

Light Measurement Report

Print date: 14-10-2024

Measurement date and time: 14-10-2024 10:17:53 – Measurement no. VFR-241014-1234-MS

Measurement tracking No. and Link: [VT241014-008969](#)

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

γ (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°

11,99 m

31,8 W – PF 0,95 – DPF 0,96

230 V – 0,145 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)

273658-5000K

273658-5000K – Dutchfulfillment

SIDE-LIT LED PANEEL | LUNA | 120X30CM | 30W

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

4020 lm – 1,13% / 98,87%

127 lm/W

2042 cd – 82,4°

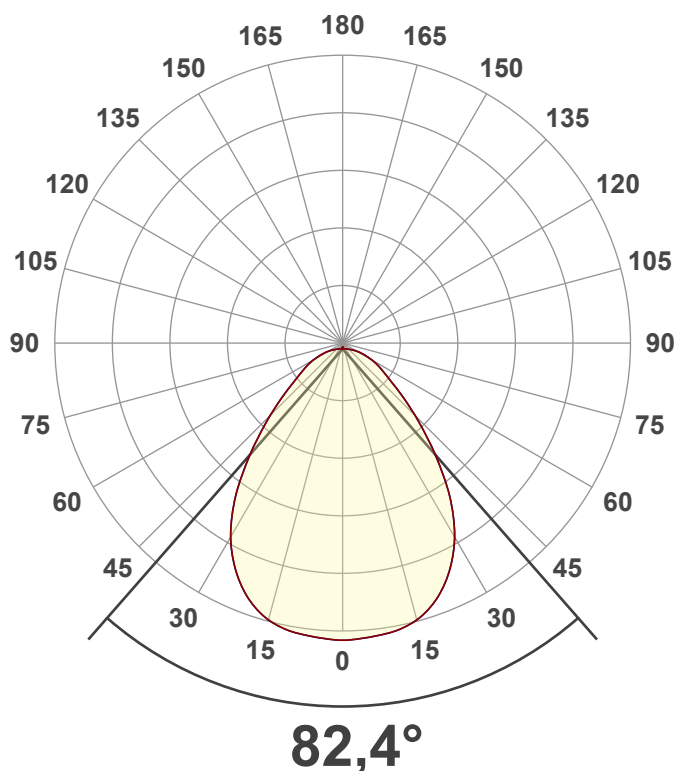
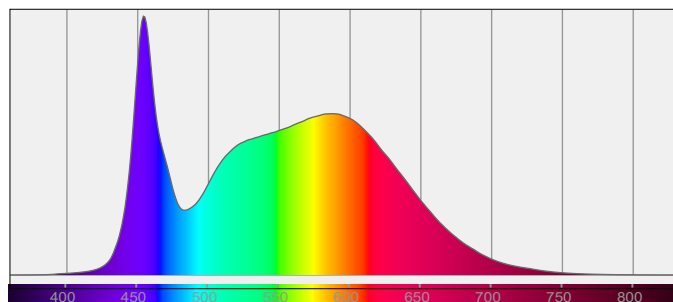
CCT = 5000 K / 4818 K

CRI 82,8

R_f 83,0 – R_g 93,3

Duv 0,0041 – SDCM 5,0

SVM 0,01 – PstLM 0,02



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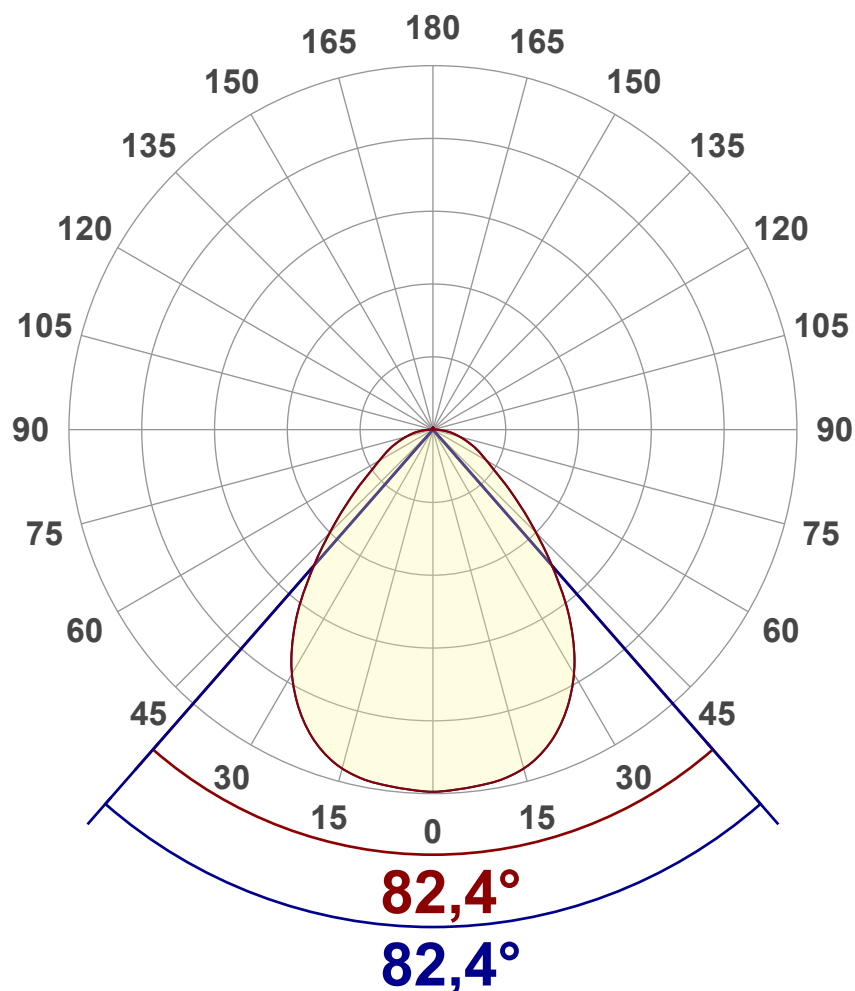
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	4020 lm
Lumen Up% / Down%	1,13% / 98,87%
Peak Intensity	2042 cd
Beam Angle (50%)	82,4°
Beam Angle (90%)	82,4°
Beam Angle (10%)	82,4°

