

Light Measurement Report

Print date: 16-6-2025

Measurement date and time: 13-6-2025 13:13:32 – Measurement no. VFR-250613-1556-MS

Measurement tracking No. and Link: [n/a](#)

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

24 planes – 15°
5°
12,10 m
20,6 W – PF 0,96 – DPF 1,0
230 V – 0,093 A
50 Hz
Lamp stabilized in 15 min 2 sec – 2,0%

Tested Light Source

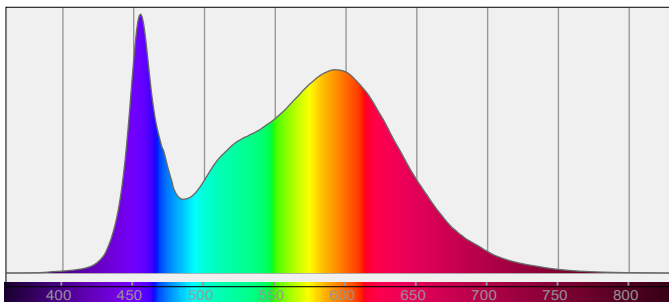
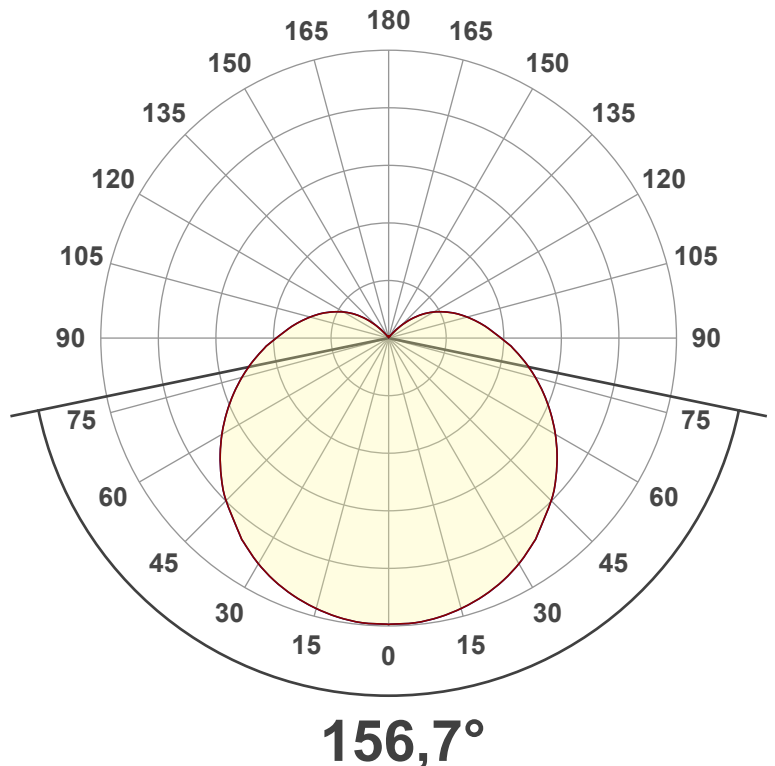
Product Name
Item No. and Manufacturer
Product Description (line 1)

805081-4000K
805081-4000K – Dutchfulfillment
LED T5 BUIS | 145CM | 20W

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

3060 lm – 20,36% / 79,64%
149 lm/W
569 cd – 156,7°
CCT = 4000 K / 4199 K
CRI 83,3
 R_f 82,4 – R_g 93,3
Duv -0,0031 – SDCM 5,1
SVM 3,33 – PstLM 0,13



