Light Measurement Report

Print date: 14-10-2024
Measurement date and time: 14-10-2024 15:16:03 – Measurement no. VFR-241014-1253-MS
Measurement tracking No. and Link: VT241014-003575
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

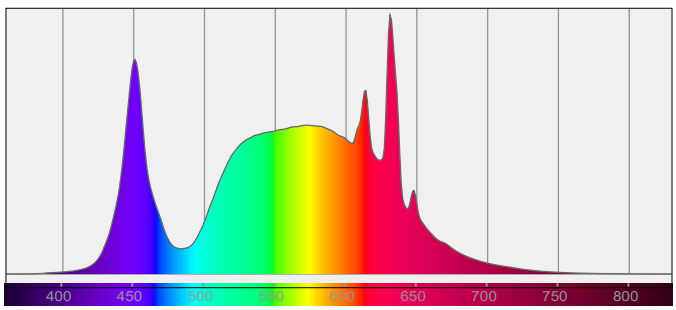
Number of C-planes and Resolution	32 planes – 11,25°
γ (gamma)-Resolution	5°
Test Distance	12,13 m
Input Power, Power and Displ. Factors	57,8 W – PF 0,97 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,258 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

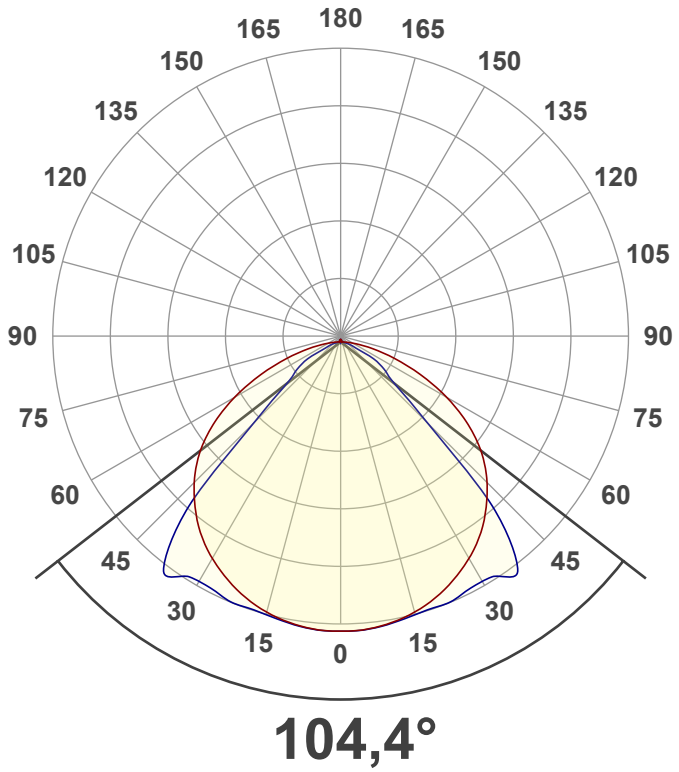
Tested Light Source

Product Name	804572-4000K
Item No. and Manufacturer	804572-4000K – Dutchfulfillment
Product Description (line 1)	LED RETROFIT MODULE | JUPITER | 65W | 90°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	10150 lm – 1,05% / 98,95%
Efficiency	175 lm/W
Peak Intensity and Beam Angle	3944 cd – 104,4°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4113 K
Color Rendering Index	CRI 81,9
Color Rendering TM30-18	R_f 81,5 – R_g 98,8
Color Shift, CIE duv and MacAdam Steps	Duv 0,0021 – SDCM 2,8
Flicker	SVM 0 – PstLM 0,01





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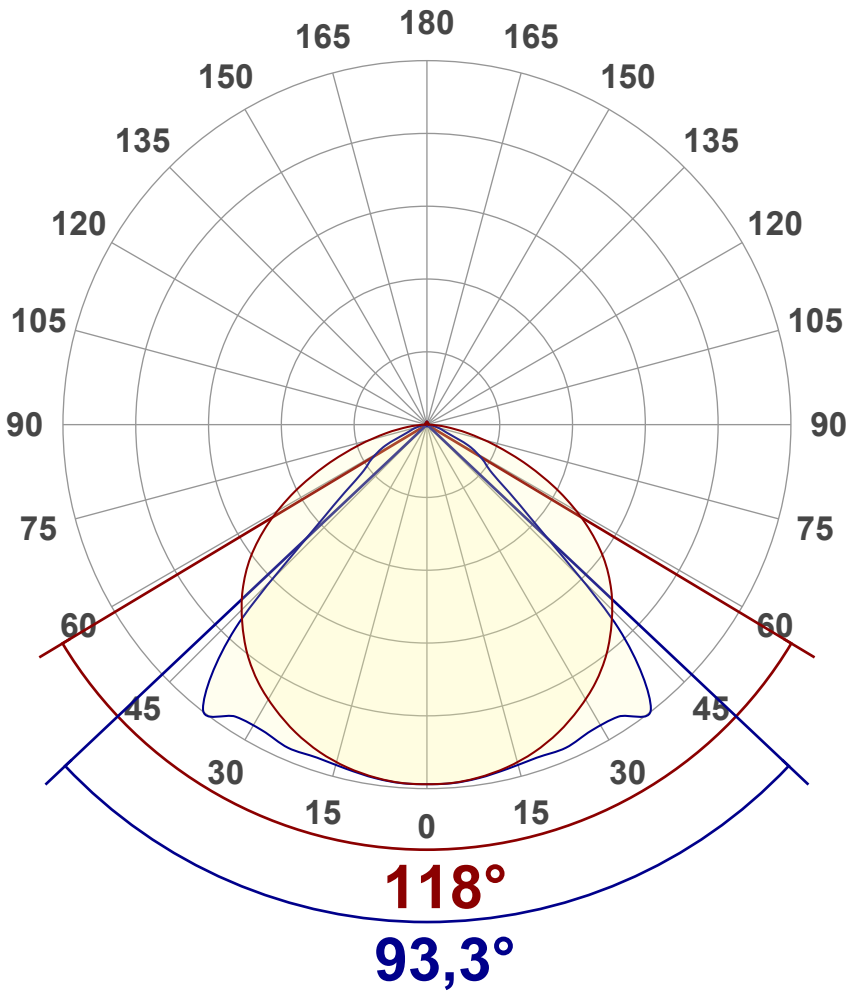
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	10150 lm
Lumen Up% / Down%	1,05% / 98,95%
Peak Intensity	3944 cd
Beam Angle (50%)	104,4°
Beam Angle (90%)	93,3°
Beam Angle (10%)	115,8°

