

Light Measurement Report

Print date: 1-11-2024
Measurement date and time: 1-11-2024 15:43:33 – Measurement no. VFR-241101-1825-MS
Measurement tracking No. and Link: [VT241101-004923](#)
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

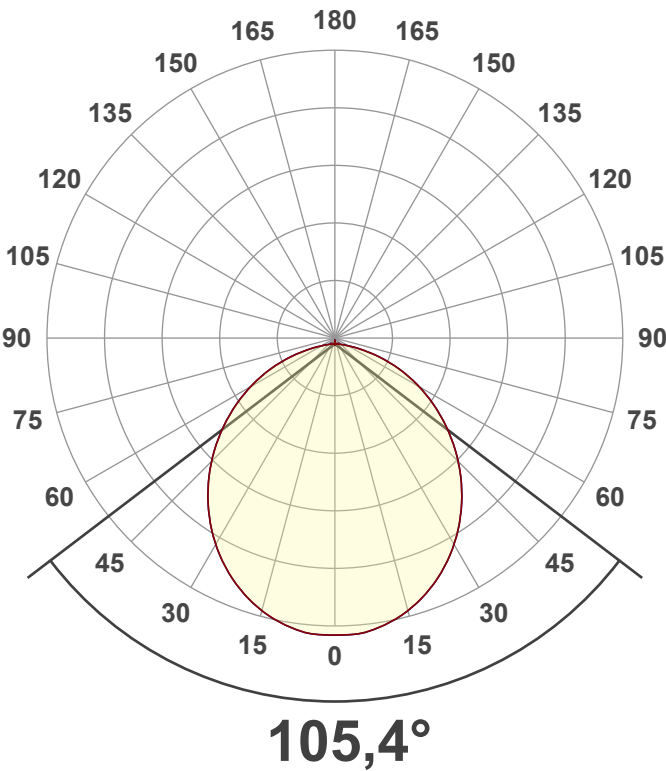
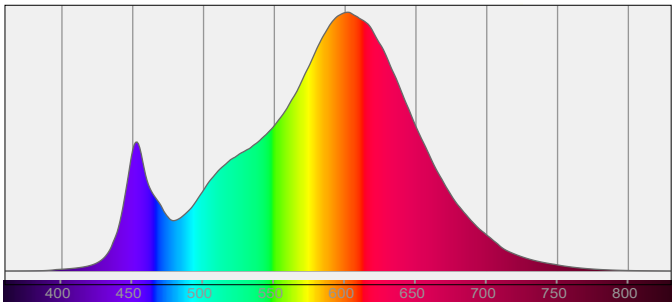
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	2,00 m
Input Power, Power and Displ. Factors	6,1 W – PF 0,89 – DPF 0,9
Input RMS Voltage and Current	230 V – 0,030 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

Product Name	273863-3000K
Item No. and Manufacturer	273863-3000K – Dutchfulfillment
Product Description (line 1)	LED DOWNLIGHT UMBRIEL SLIM Ø108 6W WIT

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	328 lm – 0,19% / 99,81%
Efficiency	54 lm/W
Peak Intensity and Beam Angle	125 cd – 105,4°
Correlated Color Temperature, Target/Measured	CCT = 3000 K / 2912 K
Color Rendering Index	CRI 81,9
Color Rendering TM30-18	R _f 84,6 – R _g 94,7
Color Shift, CIE duv and MacAdam Steps	Duv -0,0007 – SDCM 3,1
Flicker	SVM 0 – PstLM 0,08



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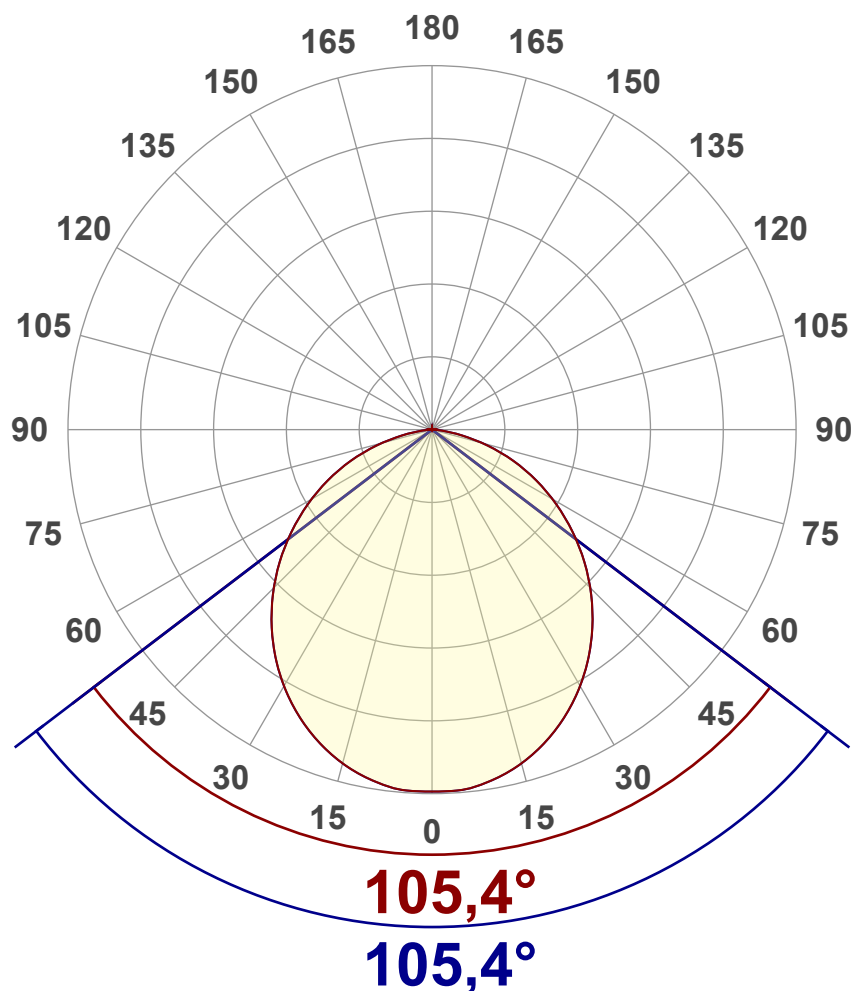
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	328 lm
Lumen Up% / Down%	0,19% / 99,81%
Peak Intensity	125 cd
Beam Angle (50%)	105,4°
Beam Angle (90%)	105,4°
Beam Angle (10%)	105,4°