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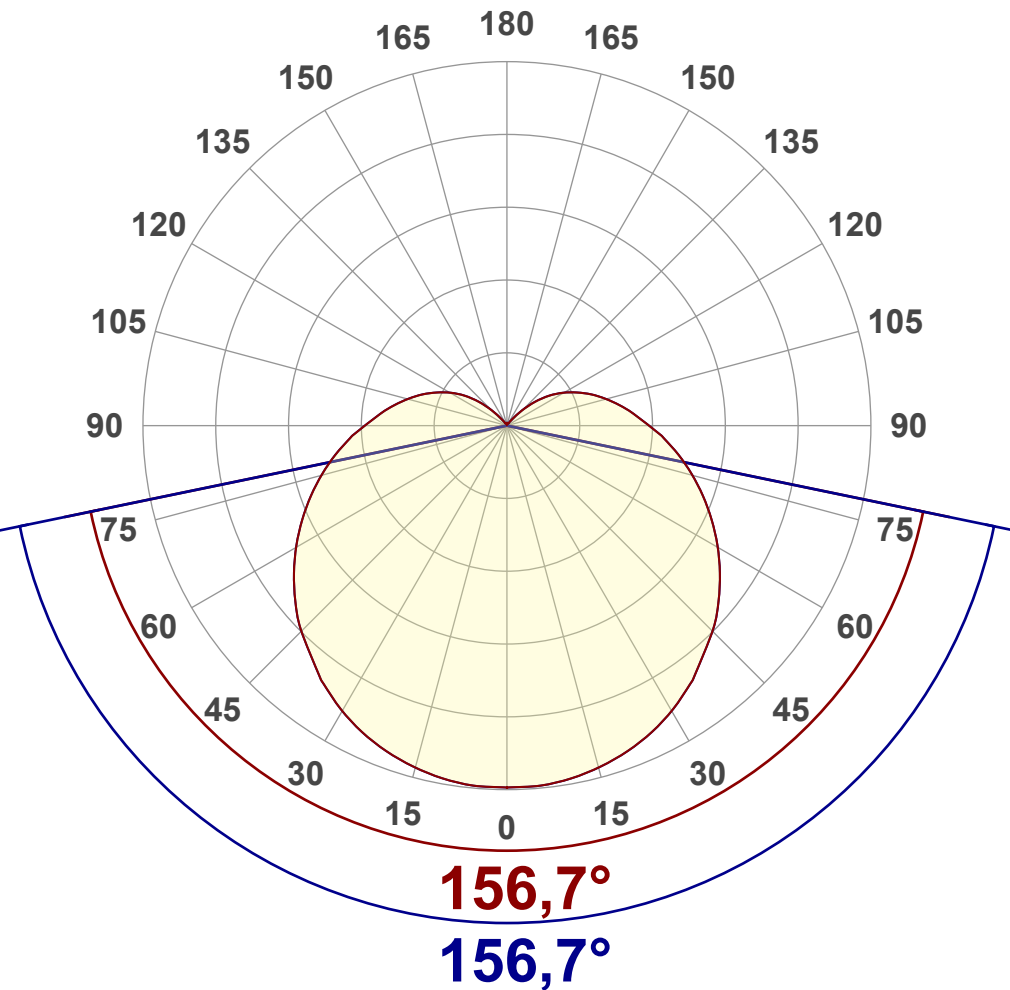
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3060 lm
Lumen Up% / Down%	20,36% / 79,64%
Peak Intensity	569 cd
Beam Angle (50%)	156,7°
Beam Angle (90%)	156,7°
Beam Angle (10%)	156,7°

Cut-off Angle

Average 2,5%	280,4°
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Field Angle

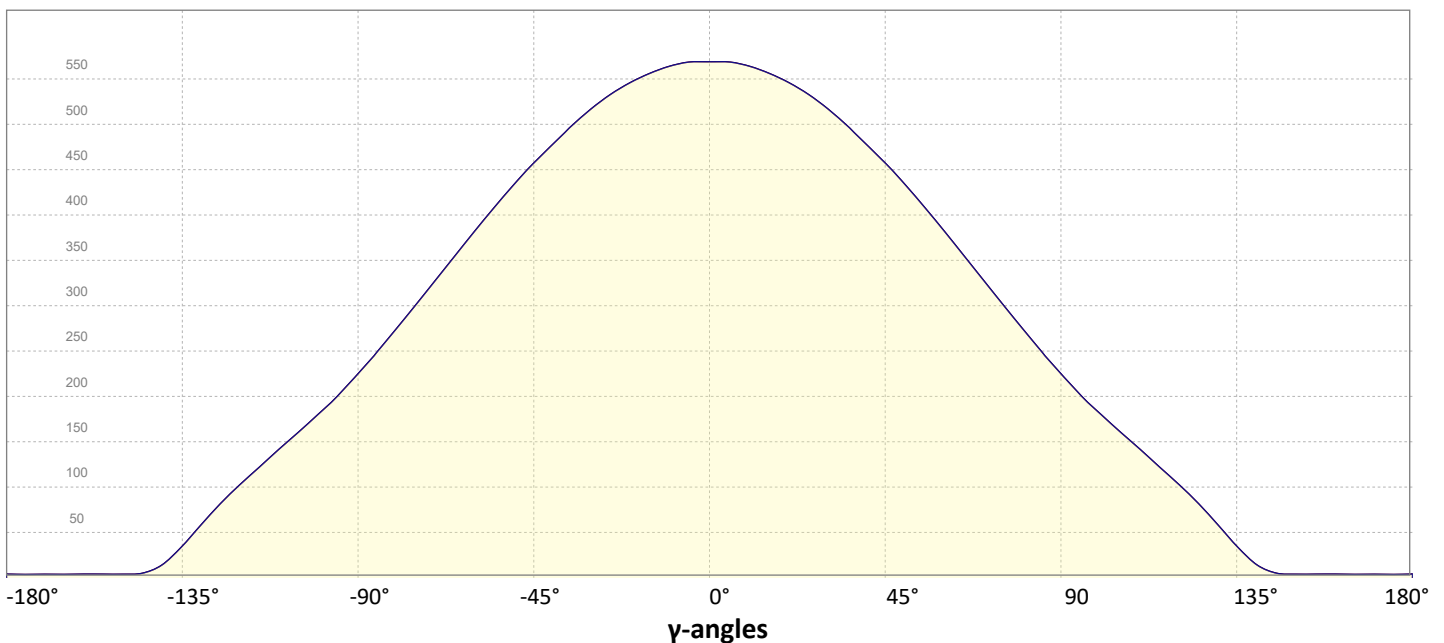
Average 10%	261°
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Intensity Ratio