Cut-off Angle

Average 2,5%	161,4°

Field Angle

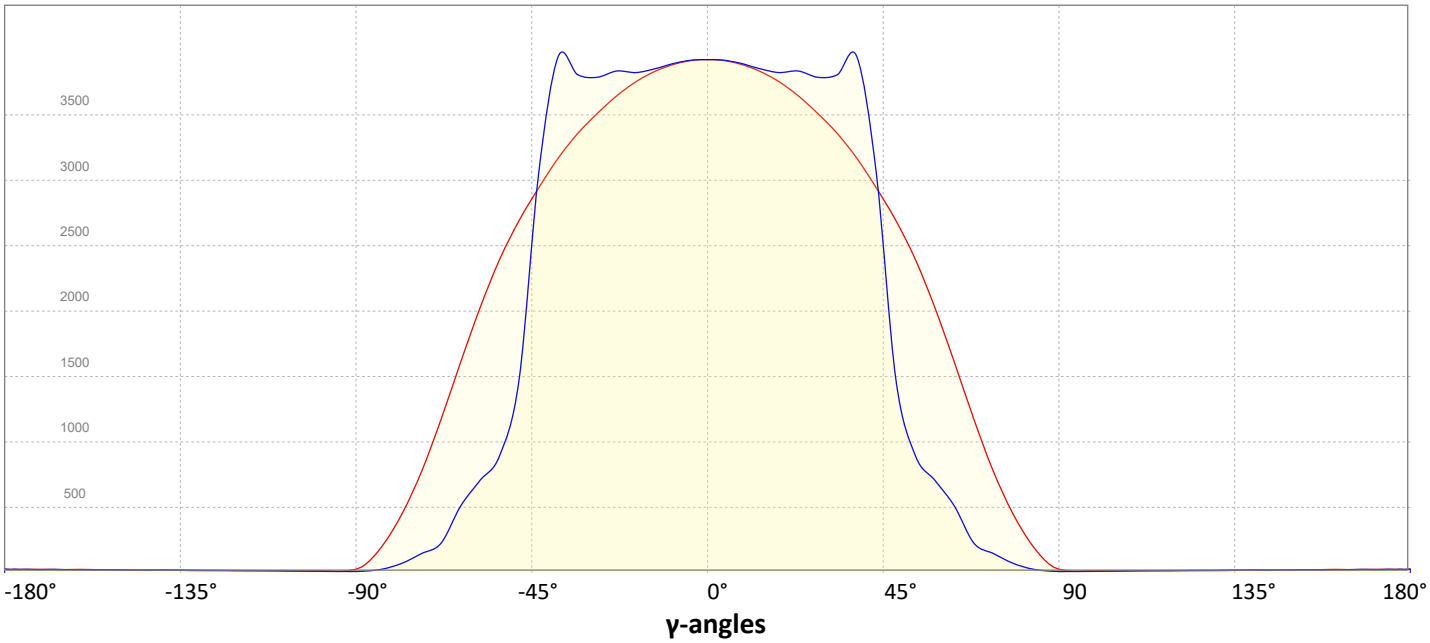
Average 10%	140,9°

Intensity Ratio

In 120° cone	88,3%
In 90° cone	65,0%

C000-C180
C090-C270

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



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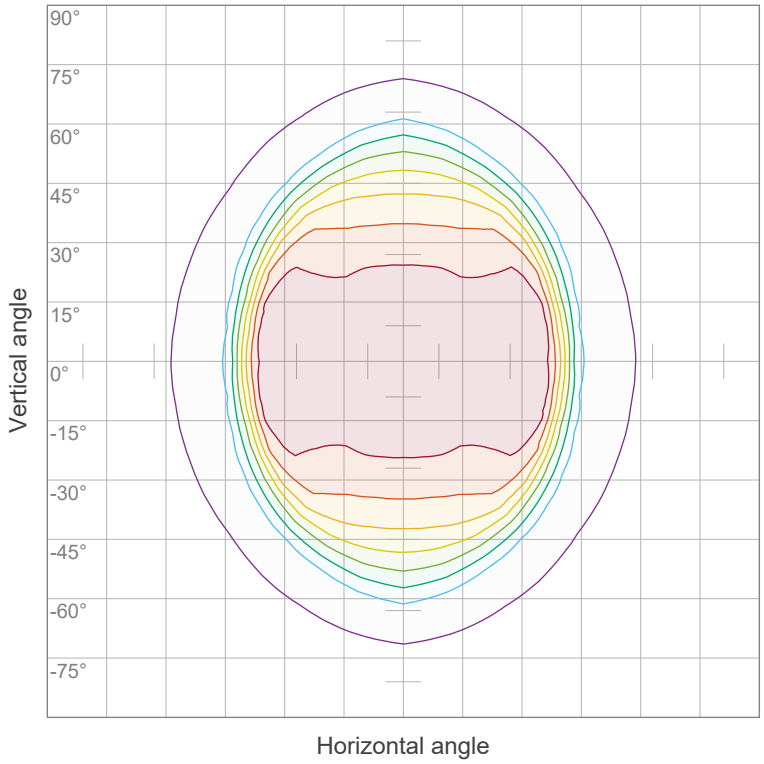
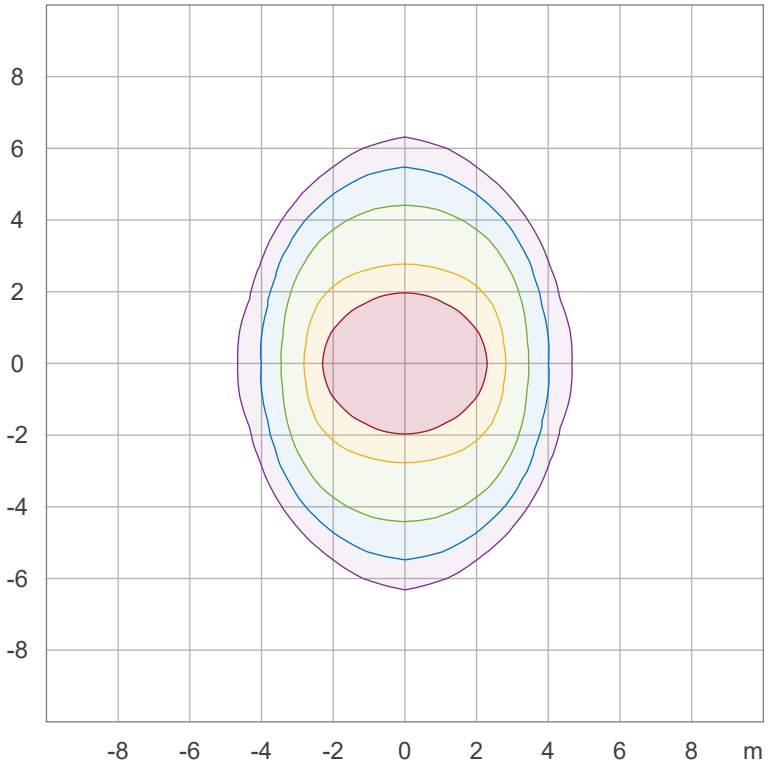
Iso-intensity Diagram (Iso-candela)



90 %	3543,3 cd
80 %	3149,6 cd
70 %	2755,9 cd
60 %	2362,2 cd
50 %	1968,5 cd
40 %	1574,8 cd
30 %	1181,1 cd
20 %	787,4 cd
10 %	393,7 cd

Peak intensity: 3937,0 cd
Number of c-planes: 32

Iso-illuminance Diagram (Iso-lux)



50,0 %	217,9 lx
30,0 %	130,8 lx
10,0 %	43,6 lx