Cut-off Angle

Average 2,5%	169,4°
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Field Angle

Average 10%	155,9°
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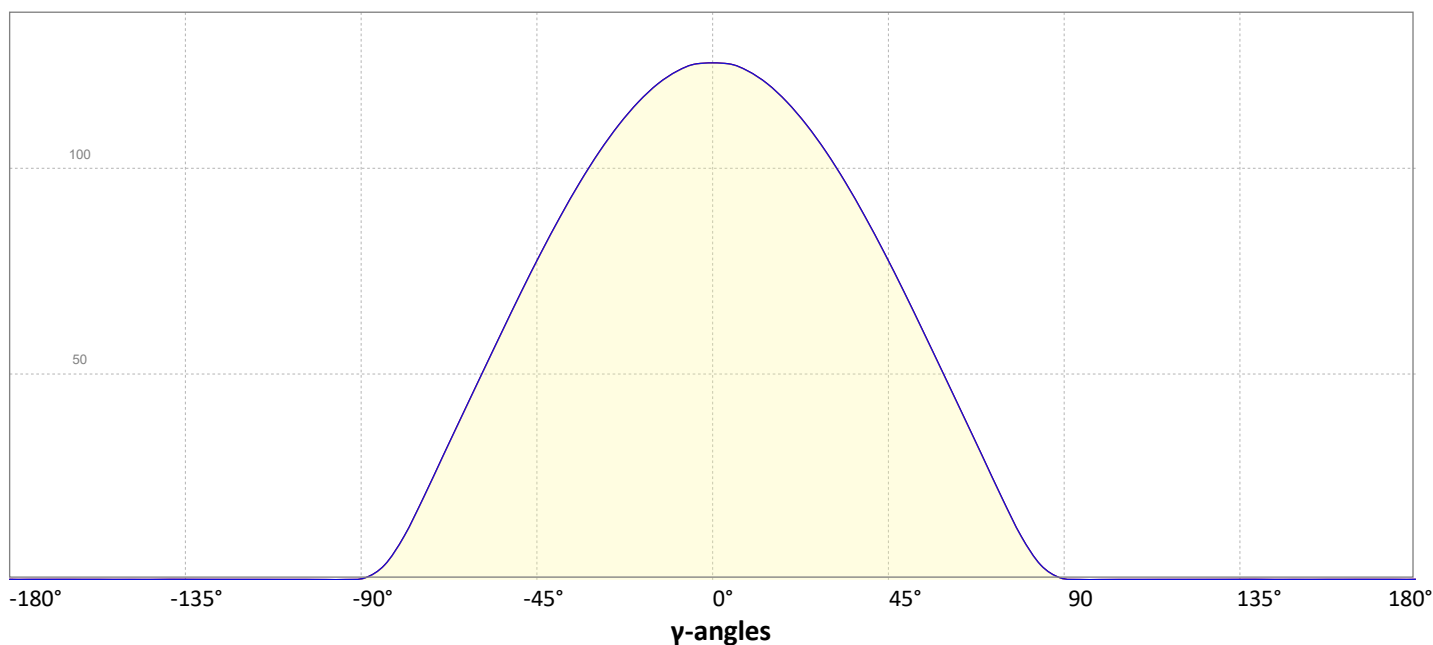
Intensity Ratio