In 120° cone	48,7%
In 90° cone	30,8%

C000-C180
C090-C270

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



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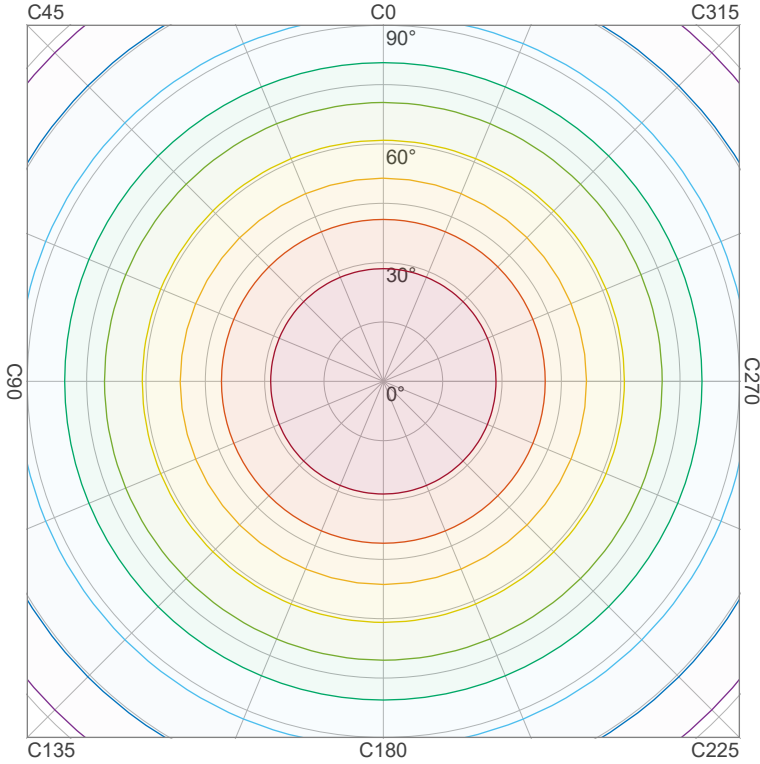
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Operator:



Iso-intensity Diagram (Iso-candela)

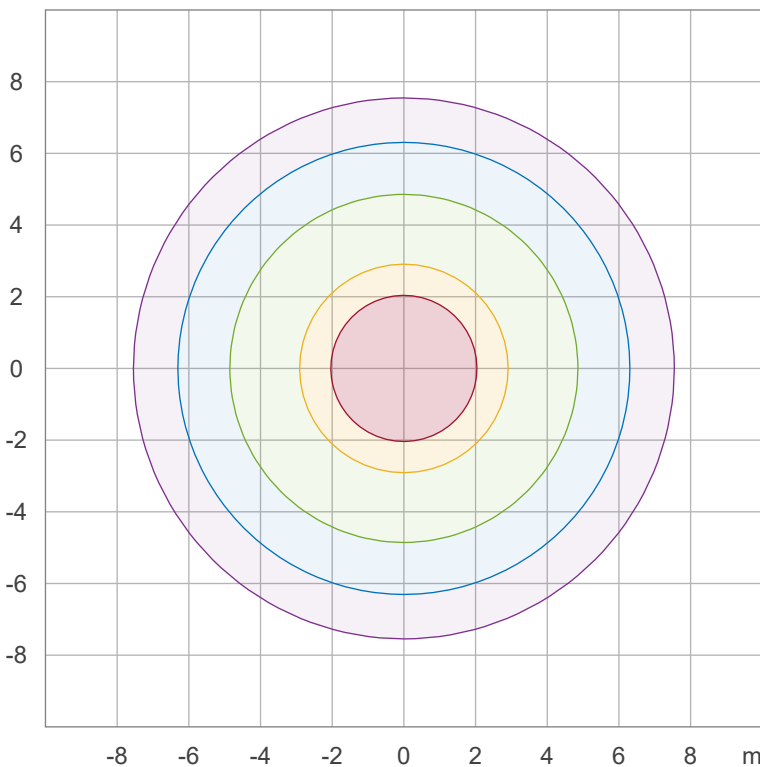


90 %	512,0 cd
80 %	455,1 cd
70 %	398,2 cd
60 %	341,4 cd
50 %	284,5 cd
40 %	227,6 cd
30 %	170,7 cd
20 %	113,8 cd
10 %	56,9 cd