5,0 %	21,8 lx
3,0 %	13,1 lx

Peak illuminance: 435,9 lx
Mounting height: 3,0 m
Number of c-planes: 32

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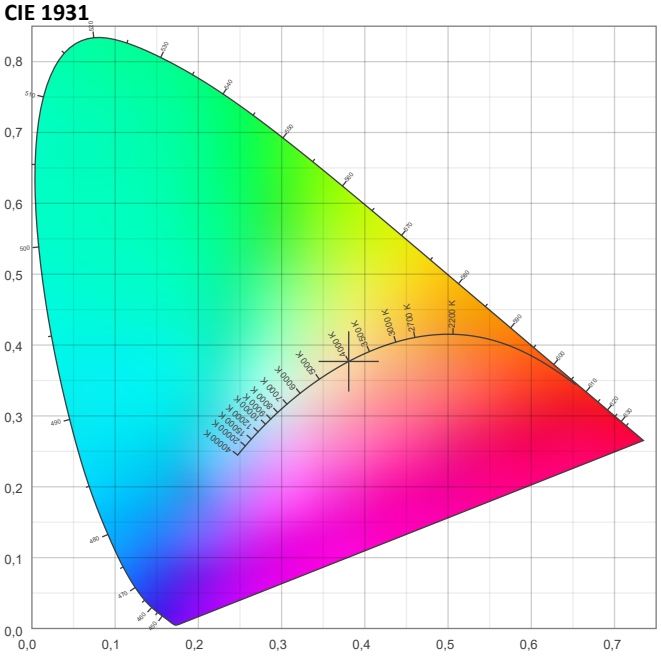
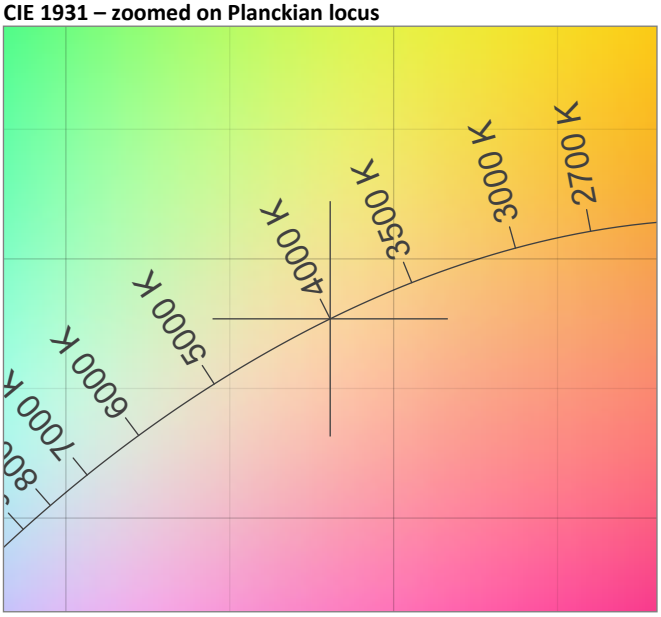
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4113 K
Color Rendering Index	CRI 81,9
Color Rendering Index, R9 (red component)	R9 = 29,7
Color Rendering TM30-18	R_f 81,5 – R_g 98,8
Color Quality Scale	CQS = 81,3
MacAdam Steps	SDCM = 2,8
Color coordinates CIE 1931	(x;y) = (0,381;0,377)
Color coordinate CIEs 1960	(u;v) = (0,225;0,334)
Color deviation from BBL	Duv = 0,0021
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