Cut-off Angle

Average 2,5%	171,7°
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Field Angle

Average 10%	142°
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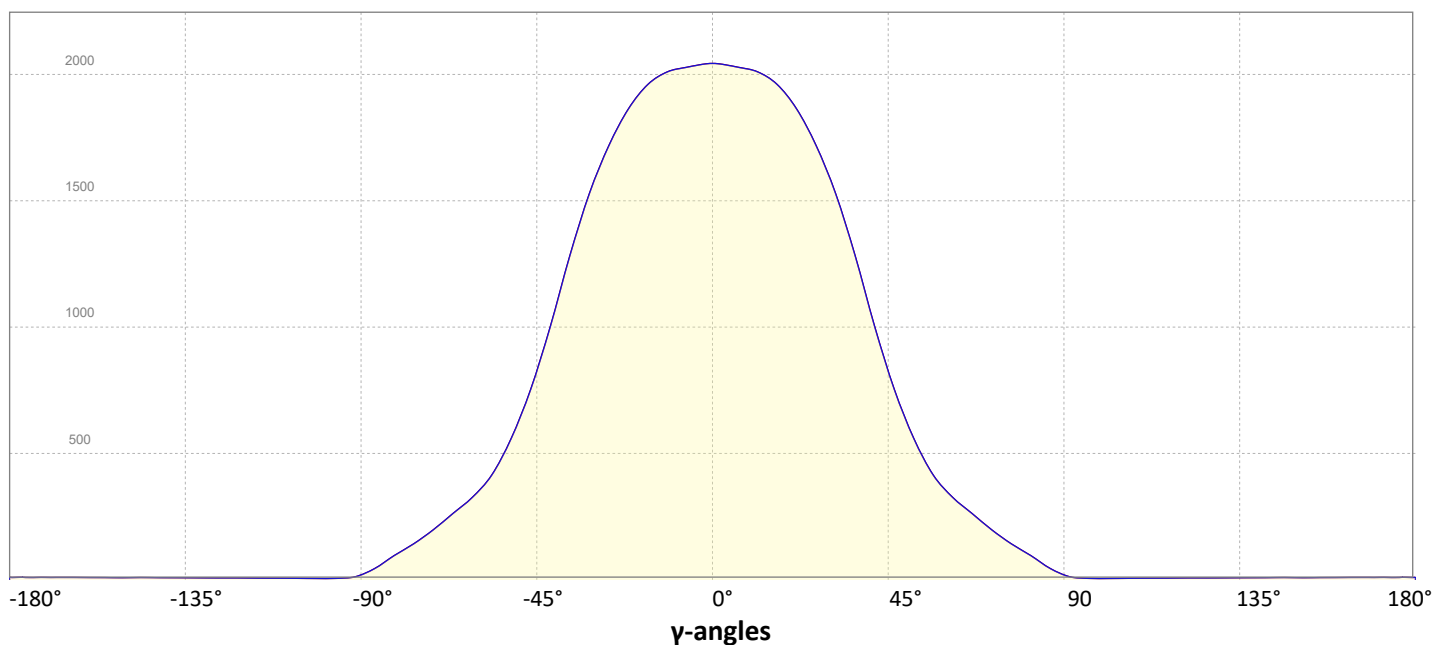
Intensity Ratio