In 120° cone	81,3%
In 90° cone	56,5%

C000-C180

C090-C270

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



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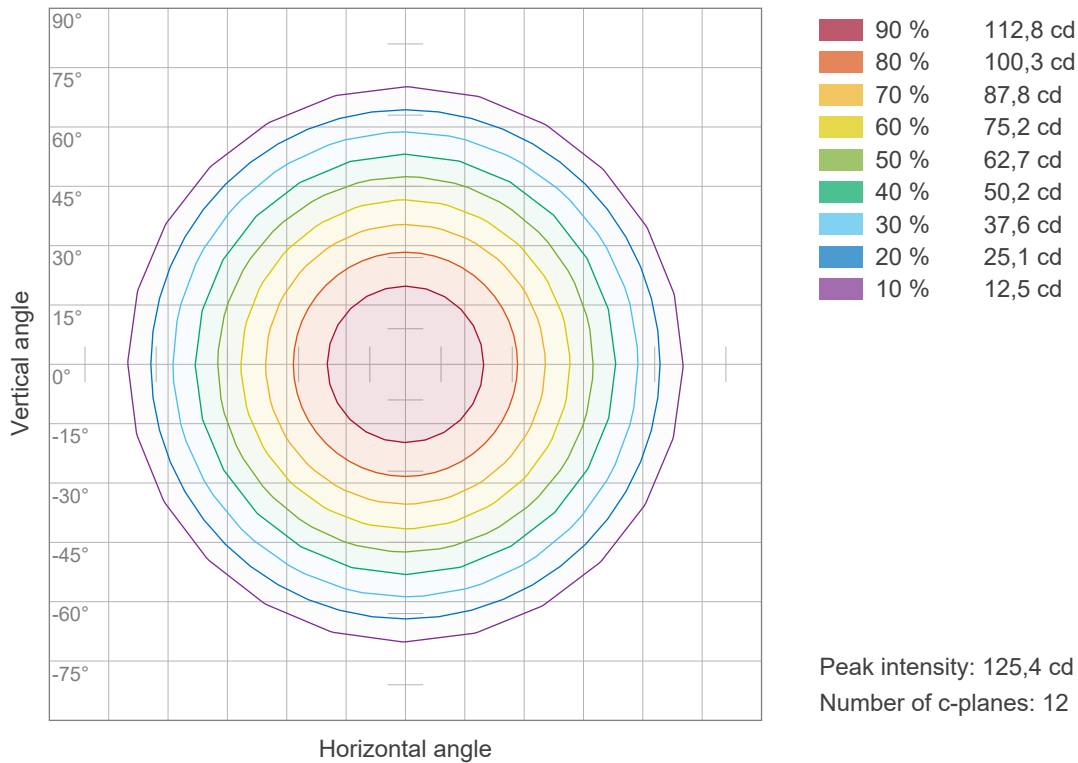
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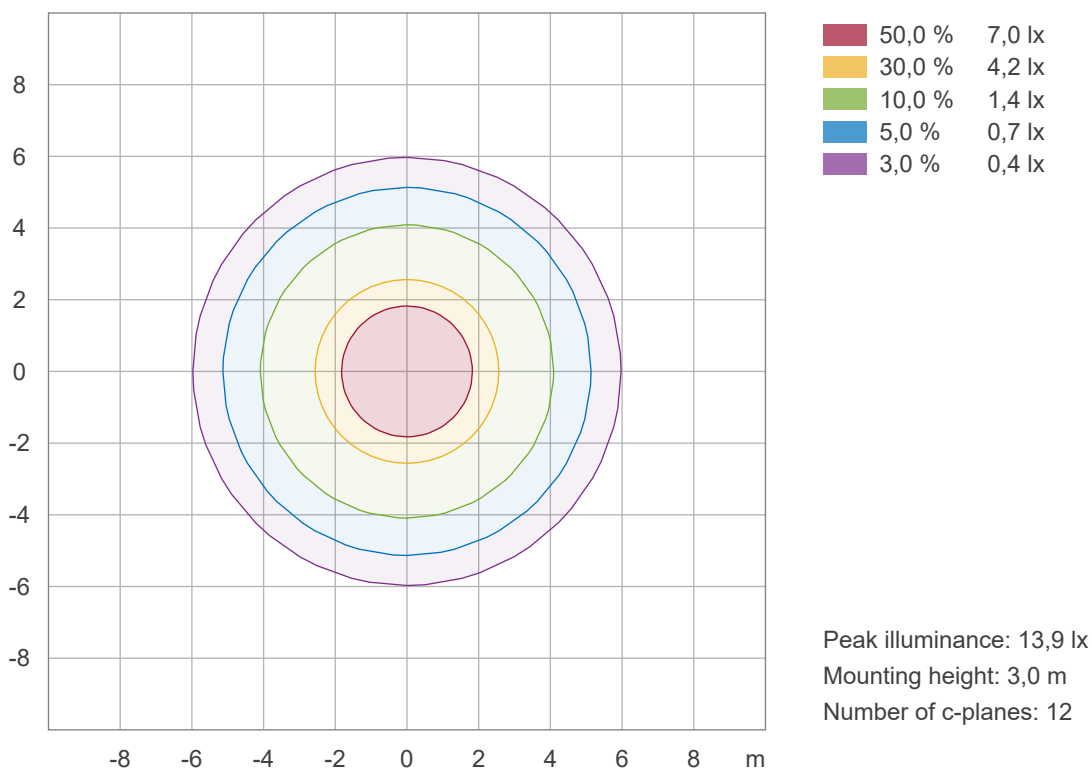
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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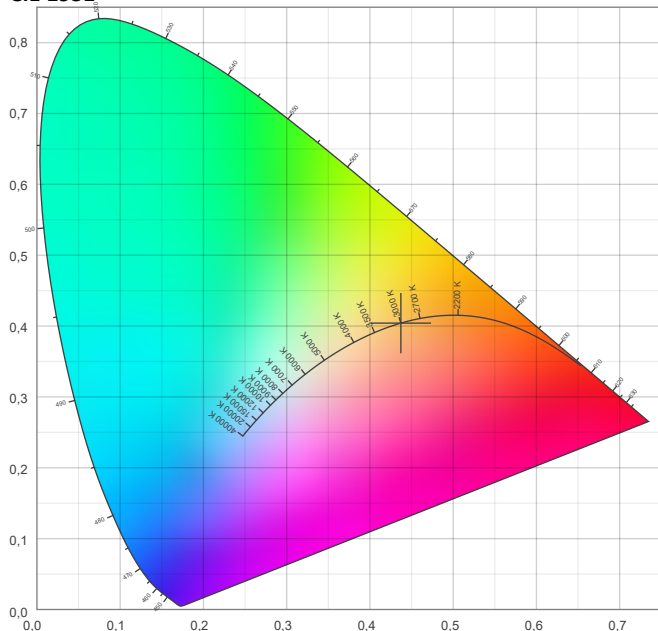