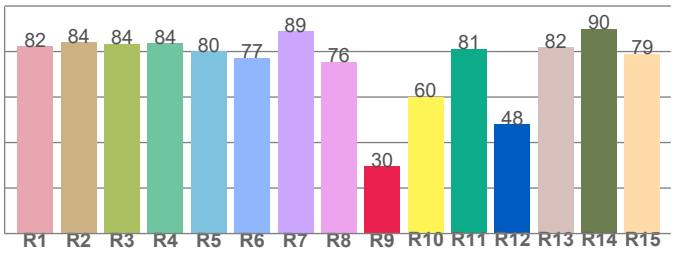
CIE 1931



CIE 1931 – zoomed on Planckian locus



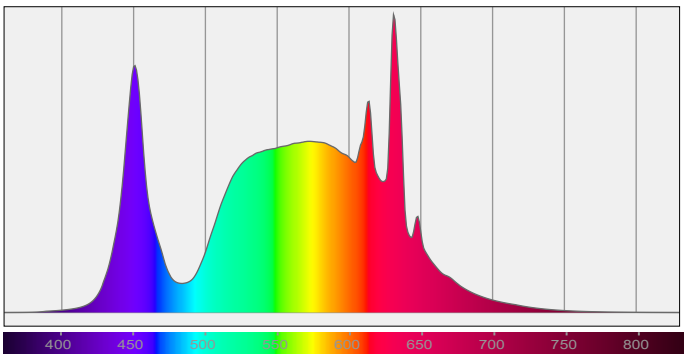
Color Rendering Index per reference color (CIE 1995)



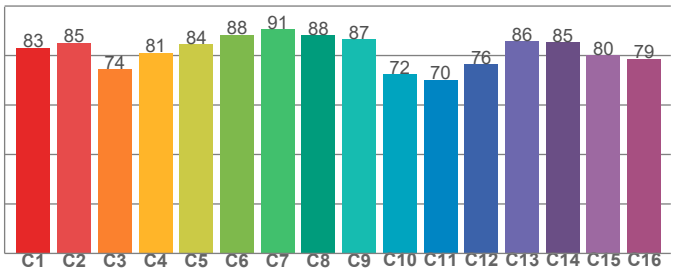
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,4	84,2	83,5	83,5	80,2	77,2	88,8	75,6	29,7	60,1	81,1	47,9	82,0	90,0	78,9

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



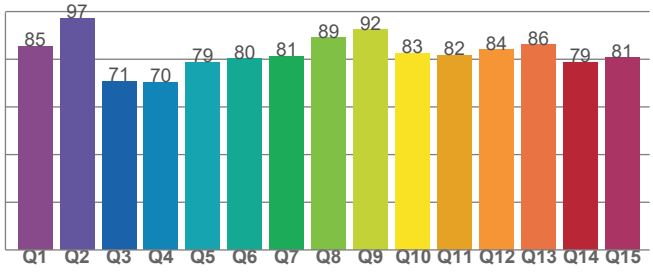
TM30-18 Rf-values per hue bin



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
83,1	85,2	74,3	81,1	84,5	88,4	90,5	88,2	86,6	72,3	70,2	76,4	85,9	85,5	80,2	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
85,5	97,2	70,7	70,4	78,8	80,2	81,3	89,1	92,4	82,5	81,7	84,0	86,2	78,8	80,6