In 120° cone	86,1%
In 90° cone	68,6%

C000-C180

C090-C270

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



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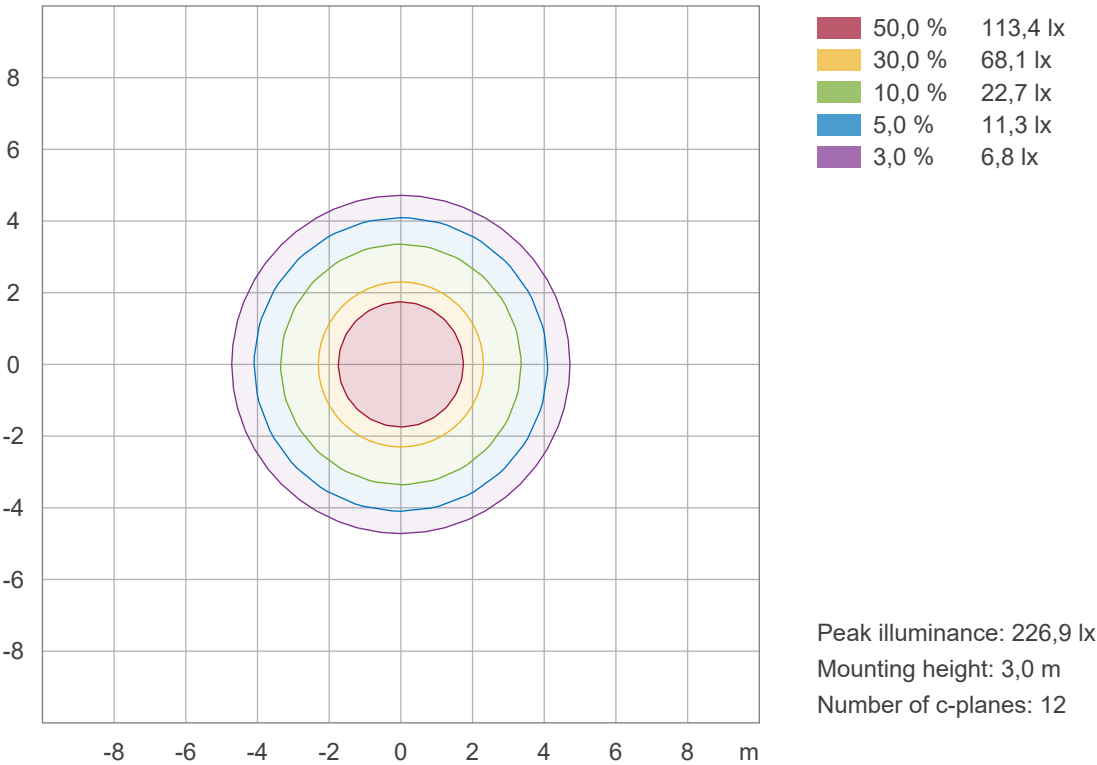
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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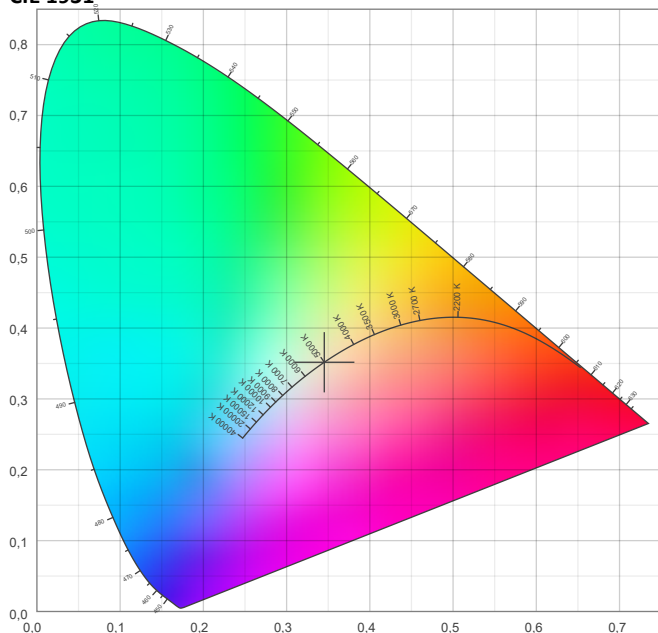


Color details

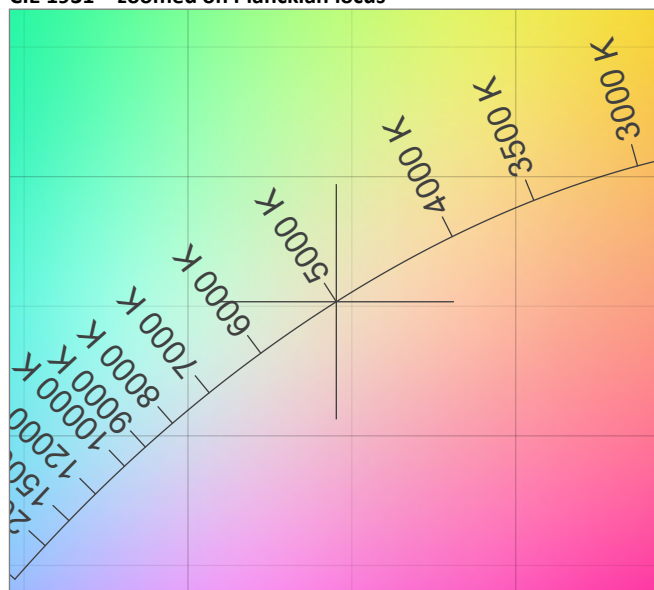
Correlated Color Temperature, Target CCT = 5000 K
Correlated Color Temperature, Measured CCT = 4818 K
Color Rendering Index CRI 82,8
Color Rendering Index, R9 (red component) R9 = 6,0
Color Rendering TM30-18 R_f 83,0 – R_g 93,3
Color Quality Scale CQS = 81,5

MacAdam Steps
Color coordinates CIE 1931 (x;y) = (0,345;0,352)
Color coordinate CIEs 1960 (u;v) = (0,211;0,323)
Color deviation from BBL Duv = 0,0041
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,211;0,485)