Color details

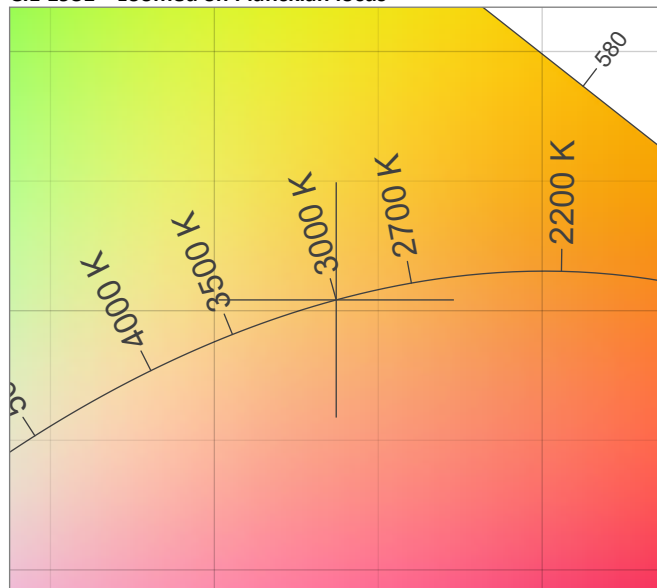
Correlated Color Temperature, Target CCT = 3000 K
Correlated Color Temperature, Measured CCT = 2912 K
Color Rendering Index CRI 81,9
Color Rendering Index, R9 (red component) R9 = 2,7
Color Rendering TM30-18 R_f 84,6 – R_g 94,7
Color Quality Scale CQS = 81,6

MacAdam Steps
Color coordinates CIE 1931 (x;y) = (0,437;0,404)
Color coordinate CIEs 1960 (u;v) = (0,251;0,348)
Color deviation from BBL Duv = -0,0007
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,251;0,521)

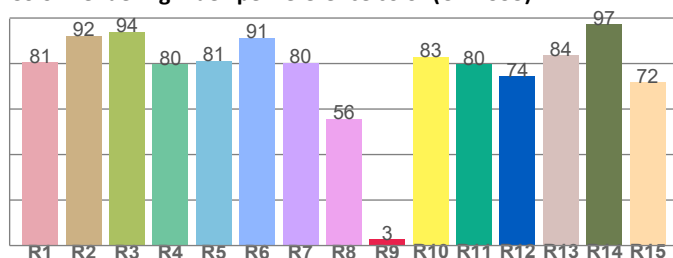
CIE 1931



CIE 1931 – zoomed on Planckian locus



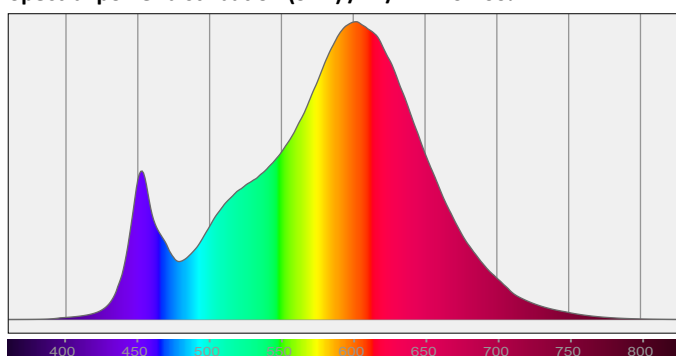
Color Rendering Index per reference color (CIE 1995)



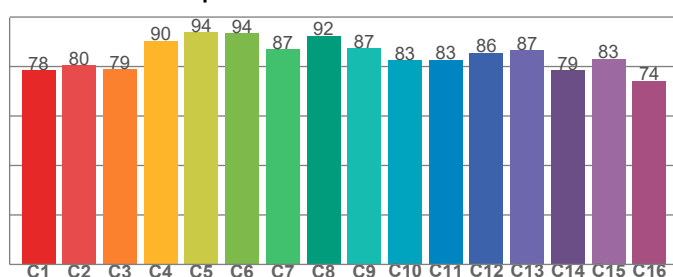
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,7	92,3	94,0	79,6	81,3	91,4	80,4	55,8	2,7	83,0	79,6	74,3	83,7	97,3	71,8

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



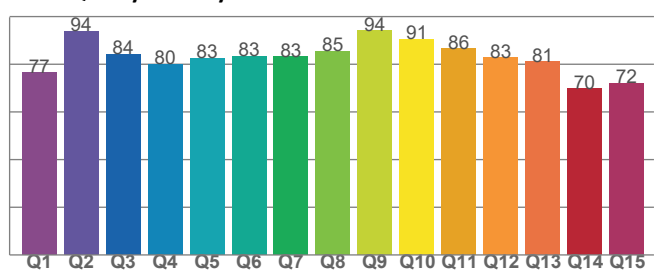
TM30-18 Rf-values per hue bin



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
78,5	80,5	79,0	90,4	93,9	93,6	87,0	92,4	87,5	82,6	82,7	85,6	86,5	78,5	83,1	74,3

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
76,5	93,9	84,1	80,0	82,5	83,4	83,1	85,4	94,0	90,6	86,4	82,8	81,1	69,8	72,0