Peak intensity: 568,9 cd

Number of c-planes: 24

Iso-illuminance Diagram (Iso-lux)



50,0 %	31,6 lx
30,0 %	19,0 lx
10,0 %	6,3 lx
5,0 %	3,2 lx
3,0 %	1,9 lx

Peak illuminance: 63,2 lx

Mounting height: 3,0 m

Number of c-planes: 24

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Operator:



Color details

Correlated Color Temperature, Target CCT = 4000 K
 Correlated Color Temperature, Measured CCT = 4199 K
 Color Rendering Index CRI 83,3
 Color Rendering Index, R9 (red component) R9 = 7,6
 Color Rendering TM30-18 R_f 82,4 – R_g 93,3
 Color Quality Scale CQS = 80,6

MacAdam Steps
 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 = -0,0031
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

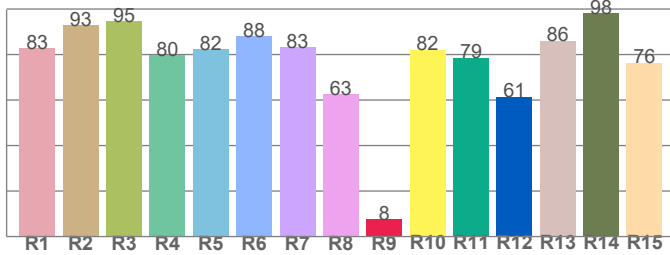
CIE 1931



CIE 1931 – zoomed on Planckian locus



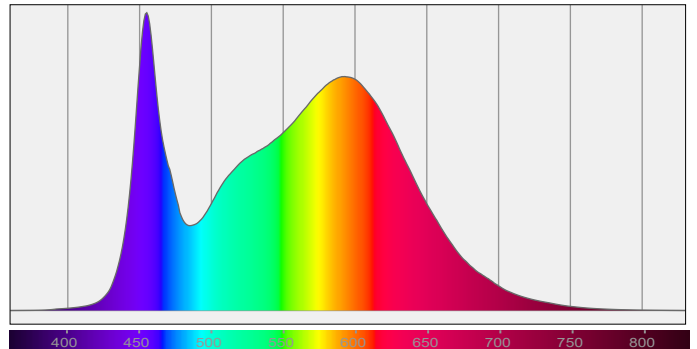
Color Rendering Index per reference color (CIE 1995)



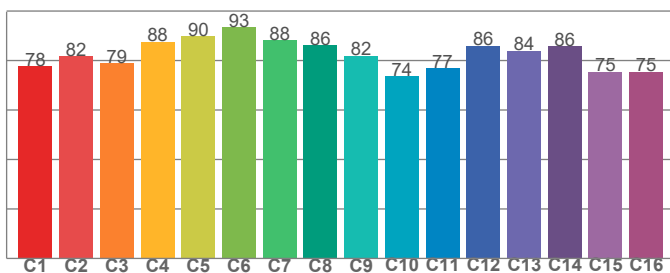
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,7	93,0	94,6	79,7	82,3	88,0	83,1	62,7	7,6	82,0	78,6	61,5	86,1	98,0	76,4

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



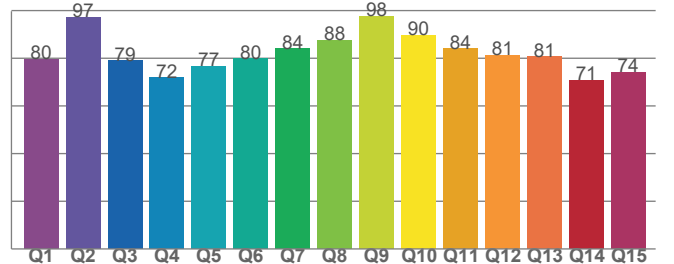
TM30-18 R_f-values per hue bin



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
77,7	81,7	78,8	87,6	89,9	93,4	88,1	86,2	81,9	73,7	76,9	86,0	84,0	85,7	75,4	75,4

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
79,5	97,2	78,9	71,8	76,7	79,8	84,1	87,7	97,6	89,6	83,9	81,3	80,6	70,7	74,2