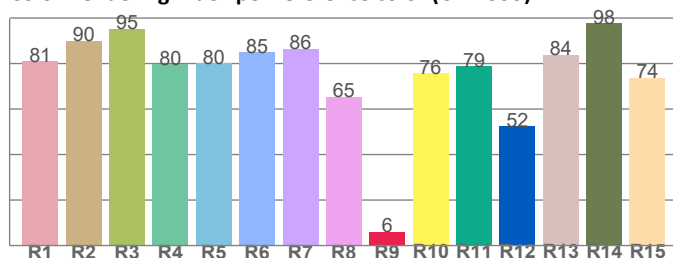
CIE 1931



CIE 1931 – zoomed on Planckian locus



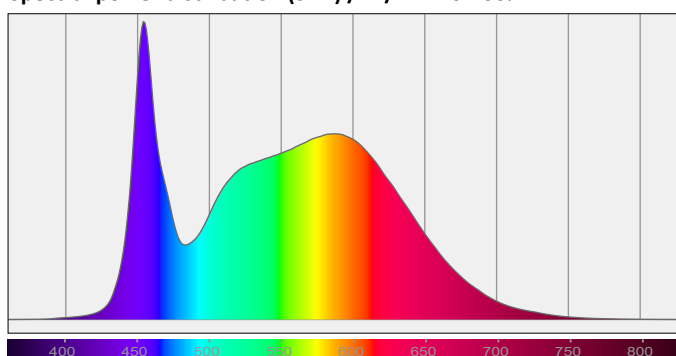
Color Rendering Index per reference color (CIE 1995)



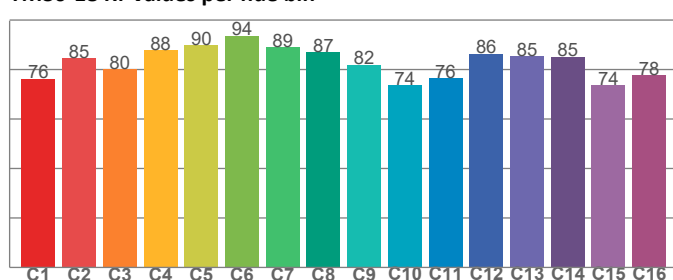
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,9	90,1	95,2	79,6	80,0	85,0	86,5	65,3	6,0	75,7	78,7	52,4	83,9	97,8	73,8

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



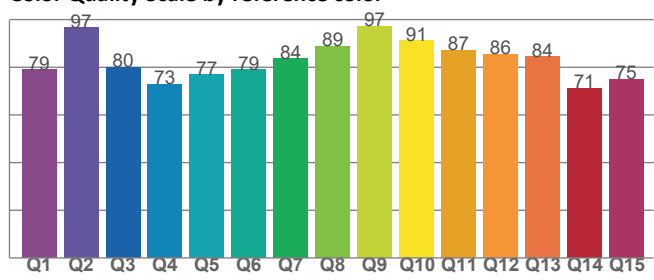
TM30-18 R_f -values per hue bin



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
76,3	84,6	80,1	87,8	89,8	93,6	89,1	87,0	81,9	73,7	76,4	86,4	85,5	85,2	73,7	77,6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
79,0	96,6	80,0	72,8	77,0	78,9	83,5	88,7	97,2	91,1	87,1	85,5	84,4	71,3	74,9

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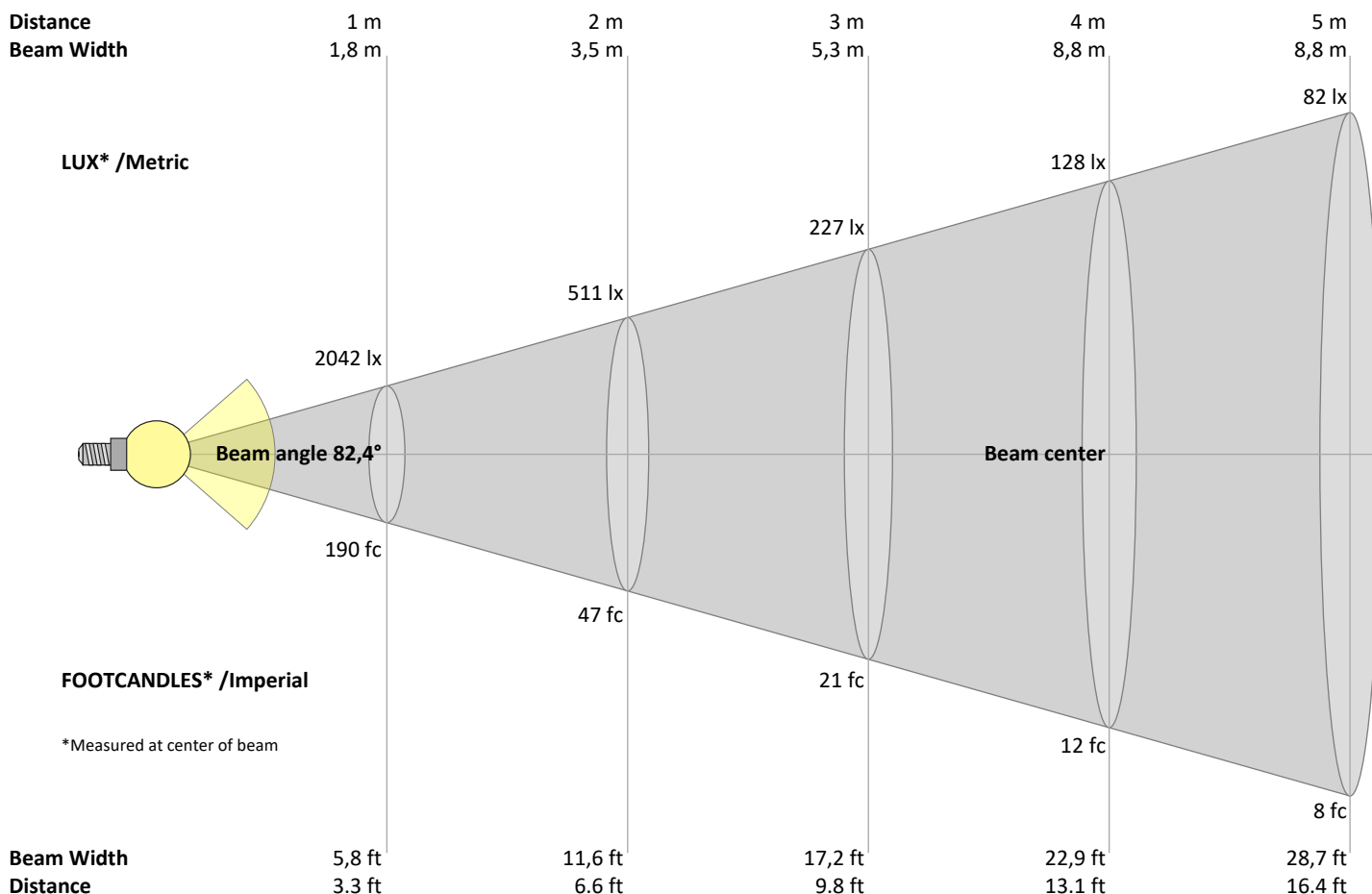
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Beam Details