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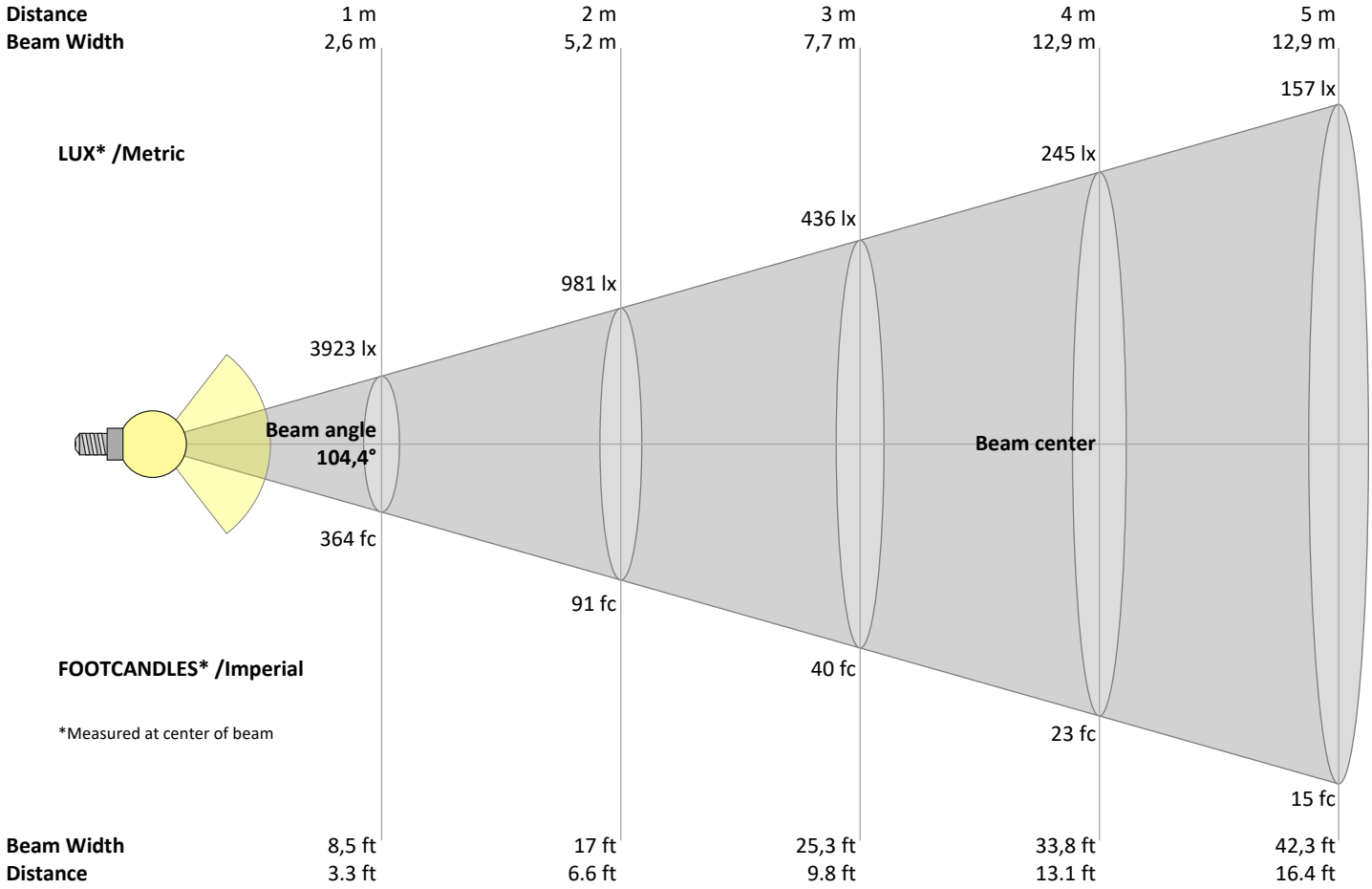
Beam Details



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
3923	981	436	245	157	109	80	61	48	39	32	27	23	20	17	15	14	12	11	10	lux
364,4	91,1	40,5	22,8	14,6	10,1	7,4	5,7	4,5	3,6	3	2,5	2,2	1,9	1,6	1,4	1,3	1,1	1	0,9	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
3923	3908	3870	3807	3716	3598	3456	3291	3088	2853	2587	2264	1878	1453	1031	659	364	152	38	14	cd
100%	100%	99%	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
3923	3911	3881	3843	3827	3818	3794	3855	3630	2496	1272	828	637	409	198	120	57	22	11	10	cd
100%	100%	99%	98%	98%	97%	97%	98%	93%	64%	32%	21%	16%	10%	5%	3%	1%	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
3923	3908	3870	3807	3716	3598	3456	3291	3088	2853	2587	2264	1878	1453	1031	659	364	152	38	14	cd
100%	100%	99%	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
3923	3911	3881	3843	3827	3818	3794	3855	3630	2496	1272	828	637	409	198	120	57	22	11	10	cd
100%	100%	99%	98%	98%	97%	97%	98%	93%	64%	32%	21%	16%	10%	5%	3%	1%	1%	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	27,7	28,8	27,9	29,1	29,3	24,1	25,1	24,3	25,4	25,7
	3H	28,7	29,8	29,1	30,1	30,3	24,0	25,1	24,4	25,4	25,6
	4H	29,1	30,2	29,5	30,5	30,7	24,0	25,1	24,4	25,3	25,6
	6H	29,5	30,4	29,8	30,7	31,1	24,0	24,9	24,3	25,2	25,6
	8H	29,5	30,4	29,9	30,8	31,2	24,0	24,9	24,3	25,2	25,6
	12H	29,6	30,4	29,9	30,8	31,3	23,9	24,8	24,3	25,1	25,6
4H	2H	27,6	28,6	28,0	28,9	29,2	24,3	25,4	24,8	25,7	26,0
	3H	28,8	29,7	29,2	30,0	30,5	24,5	25,4	24,9	25,7	26,2
	4H	29,2	30,0	29,6	30,4	31,0	24,4	25,2	24,9	25,7	26,2
	6H	29,5	30,3	30,0	30,7	31,1	24,4	25,2	24,9	25,5	25,9
	8H	29,7	30,4	30,2	30,7	31,1	24,4	25,1	24,9	25,4	25,8
	12H	29,7	30,3	30,2	30,7	31,2	24,3	24,9	24,8	25,3	25,8
8H	4H	29,1	29,8	29,6	30,2	30,6	24,5	25,2	25,0	25,6	26,0
	6H	29,5	30,0	30,0	30,5	31,0	24,5	25,0	25,0	25,5	26,0
	8H	29,7	30,1	30,2	30,6	31,3	24,5	24,9	25,0	25,5	26,1
	12H	29,8	30,1	30,4	30,7	31,3	24,5	24,8	25,1	25,3	26,0
12H	4H	29,1	29,6	29,6	30,1	30,5	24,5	25,1	25,0	25,5	26,0
	6H	29,5	29,9	30,0	30,5	31,1	24,5	25,0	25,1	25,5	26,1
	8H	29,6	30,0	30,2	30,5	31,1	24,5	24,9	25,1	25,4	26,0