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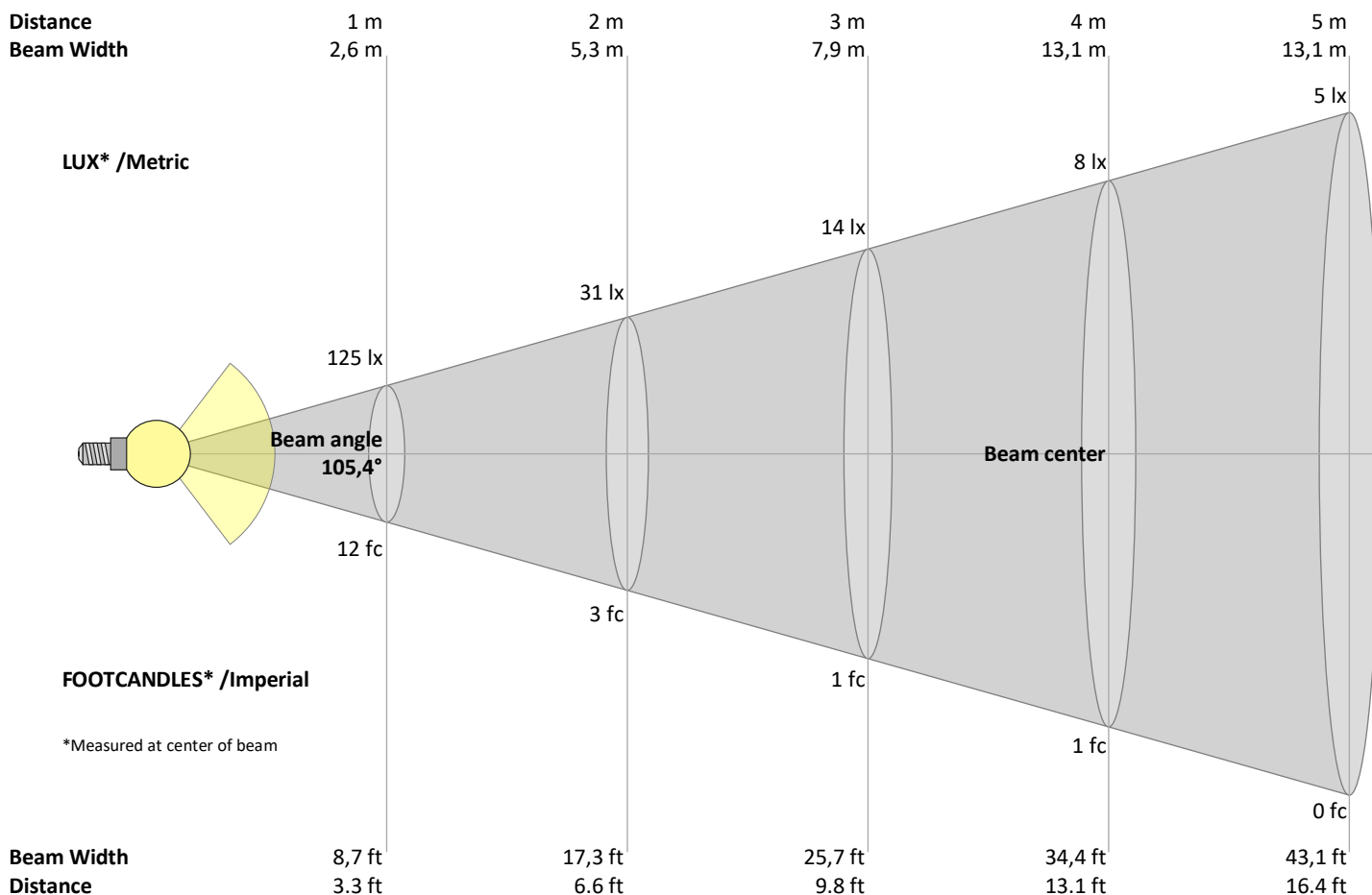
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Beam Details



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
125	31	14	8	5	3	3	2	2	1	1	1	1	1	1	0	0	0	0	0	lux
11,6	2,9	1,3	0,7	0,5	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0	0	0	0	0	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
125	125	123	120	115	109	103	95	86	77	68	58	48	38	28	18	9	3	0	0	cd
100%	100%	98%	95%	92%	87%	82%	76%	69%	62%	54%	46%	38%	30%	22%	14%	7%	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
125	125	123	120	115	109	103	95	86	77	68	58	48	38	28	18	9	3	0	0	cd
100%	100%	98%	95%	92%	87%	82%	76%	69%	62%	54%	46%	38%	30%	22%	14%	7%	2%	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
125	125	123	120	115	109	103	95	86	77	68	58	48	38	28	18	9	3	0	0	cd
100%	100%	98%	95%	92%	87%	82%	76%	69%	62%	54%	46%	38%	30%	22%	14%	7%	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
125	125	123	120	115	109	103	95	86	77	68	58	48	38	28	18	9	3	0	0	cd
100%	100%	98%	95%	92%	87%	82%	76%	69%	62%	54%	46%	38%	30%	22%	14%	7%	2%	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		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	22,7	23,9	22,9	24,2	24,4	22,7	23,9	22,9	24,2	24,4
	3H	23,8	25,0	24,2	25,3	25,5	23,8	25,0	24,2	25,3	25,5
	4H	24,2	25,4	24,6	25,7	25,9	24,2	25,4	24,6	25,7	25,9
	6H	24,5	25,5	24,8	25,8	26,2	24,5	25,5	24,8	25,8	26,2
	8H	24,5	25,5	24,8	25,8	26,2	24,5	25,5	24,8	25,8	26,2
	12H	24,5	25,4	24,8	25,8	26,2	24,5	25,4	24,8	25,8	26,2
4H	2H	23,2	24,4	23,6	24,6	24,9	23,2	24,4	23,6	24,6	24,9
	3H	24,6	25,6	25,0	25,9	26,4	24,6	25,6	25,0	25,9	26,4
	4H	25,0	25,9	25,5	26,3	26,9	25,0	25,9	25,5	26,3	26,9
	6H	25,3	26,1	25,8	26,5	26,9	25,3	26,1	25,8	26,5	26,9
	8H	25,3	26,1	25,8	26,5	26,9	25,3	26,1	25,8	26,5	26,9
	12H	25,3	26,0	25,8	26,4	26,9	25,3	26,0	25,8	26,4	26,9
8H	4H	25,2	26,0	25,7	26,3	26,7	25,2	26,0	25,7	26,3	26,7
	6H	25,5	26,1	26,0	26,6	27,1	25,5	26,1	26,0	26,6	27,1
	8H	25,7	26,2	26,2	26,7	27,3	25,7	26,2	26,2	26,7	27,3
	12H	25,7	26,1	26,3	26,6	27,2	25,7	26,1	26,3	26,6	27,2
12H	4H	25,2	25,8	25,7	26,2	26,7	25,2	25,8	25,7	26,2	26,7
	6H	25,6	26,1	26,1	26,6	27,2	25,6	26,1	26,1	26,6	27,2
	8H	25,7	26,1	26,3	26,6	27,2	25,7	26,1	26,3	26,6	27,2
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H			0,1 / -0,2			0,1 / -0,2					
S = 1.5H			0,3 / -0,5			0,3 / -0,5					
S = 2.0H			0,7 / -0,9			0,7 / -0,9					