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
2042	511	227	128	82	57	42	32	25	20	17	14	12	10	9	8	7	6	6	5	lux
189,7	47,4	21,1	11,9	7,6	5,3	3,9	3	2,3	1,9	1,6	1,3	1,1	1	0,8	0,7	0,7	0,6	0,5	0,5	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
2042	2033	2016	1976	1893	1763	1587	1358	1088	830	619	459	353	281	217	159	110	60	22	7	cd
100%	100%	99%	97%	93%	86%	78%	66%	53%	41%	30%	22%	17%	14%	11%	8%	5%	3%	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
2042	2033	2016	1976	1893	1763	1587	1358	1088	830	619	459	353	281	217	159	110	60	22	7	cd
100%	100%	99%	97%	93%	86%	78%	66%	53%	41%	30%	22%	17%	14%	11%	8%	5%	3%	1%	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
2042	2033	2016	1976	1893	1763	1587	1358	1088	830	619	459	353	281	217	159	110	60	22	7	cd
100%	100%	99%	97%	93%	86%	78%	66%	53%	41%	30%	22%	17%	14%	11%	8%	5%	3%	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
2042	2033	2016	1976	1893	1763	1587	1358	1088	830	619	459	353	281	217	159	110	60	22	7	cd
100%	100%	99%	97%	93%	86%	78%	66%	53%	41%	30%	22%	17%	14%	11%	8%	5%	3%	1%	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											
X	Y	Viewed Crosswise (Viewing direction orthogonal to lamp length axis)					Viewed Endwise (Viewing direction parallel to lamp length axis)				
2H	2H	14,7	15,8	15,0	16,1	16,3	14,7	15,7	14,9	16,0	16,2
	3H	15,7	16,7	16,1	17,0	17,2	15,6	16,7	16,0	16,9	17,1
	4H	16,2	17,2	16,6	17,5	17,7	16,0	17,1	16,5	17,4	17,6
	6H	16,7	17,6	17,0	17,9	18,3	16,5	17,4	16,9	17,7	18,1
	8H	16,9	17,7	17,2	18,1	18,5	16,7	17,6	17,0	17,9	18,3
	12H	17,0	17,8	17,4	18,2	18,7	16,8	17,7	17,2	18,0	18,5
4H	2H	15,0	16,1	15,4	16,3	16,6	15,0	16,0	15,4	16,3	16,6
	3H	16,3	17,2	16,7	17,5	18,0	16,2	17,1	16,6	17,5	17,9
	4H	16,9	17,7	17,3	18,1	18,7	16,8	17,6	17,2	18,0	18,6
	6H	17,5	18,3	18,0	18,6	19,0	17,4	18,1	17,9	18,5	18,9
	8H	17,8	18,4	18,3	18,8	19,2	17,6	18,3	18,1	18,7	19,1
	12H	18,0	18,5	18,5	19,0	19,5	17,8	18,3	18,3	18,8	19,3
8H	4H	17,1	17,8	17,7	18,2	18,6	17,0	17,7	17,6	18,1	18,5
	6H	17,9	18,4	18,4	18,9	19,5	17,8	18,3	18,3	18,8	19,3
	8H	18,3	18,7	18,8	19,3	19,9	18,1	18,6	18,7	19,1	19,8
	12H	18,6	19,0	19,2	19,5	20,1	18,4	18,8	19,0	19,3	19,9
12H	4H	17,1	17,7	17,6	18,1	18,6	17,0	17,6	17,6	18,1	18,5
	6H	18,0	18,4	18,5	19,0	19,6	17,9	18,3	18,4	18,9	19,5
	8H	18,4	18,8	19,0	19,3	19,9	18,2	18,6	18,8	19,1	19,8
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		0,2 / -0,3					0,2 / -0,3				
S = 1.5H		0,5 / -0,5					0,5 / -0,5				
S = 2.0H		1,0 / -0,7					1,0 / -0,8				