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

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	111	106	106	106	101	101	101	99
1	110	106	103	99	107	104	101	98	99	97	94	95	93	91	92	90	88	86
2	101	94	88	83	99	92	87	82	89	84	80	85	82	78	82	79	76	74
3	93	84	77	71	91	82	76	70	79	74	69	76	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	73	61	53	47	72	60	52	46	58	51	46	56	50	46	55	49	45	43
7	68	55	47	41	66	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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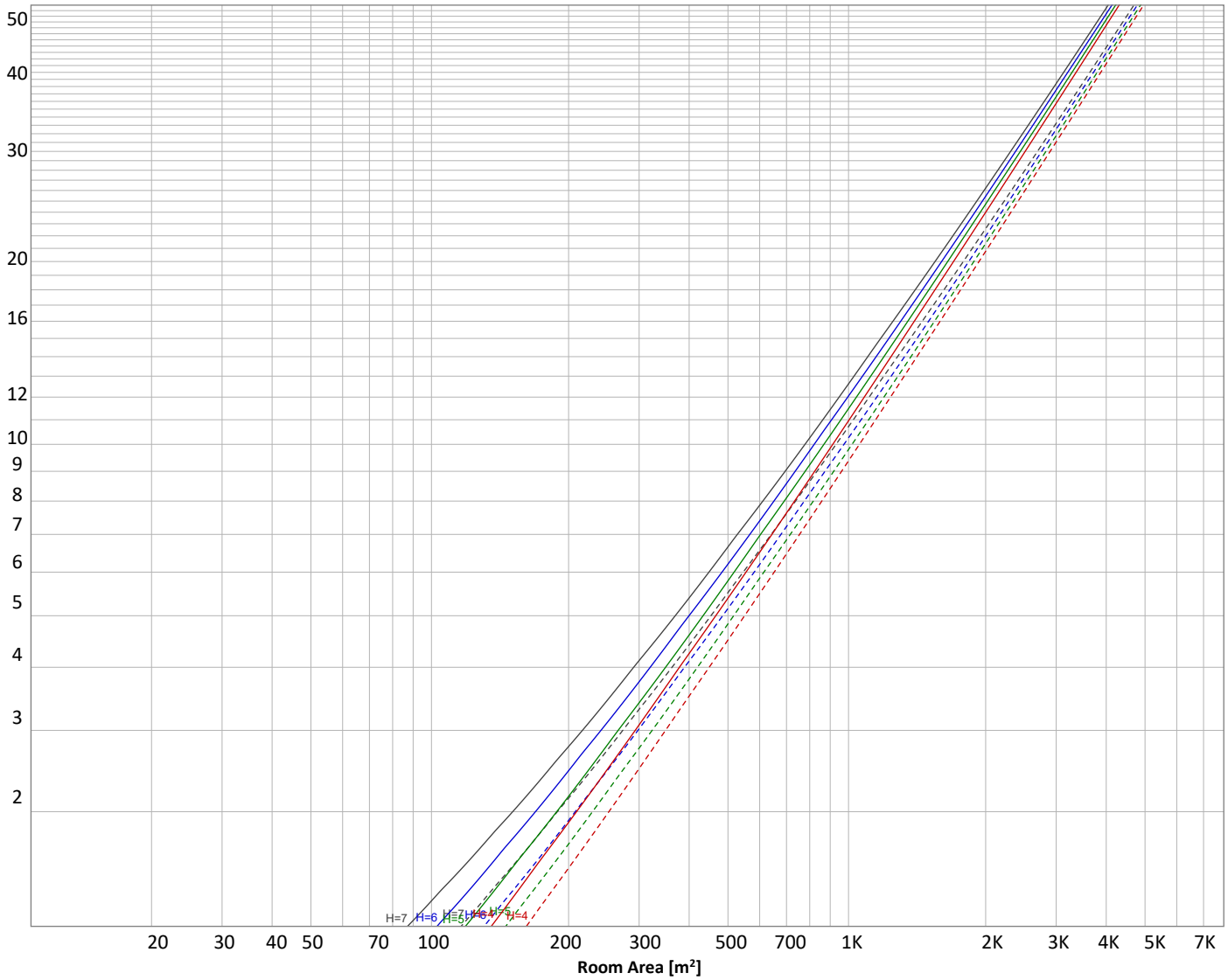
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 10150 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°
372 lm	1082 lm	1707 lm	2230 lm	2212 lm	1363 lm	722 lm	290 lm	65,8 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
13,7 lm	14,6 lm	15,8 lm	15,6 lm	14,6 lm	12,8 lm	10,4 lm	6,86 lm	2,41 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	372 lm	3,7%
10-20°	1082 lm	10,7%
20-30°	1707 lm	16,8%
30-40°	2230 lm	22,0%
40-50°	2212 lm	21,8%
50-60°	1363 lm	13,4%
60-70°	722 lm	7,1%
70-80°	290 lm	2,9%
80-90°	66 lm	0,6%
90-100°	14 lm	0,1%
100-110°	15 lm	0,1%
110-120°	16 lm	0,2%
120-130°	16 lm	0,2%
130-140°	15 lm	0,1%
140-150°	13 lm	0,1%
150-160°	10 lm	0,1%
160-170°	7 lm	0,1%
170-180°	2 lm	0,0%
Total	10150 lm	100,0%