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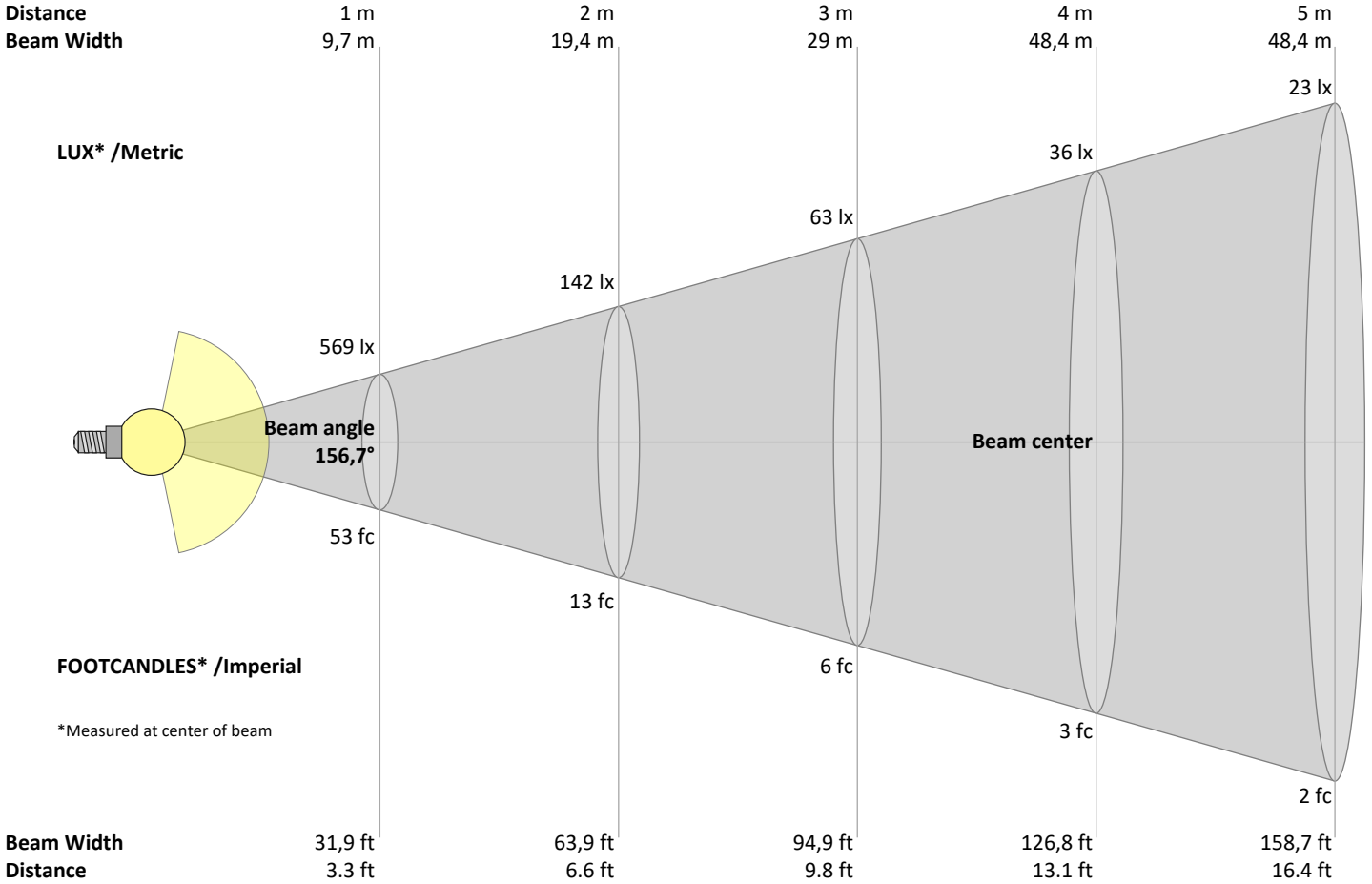
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Beam Details



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
569	142	63	36	23	16	12	9	7	6	5	4	3	3	3	2	2	2	2	1	lux
52,9	13,2	5,9	3,3	2,1	1,5	1,1	0,8	0,7	0,5	0,4	0,4	0,3	0,3	0,2	0,2	0,2	0,2	0,1	0,1	fc

Intensities in 0° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
569	565	551	528	495	457	414	367	318	270	225	185	150	115	78	35	7	4	4	4	cd
100%	99%	97%	93%	87%	80%	73%	64%	56%	48%	40%	33%	26%	20%	14%	6%	1%	1%	1%	1%	of 0°val

Intensities in 90° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
569	565	551	528	495	457	414	367	318	270	225	185	150	115	78	35	7	4	4	4	cd
100%	99%	97%	93%	87%	80%	73%	64%	56%	48%	40%	33%	26%	20%	14%	6%	1%	1%	1%	1%	of 0°val

Intensities in 180° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
569	565	551	528	495	457	414	367	318	270	225	185	150	115	78	35	7	4	4	4	cd
100%	99%	97%	93%	87%	80%	73%	64%	56%	48%	40%	33%	26%	20%	14%	6%	1%	1%	1%	1%	of 0°val