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	110	110	110	106	106	106	101	101	101	99
1	110	106	102	99	107	103	100	97	99	96	94	95	93	91	91	90	88	86
2	102	94	88	83	99	92	87	82	89	84	80	85	82	78	82	79	77	74
3	94	85	78	72	91	83	76	71	80	74	70	77	72	68	75	71	67	65
4	87	76	69	63	85	75	68	62	73	66	61	70	65	60	68	63	60	58
5	81	69	61	55	79	68	61	55	66	60	54	64	58	54	62	57	53	51
6	75	63	55	50	73	62	55	49	61	54	49	59	53	48	57	52	48	46
7	70	58	50	45	69	57	50	44	56	49	44	54	48	44	53	47	43	41
8	66	54	46	40	64	53	45	40	51	45	40	50	44	40	49	44	39	38
9	62	50	42	37	60	49	42	37	48	41	37	47	41	36	46	40	36	34
10	58	46	39	34	57	45	38	34	44	38	34	43	38	33	43	37	33	32

Light Measurement Report

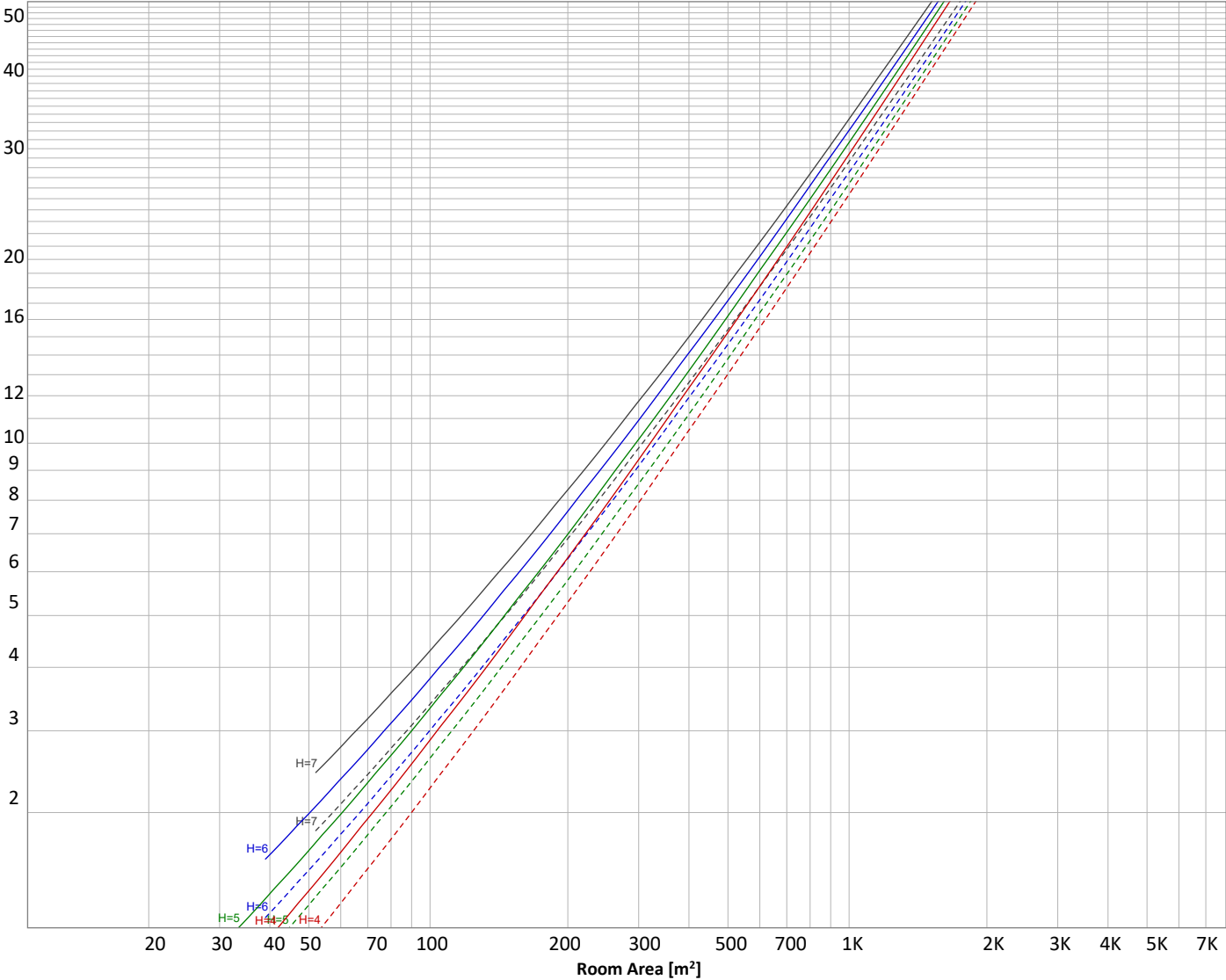
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 4020 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = 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°
194 lm	557 lm	809 lm	844 lm	642 lm	414 lm	278 lm	169 lm	67,2 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
8,69 lm	5,81 lm	6,20 lm	6,24 lm	5,94 lm	5,31 lm	3,90 lm	2,58 lm	0,882 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	194 lm	4,8%
10-20°	557 lm	13,9%
20-30°	809 lm	20,1%
30-40°	844 lm	21,0%
40-50°	642 lm	16,0%
50-60°	414 lm	10,3%
60-70°	278 lm	6,9%
70-80°	169 lm	4,2%
80-90°	67 lm	1,7%
90-100°	9 lm	0,2%
100-110°	6 lm	0,1%
110-120°	6 lm	0,2%
120-130°	6 lm	0,2%
130-140°	6 lm	0,1%
140-150°	5 lm	0,1%
150-160°	4 lm	0,1%
160-170°	3 lm	0,1%
170-180°	1 lm	0,0%
Total	4020 lm	100,0%