Intensity peaks

Max intensity	3944 cd
Intensity, 90°	38 cd
Intensity, 0°	3923 cd

Zonal Lumen summary

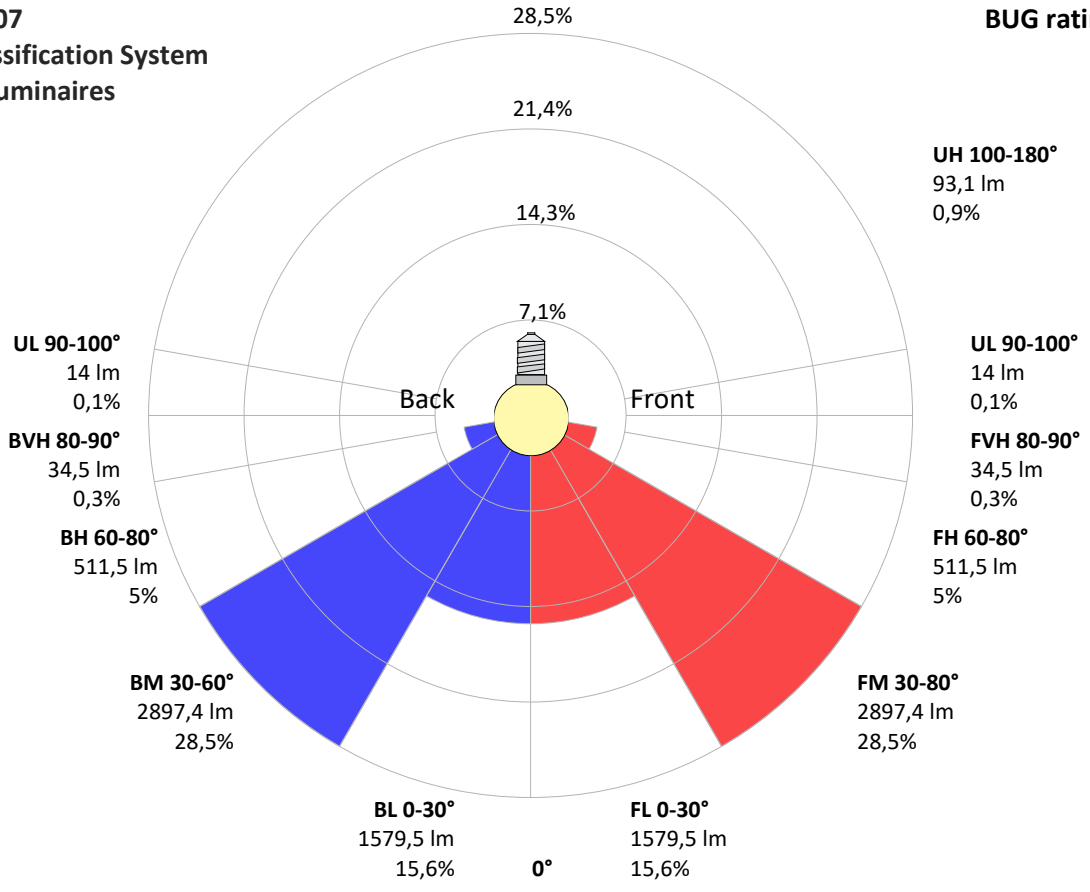
Zone (γ)	Lumen	% Total
0-30°	3161 lm	31,1%
0-40°	5391 lm	53,1%
0-60°	8966 lm	88,3%
60-90°	1077 lm	10,6%
70-100°	369 lm	3,6%
90-120°	44 lm	0,4%
0-90°	10044 lm	98,9%
90-180°	107 lm	1,1%
0-180°	10150 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1579 lm	15,6%
Medium(30-60°)	2897 lm	28,5%
High(60-80°)	512 lm	5,0%
Very high(80-90°)	35 lm	0,3%
Back light		
Low(0-30°)	1579 lm	15,6%
Medium(30-60°)	2897 lm	28,5%
High(60-80°)	512 lm	5,0%
Very high(80-90°)	35 lm	0,3%
Uplight		
Low(90-100°)	14 lm	0,1%
High(100-180°)	93 lm	0,9%

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

BUG rating B3 U3 G1



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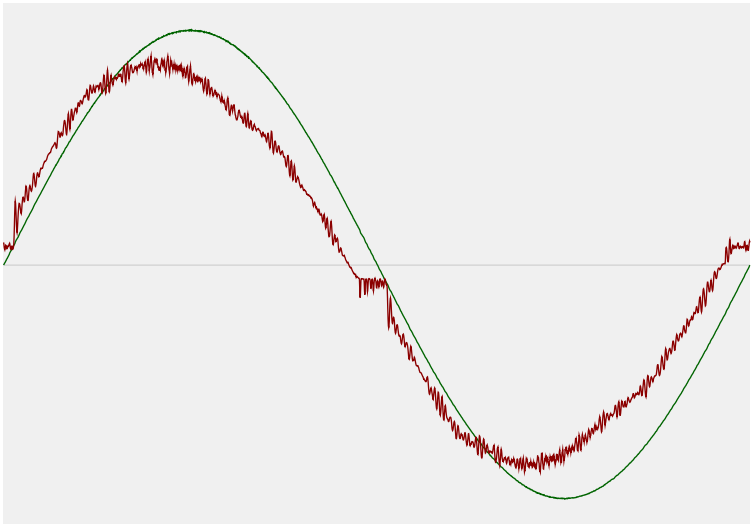
Power Details

Input Power

Power feed to light source	57,8 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,258 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	59,41 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	6,17%
Total harmonic distortion of the voltage	0,05%