Intensities in 270° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
569	565	551	528	495	457	414	367	318	270	225	185	150	115	78	35	7	4	4	4	cd
100%	99%	97%	93%	87%	80%	73%	64%	56%	48%	40%	33%	26%	20%	14%	6%	1%	1%	1%	1%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	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	19,6	20,8	20,2	21,4	22,1	21,4	22,6	22,0	23,2	23,8
	3H	21,5	22,7	22,2	23,3	23,9	23,9	25,1	24,6	25,7	26,3
	4H	22,5	23,6	23,1	24,2	24,8	25,3	26,4	25,9	27,0	27,7
	6H	23,4	24,4	24,0	25,0	25,8	26,9	27,8	27,4	28,5	29,2
	8H	23,9	24,9	24,5	25,5	26,2	27,7	28,7	28,3	29,3	30,0
	12H	24,3	25,3	24,9	25,9	26,7	28,6	29,7	29,3	30,2	31,0
4H	2H	20,5	21,6	21,1	22,2	22,9	21,8	22,9	22,5	23,5	24,2
	3H	22,6	23,7	23,3	24,2	25,0	24,5	25,6	25,2	26,1	26,9
	4H	23,6	24,8	24,3	25,2	26,1	26,0	27,1	26,7	27,6	28,4
	6H	24,7	25,6	25,4	26,2	26,9	27,6	28,5	28,4	29,1	29,9
	8H	25,2	26,0	26,0	26,7	27,4	28,5	29,3	29,3	30,0	30,7
	12H	25,7	26,4	26,4	27,1	27,9	29,6	30,2	30,3	30,9	31,7
8H	4H	24,2	25,0	24,9	25,7	26,4	26,2	27,0	26,9	27,6	28,4
	6H	25,5	26,1	26,3	26,9	27,7	28,0	28,6	28,8	29,4	30,2
	8H	26,2	26,7	26,9	27,5	28,4	29,0	29,6	29,8	30,4	31,3
	12H	26,8	27,3	27,6	28,1	28,9	30,2	30,7	31,0	31,5	32,3
12H	4H	24,4	25,0	25,1	25,7	26,5	26,2	26,9	27,0	27,6	28,4
	6H	25,7	26,3	26,5	27,1	28,0	28,1	28,6	28,9	29,4	30,4
	8H	26,5	26,9	27,3	27,7	28,6	29,2	29,6	30,0	30,4	31,3

Variations with the observer position for the luminaire spacings, S:

S = 1.0H	0,1 / 0,0	0,1 / -0,1
S = 1.5H	0,1 / -0,1	0,3 / -0,3
S = 2.0H	0,2 / -0,2	0,5 / -0,5

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	114	114	114	114	109	109	109	109	100	100	100	91	91	91	83	83	83	80
1	100	94	88	83	95	90	84	80	81	77	74	74	71	68	67	65	62	58
2	90	80	72	65	85	76	69	62	69	63	58	63	58	53	57	53	49	46
3	81	69	60	52	77	66	57	50	60	53	47	54	48	44	49	44	40	37
4	74	60	51	43	70	58	49	42	52	45	39	48	41	36	43	38	34	31
5	67	53	44	37	64	51	42	35	47	39	33	42	36	31	38	33	29	26
6	62	48	38	31	59	46	37	30	42	34	29	38	32	27	35	29	25	22
7	57	43	34	27	54	41	33	27	38	30	25	35	28	23	32	26	22	19
8	53	39	30	24	50	37	29	23	34	27	22	32	25	21	29	23	19	17
9	49	36	27	21	47	34	26	21	32	25	20	29	23	18	27	21	17	15
10	46	33	25	19	44	31	24	19	29	22	18	27	21	17	25	19	16	14

