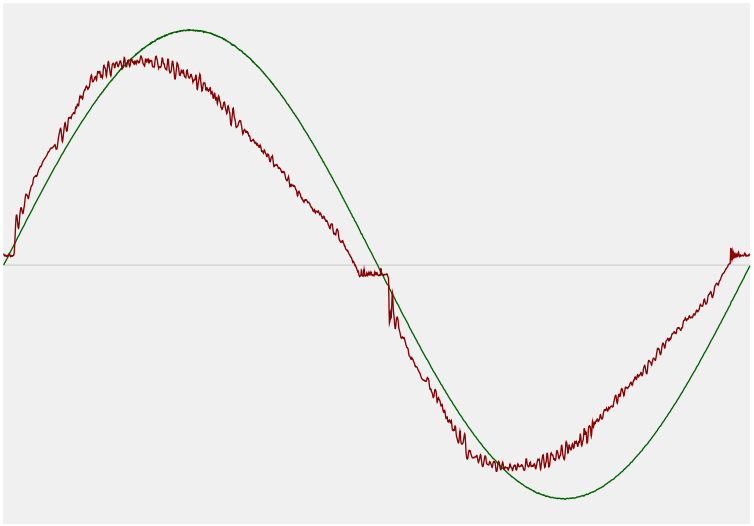
Power Details

Input Power

Power feed to light source	74,9 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,336 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	77,28 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	10,73%
Total harmonic distortion of the voltage	0,09%

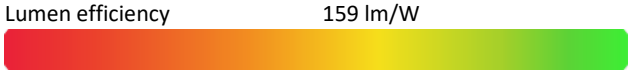
Input Power Curve



Efficiency

Radiated power efficiency 48,6%

Lumen efficiency 159 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5711 K
CCT shift	-11 K
CCT end	5700 K

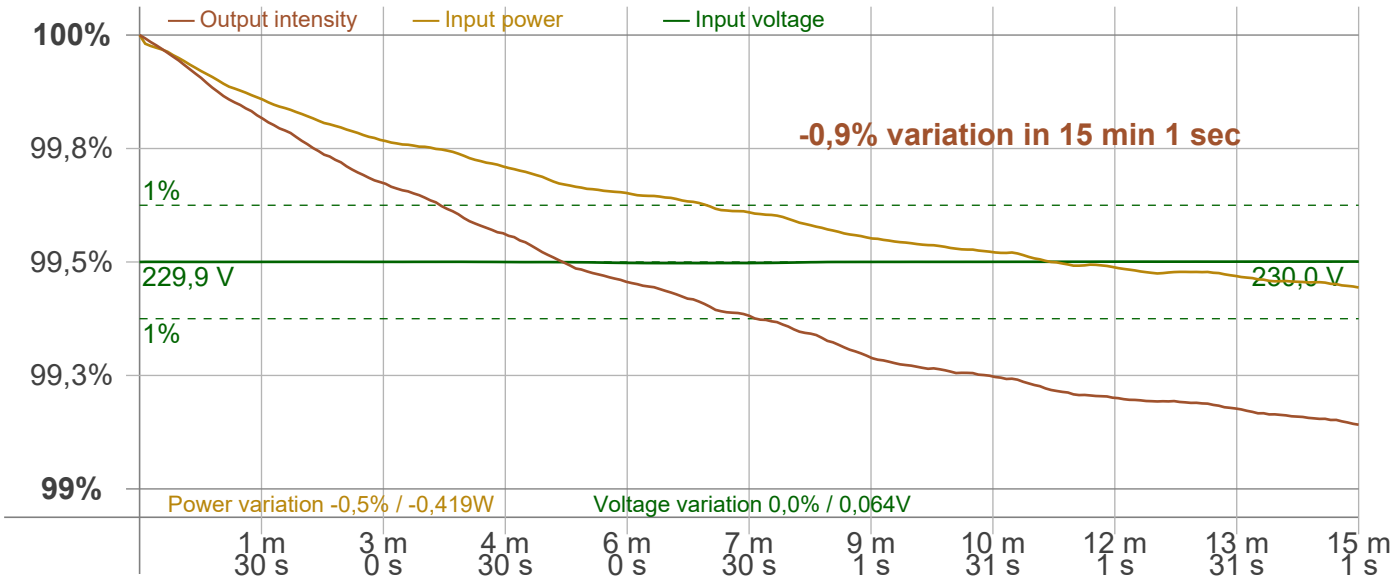
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,9%

Output Change

Output start	12035 lm
Output change	-104 lm
Output end	11931 lm

Stabilization Curve



Light Measurement Report

Print date: 27-11-2024
Measurement date and time: 27-11-2024 09:48:42 – Measurement no. VFR-241127-2194-MS
Measurement tracking No. and Link: VT241127-002628
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	0,89 %
Flicker index	0

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

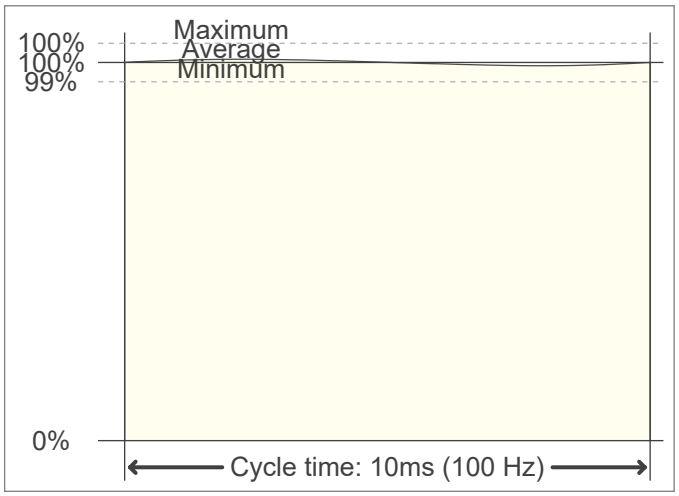
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,02 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,87 %
JA8/10 400 Hz	0,88 %
JA8/10 1000 Hz	0,88 %

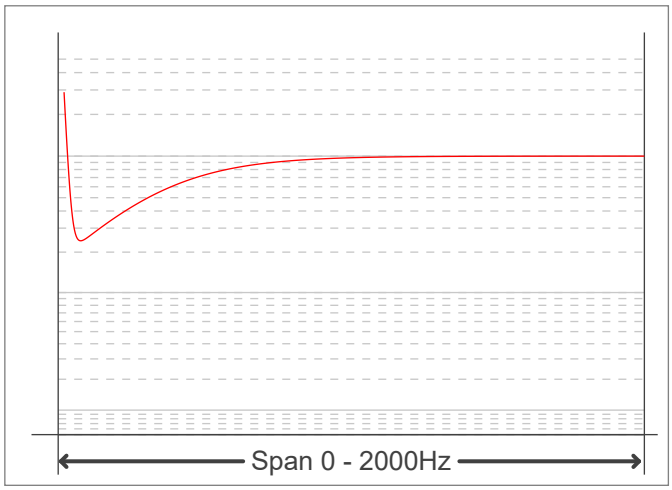
Flicker indices according to Lighting Research Center (2015)

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