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	106	106	106	102	102	102	100	
1	109	105	101	97	107	102	99	95	98	95	92	94	92	89	91	89	87	85
2	100	92	85	80	97	90	84	79	86	81	77	83	79	75	80	76	73	71
3	91	81	73	66	89	79	72	66	76	70	65	73	68	64	71	66	62	60
4	83	72	63	57	81	70	62	56	68	61	55	66	59	55	63	58	54	52
5	77	64	55	49	75	63	55	49	61	54	48	59	53	48	57	52	47	45
6	71	58	49	43	69	57	49	43	55	48	42	53	47	42	52	46	41	39
7	66	53	44	38	64	52	44	38	50	43	37	49	42	37	47	41	37	35
8	61	48	40	34	60	47	39	34	46	39	34	45	38	33	44	38	33	31
9	57	44	36	31	56	44	36	30	42	35	30	41	35	30	40	34	30	28
10	54	41	33	28	53	40	33	28	39	32	28	38	32	27	37	31	27	26

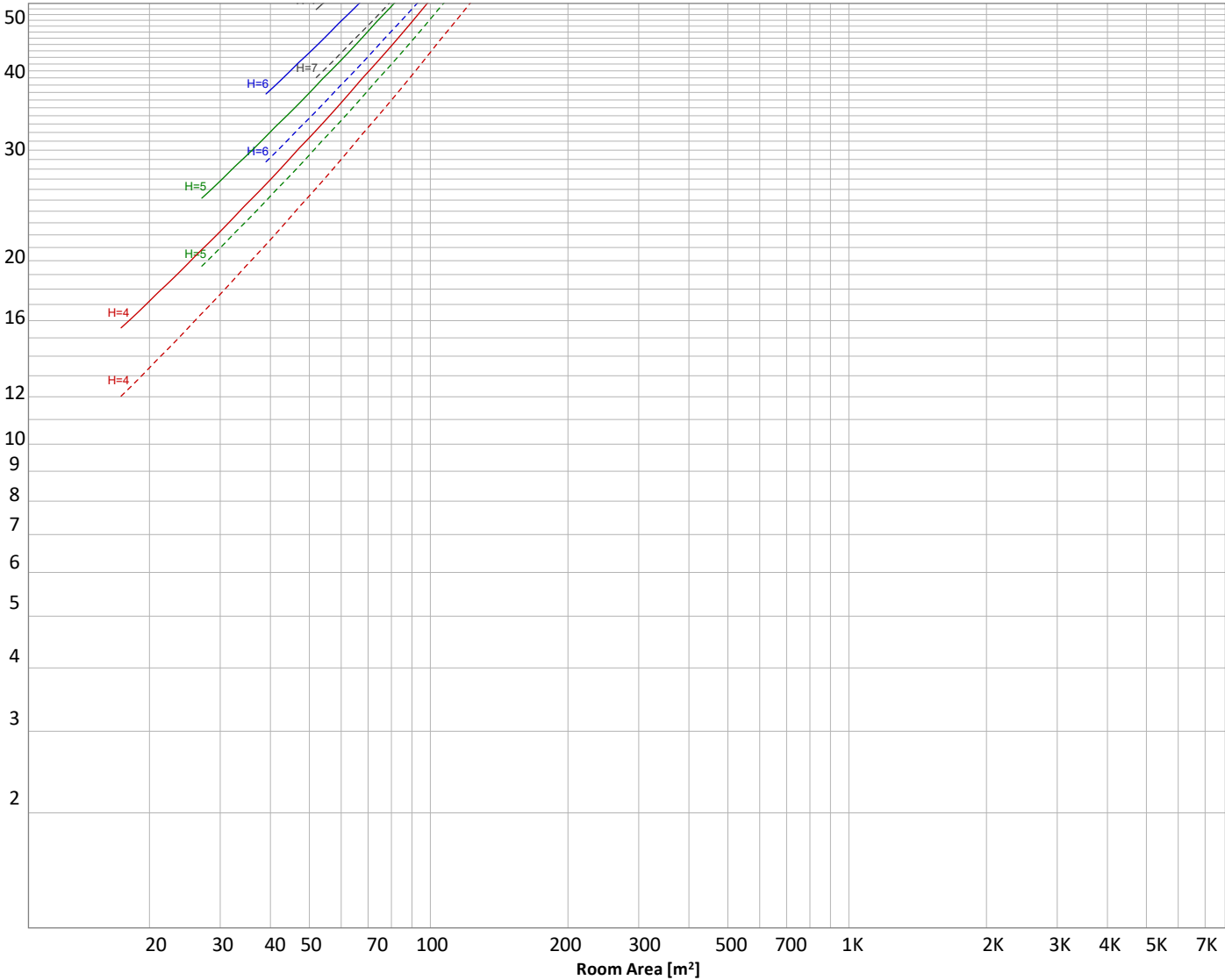
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995
LAMPS (number of lamps)



Conditions

H = Room height	Flux = 328 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
				30
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
11,9 lm	33,7 lm	50,3 lm	59,3 lm	59,7 lm	52,0 lm	37,8 lm	19,2 lm	3,83 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,136 lm	0,083 lm	0,089 lm	0,085 lm	0,083 lm	0,058 lm	0,044 lm	0,030 lm	0,010 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	12 lm	3,6%
10-20°	34 lm	10,3%
20-30°	50 lm	15,3%
30-40°	59 lm	18,1%
40-50°	60 lm	18,2%
50-60°	52 lm	15,8%
60-70°	38 lm	11,5%
70-80°	19 lm	5,8%
80-90°	4 lm	1,2%
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%
Total	328 lm	100,0%