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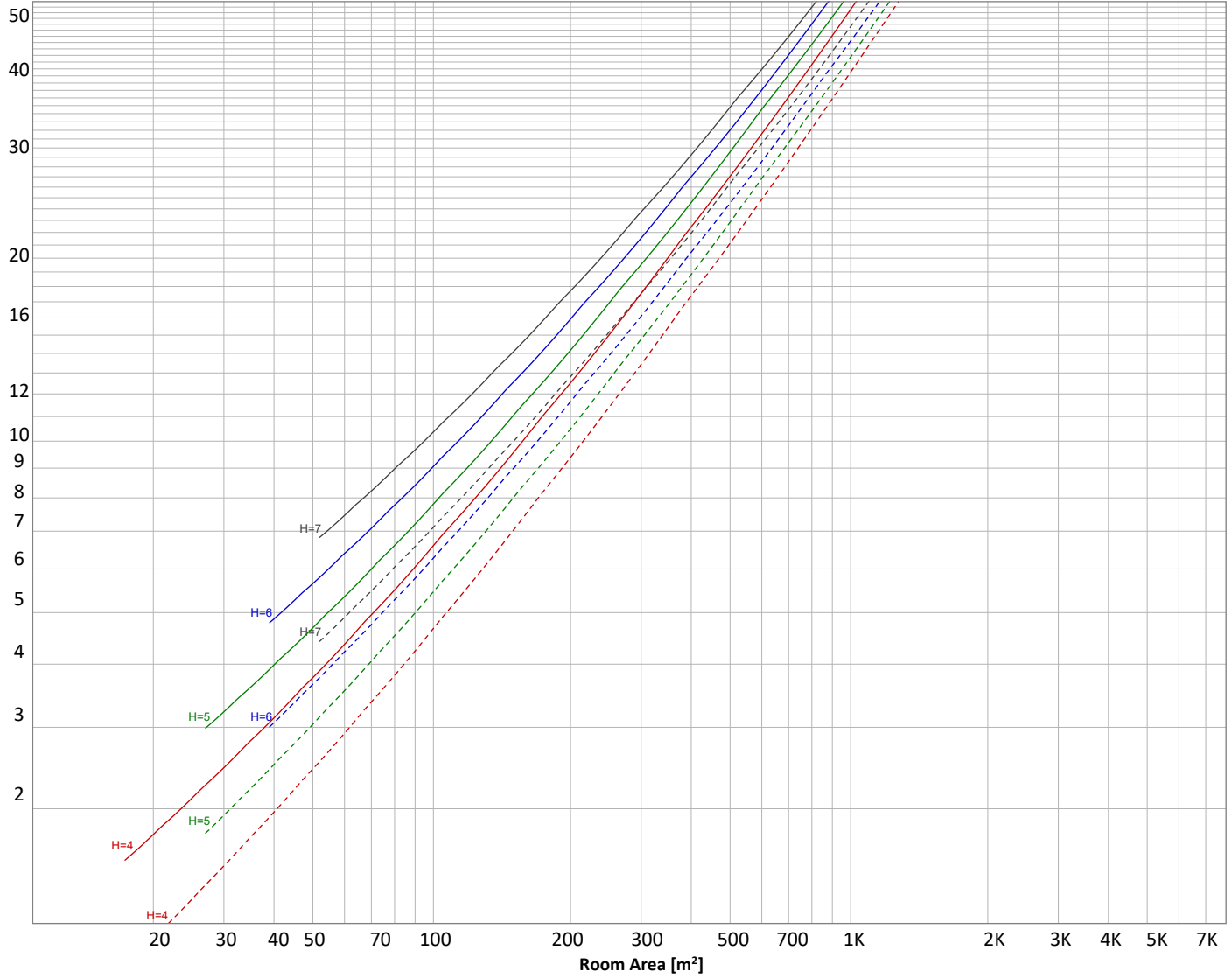
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3060 lm	$\rho(\%)$			
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°
54,1 lm	157 lm	246 lm	314 lm	352 lm	366 lm	353 lm	319 lm	275 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
218 lm	171 lm	122 lm	74,2 lm	28,5 lm	4,70 lm	1,84 lm	1,10 lm	0,364 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	54 lm	1,8%
10-20°	157 lm	5,1%
20-30°	246 lm	8,0%
30-40°	314 lm	10,3%
40-50°	352 lm	11,5%
50-60°	366 lm	12,0%
60-70°	353 lm	11,5%
70-80°	319 lm	10,4%
80-90°	275 lm	9,0%
90-100°	218 lm	7,1%
100-110°	171 lm	5,6%
110-120°	122 lm	4,0%
120-130°	74 lm	2,4%
130-140°	28 lm	0,9%
140-150°	5 lm	0,2%
150-160°	2 lm	0,1%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
Total	3060 lm	100,0%