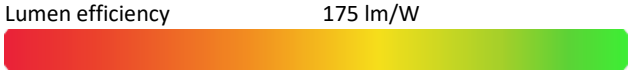
Input Power Curve



Efficiency

Radiated power efficiency 50,8%

Lumen efficiency 175 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	4005 K
CCT shift	-5 K
CCT end	4000 K

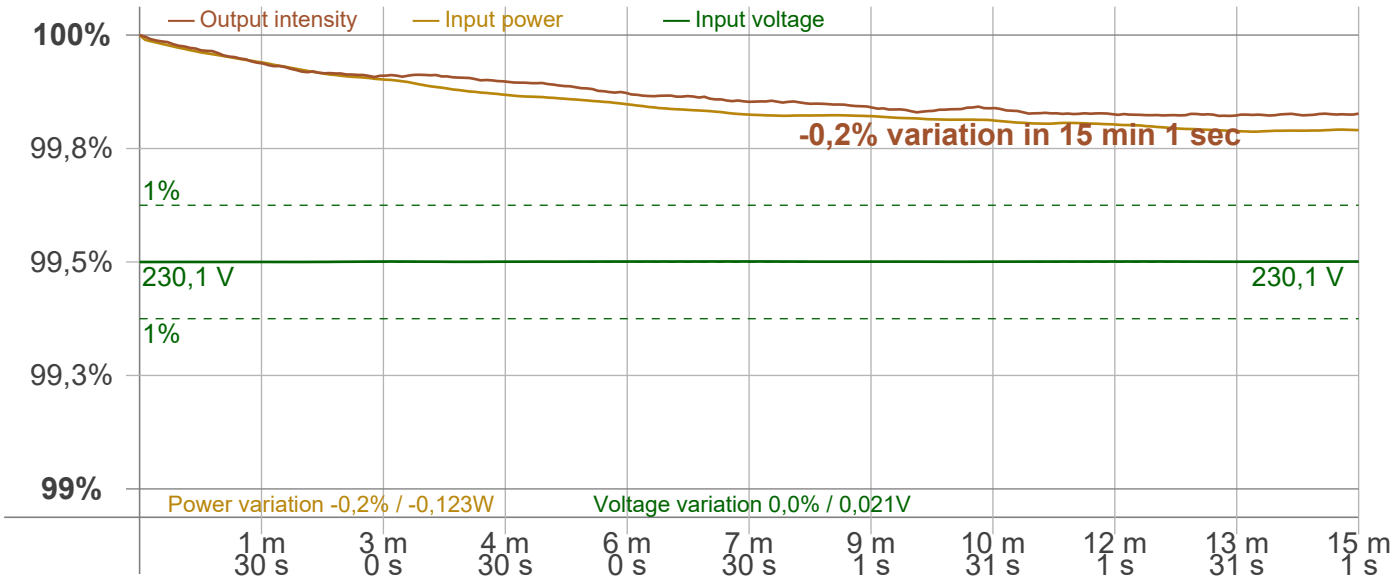
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,2%

Output Change

Output start	10169 lm
Output change	-19 lm
Output end	10150 lm

Stabilization Curve



Light Measurement Report

Print date: 14-10-2024
Measurement date and time: 14-10-2024 15:16:03 – Measurement no. VFR-241014-1253-MS
Measurement tracking No. and Link: VT241014-003575
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	98,52 Hz
Percent Flicker	0,15 %
Flicker index	0

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

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

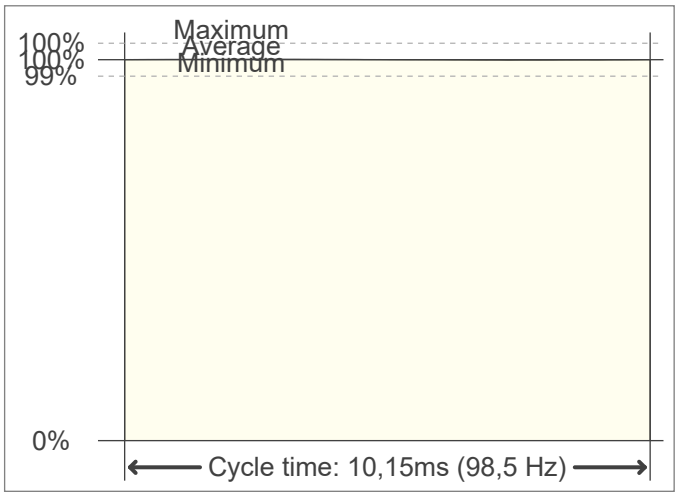
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,14 %
JA8/10 400 Hz	0,14 %
JA8/10 1000 Hz	0,14 %

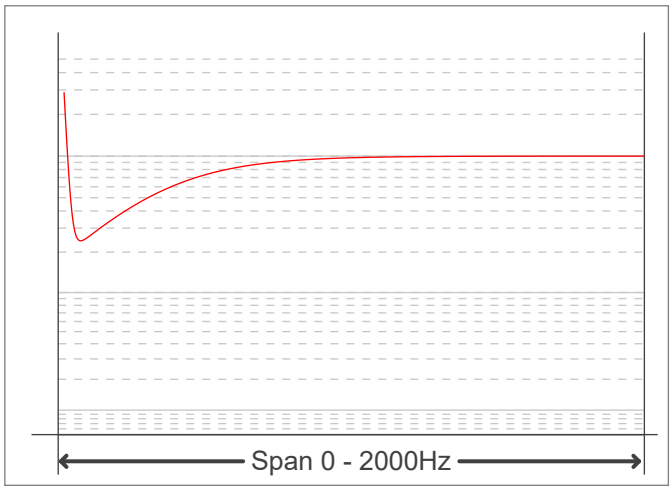
Flicker indices according to Lighting Research Center (2015)

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