Intensity peaks

Max intensity	125 cd
Intensity, 90°	0 cd
Intensity, 0°	125 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	96 lm	29,2%
0-40°	155 lm	47,3%
0-60°	267 lm	81,3%
60-90°	61 lm	18,5%
70-100°	23 lm	7,1%
90-120°	0 lm	0,1%
0-90°	328 lm	99,8%
90-180°	1 lm	0,2%
0-180°	328 lm	100,0%

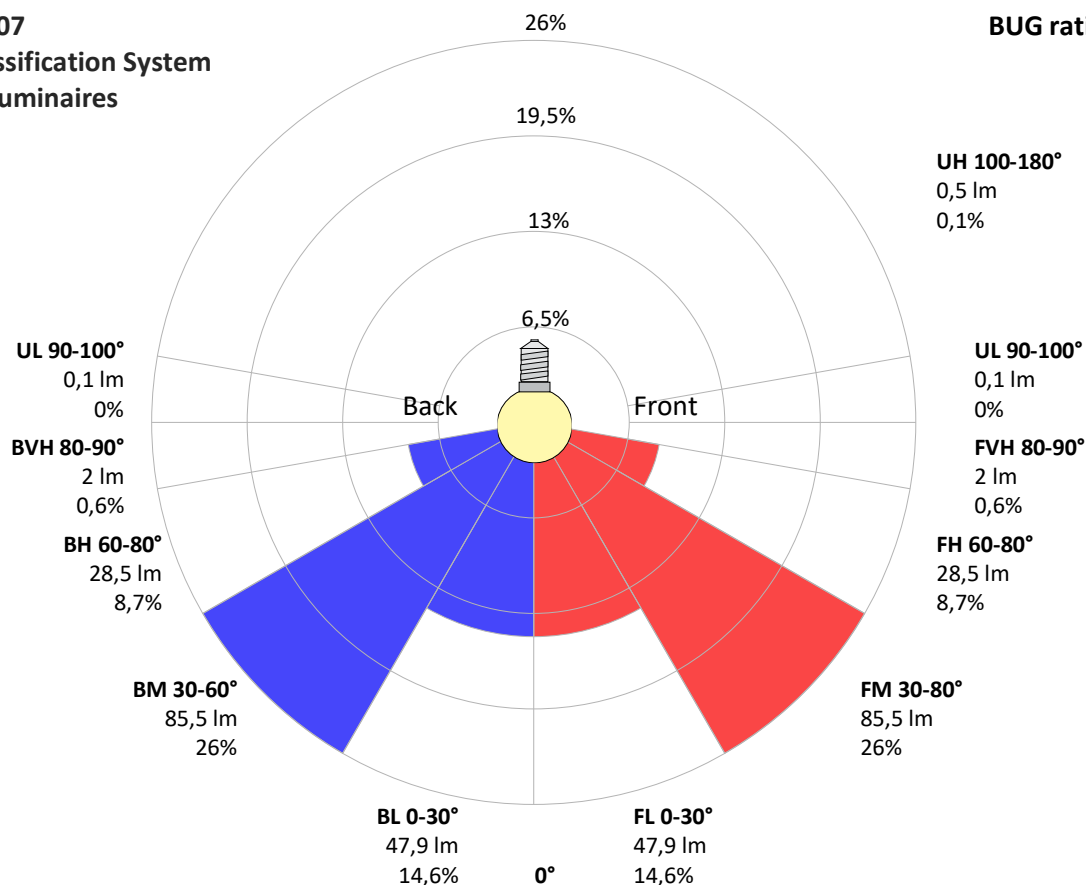
BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	48 lm	14,6%
Medium(30-60°)	85 lm	26,0%
High(60-80°)	28 lm	8,7%
Very high(80-90°)	2 lm	0,6%
Back light		
Low(0-30°)	48 lm	14,6%
Medium(30-60°)	85 lm	26,0%
High(60-80°)	28 lm	8,7%
Very high(80-90°)	2 lm	0,6%
Uplight		
Low(90-100°)	0 lm	0,0%
High(100-180°)	0 lm	0,1%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B0 U0 G0



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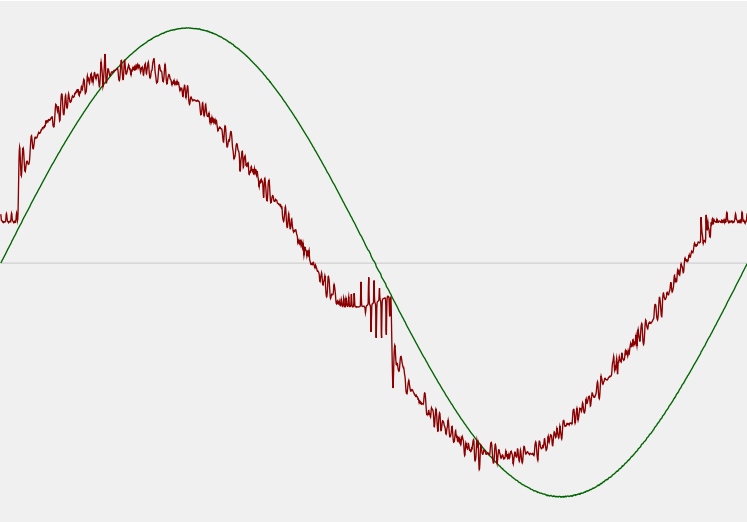


Power Details

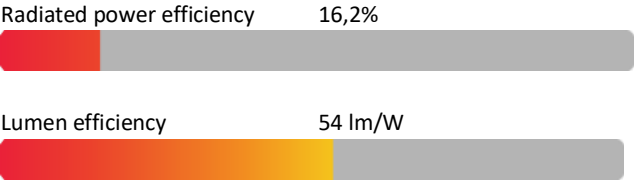
Input Power

Power feed to light source	6,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,030 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	6,85 VA
Displacement factor of AC power feed	0,9
Power factor of AC current feed	0,89
Total harmonic distortion of the current	10,94%
Total harmonic distortion of the voltage	0,06%