Intensity peaks

Max intensity	2042 cd
Intensity, 90°	22 cd
Intensity, 0°	2042 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1560 lm	38,8%
0-40°	2404 lm	59,8%
0-60°	3460 lm	86,1%
60-90°	514 lm	12,8%
70-100°	245 lm	6,1%
90-120°	21 lm	0,5%
0-90°	3974 lm	98,9%
90-180°	46 lm	1,1%
0-180°	4020 lm	100,0%

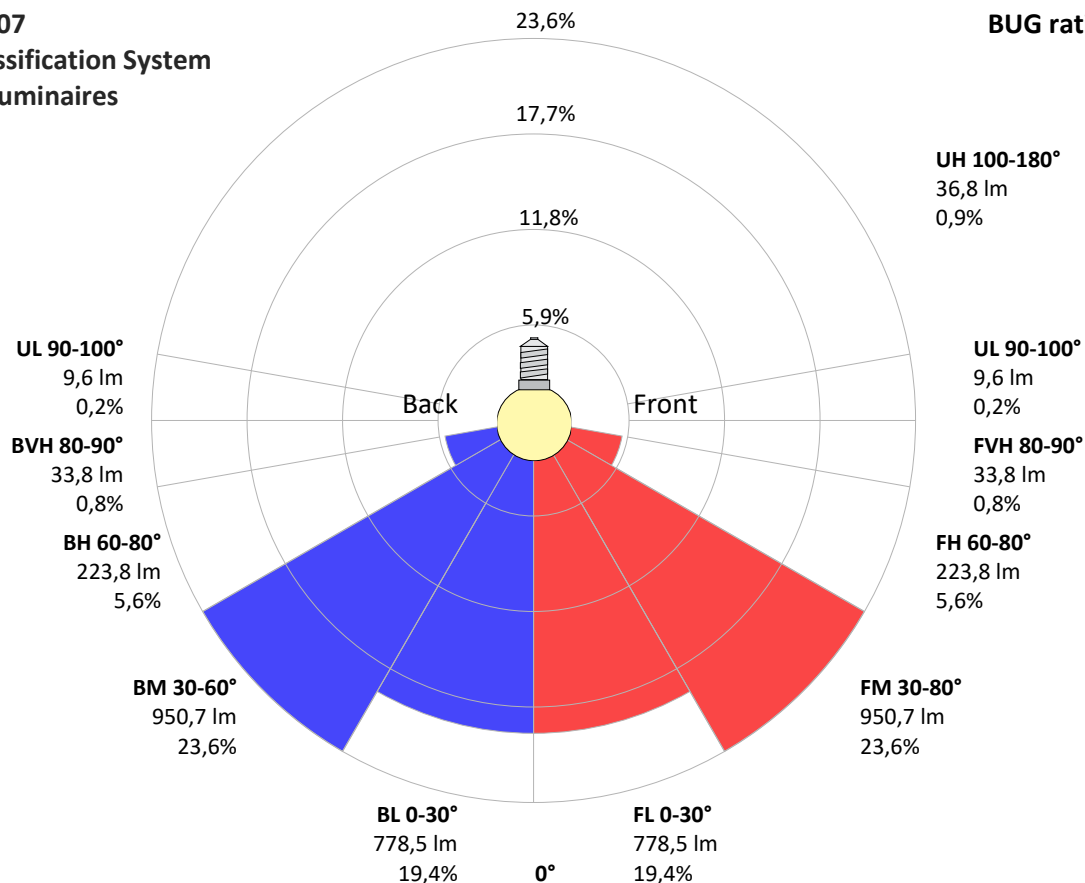
BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	778 lm	19,4%
Medium(30-60°)	951 lm	23,6%
High(60-80°)	224 lm	5,6%
Very high(80-90°)	34 lm	0,8%
Back light		
Low(0-30°)	778 lm	19,4%
Medium(30-60°)	951 lm	23,6%
High(60-80°)	224 lm	5,6%
Very high(80-90°)	34 lm	0,8%
Uplight		
Low(90-100°)	10 lm	0,2%
High(100-180°)	37 lm	0,9%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B2 U2 G1



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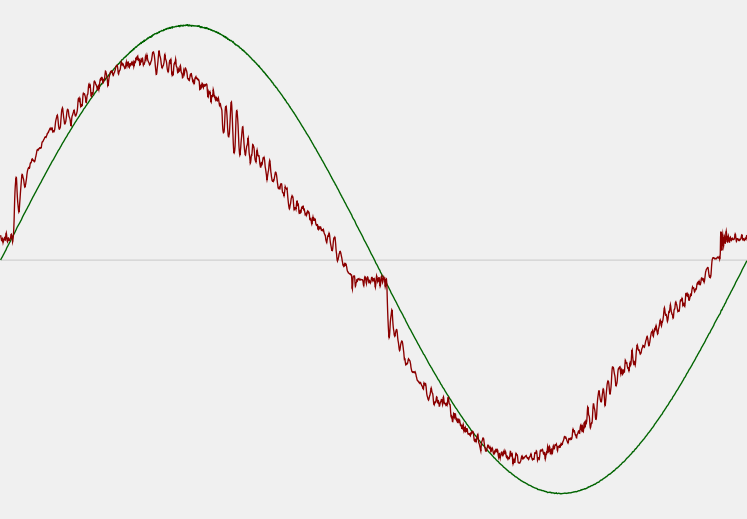


Power Details

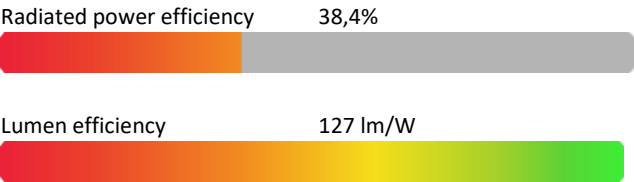
Input Power

Power feed to light source	31,8 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,145 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	33,41 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,95
Total harmonic distortion of the current	9,96%
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	4976 K
CCT shift	+24 K
CCT end	5000 K

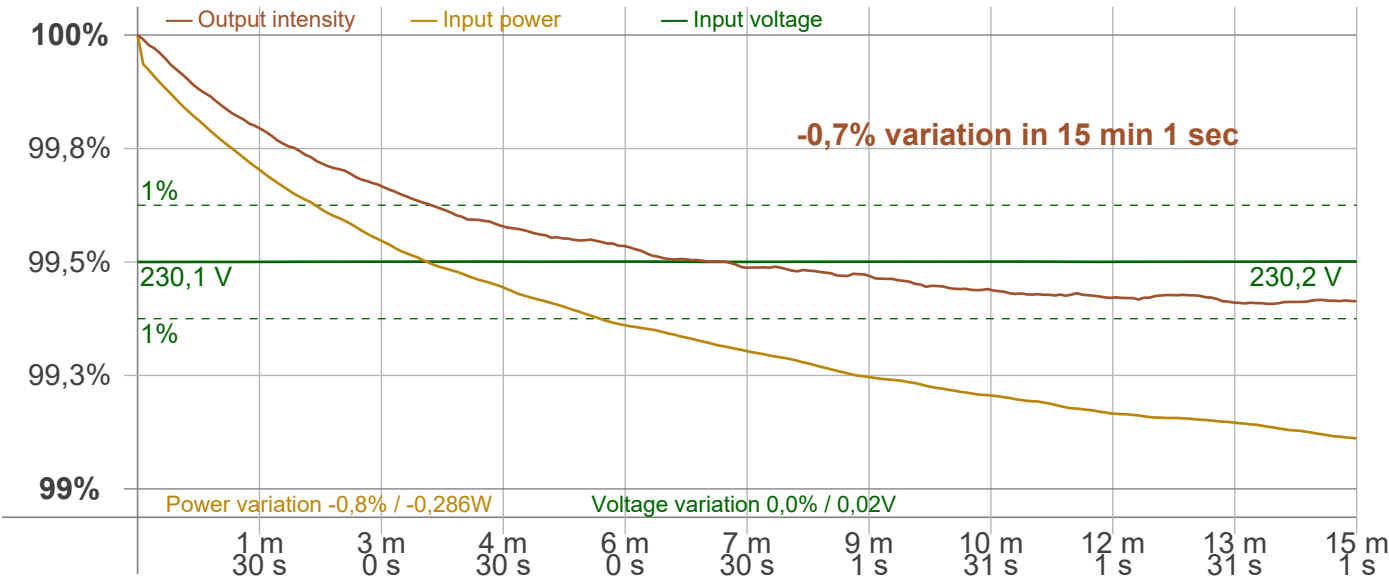
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,7%

Output Change

Output start	4045 lm
Output change	-25 lm
Output end	4020 lm

Stabilization Curve



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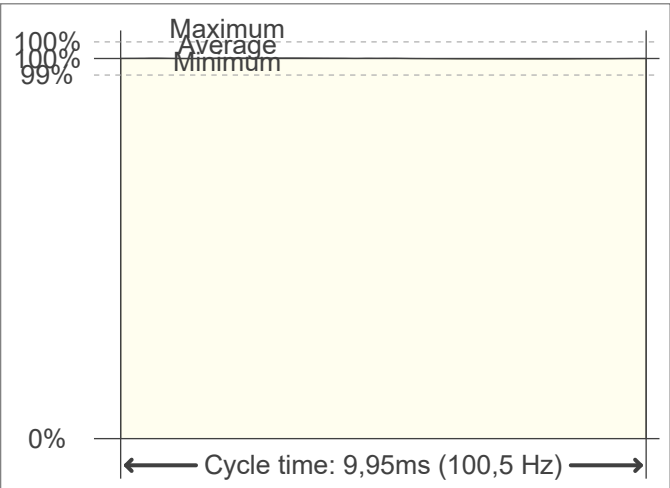
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Flicker /TLA details

Flicker Meter Type	Viso Systems LabFlicker	Measurement time	
Frequency of input power	50 Hz	PstLM	180 sec
Flicker/TLA sample rate	20000 samples/s	All other indices	1,2 sec
Flicker indices according to Illuminating Engineering Society (IES)		Flicker indices according to California Energy Commission (CEC) 2016b	
Flicker frequency	100,5 Hz	JA8/10 40 Hz	0,03 %
Percent Flicker	0,26 %	JA8/10 90 Hz	0,05 %
Flicker index	0	JA8/10 200 Hz	0,19 %
		JA8/10 400 Hz	0,21 %
		JA8/10 1000 Hz	0,25 %
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)		Flicker indices according to Lighting Research Center (2015)	
PstLM value (F < 80 Hz)	0,02	Perception metric, Assist Mp	0,01
SVM value (80 < F < 2000 Hz)	0,01		

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