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	2998 K
CCT shift	+2 K
CCT end	3000 K

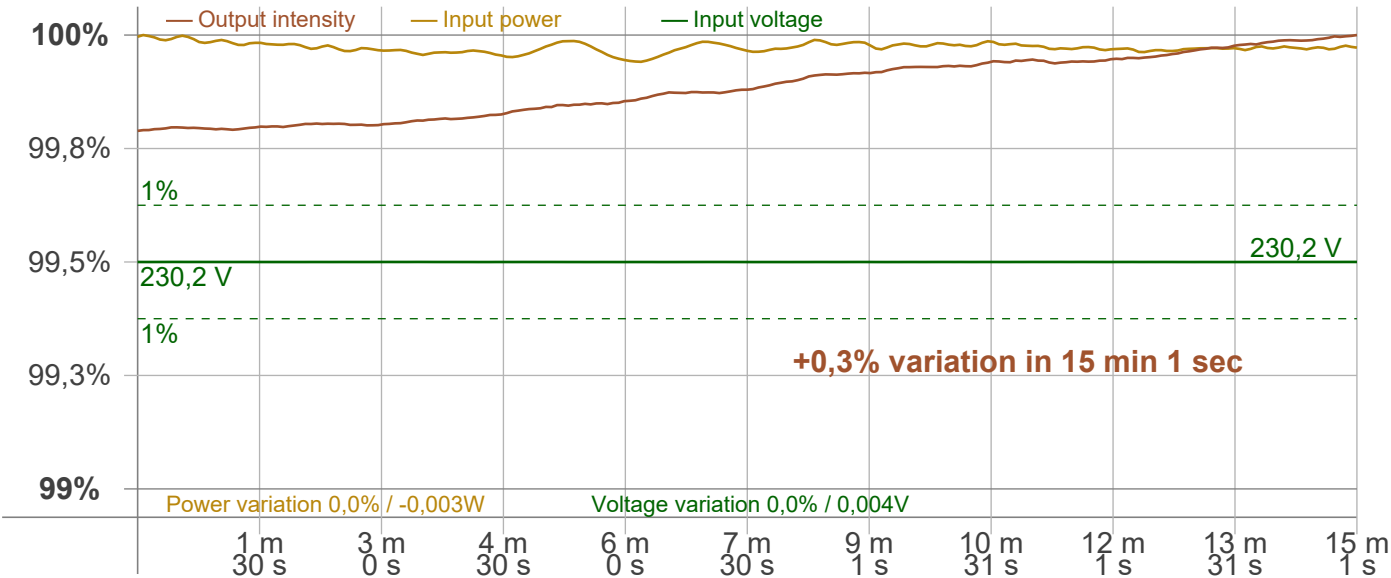
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	+0,3%

Output Change

Output start	328 lm
Output change	+1 lm
Output end	328 lm

Stabilization Curve



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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

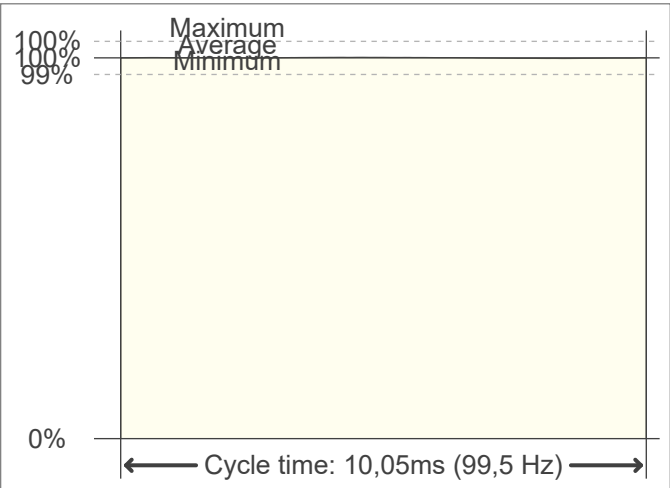
Flicker indices according to Illuminating Engineering Society (IES)
Flicker frequency 99,5 Hz
Percent Flicker 0,2 %
Flicker index 0

Flicker indices according to California Energy Commission (CEC) 2016b
JA8/10 40 Hz 0,06 %
JA8/10 90 Hz 0,06 %
JA8/10 200 Hz 0,17 %
JA8/10 400 Hz 0,2 %
JA8/10 1000 Hz 0,19 %

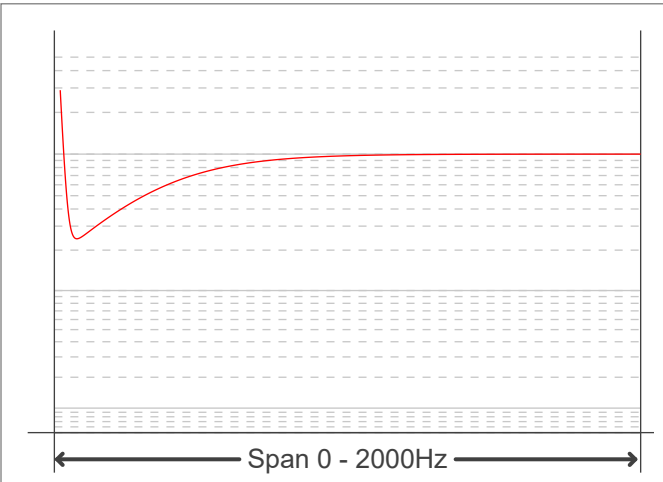
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)
PstLM value (F < 80 Hz) 0,08
SVM value (80 < F < 2000 Hz) 0

Flicker indices according to Lighting Research Center (2015)
Perception metric, Assist Mp 0,04

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