Intensity peaks

Max intensity	569 cd
Intensity, 90°	225 cd
Intensity, 0°	569 cd

Zonal Lumen summary

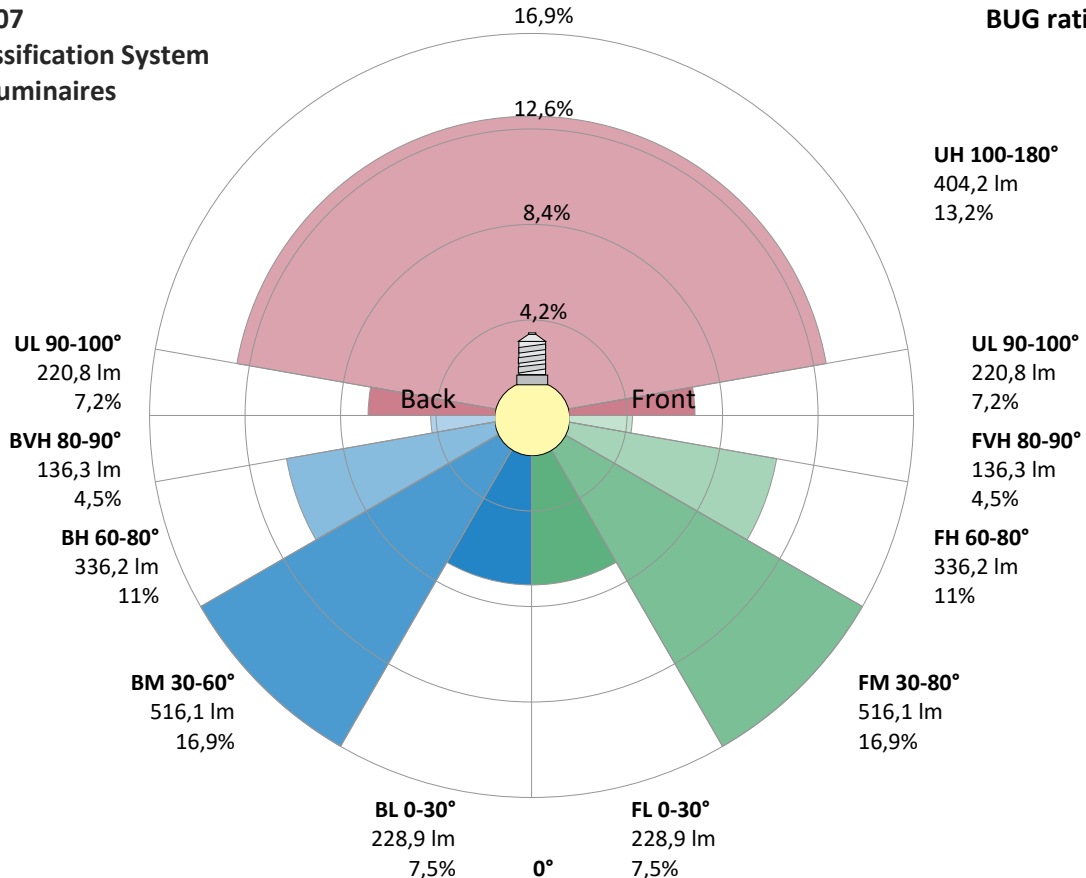
Zone (γ)	Lumen	% Total
0-30°	458 lm	15,0%
0-40°	772 lm	25,2%
0-60°	1490 lm	48,7%
60-90°	947 lm	31,0%
70-100°	813 lm	26,6%
90-120°	512 lm	16,7%
0-90°	2437 lm	79,6%
90-180°	623 lm	20,4%
0-180°	3060 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	229 lm	7,5%
Medium(30-60°)	516 lm	16,9%
High(60-80°)	336 lm	11,0%
Very high(80-90°)	136 lm	4,5%
Back light		
Low(0-30°)	229 lm	7,5%
Medium(30-60°)	516 lm	16,9%
High(60-80°)	336 lm	11,0%
Very high(80-90°)	136 lm	4,5%
Uplight		
Low(90-100°)	221 lm	7,2%
High(100-180°)	404 lm	13,2%

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

BUG rating B1 U3 G2



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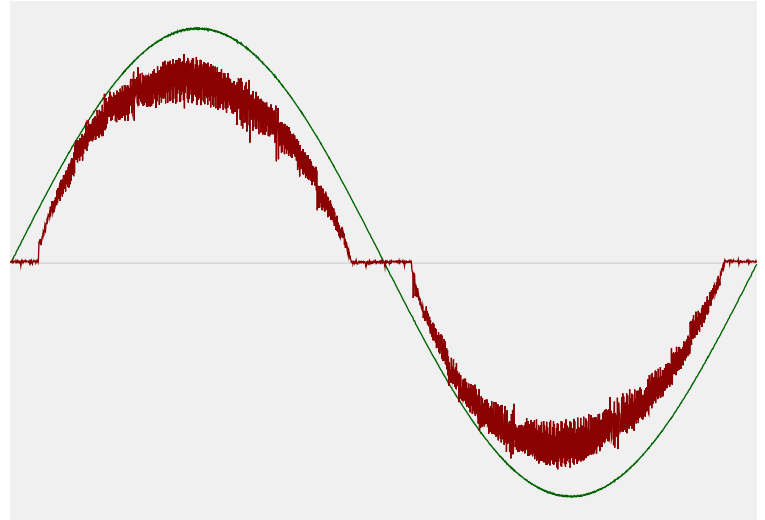


Power Details

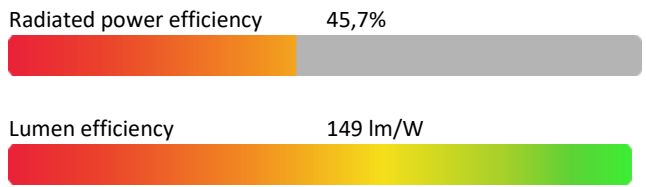
Input Power

Power feed to light source	20,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,093 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	21,39 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,96
Total harmonic distortion of the current	11,68%
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	3986 K
CCT shift	+14 K
CCT end	4000 K

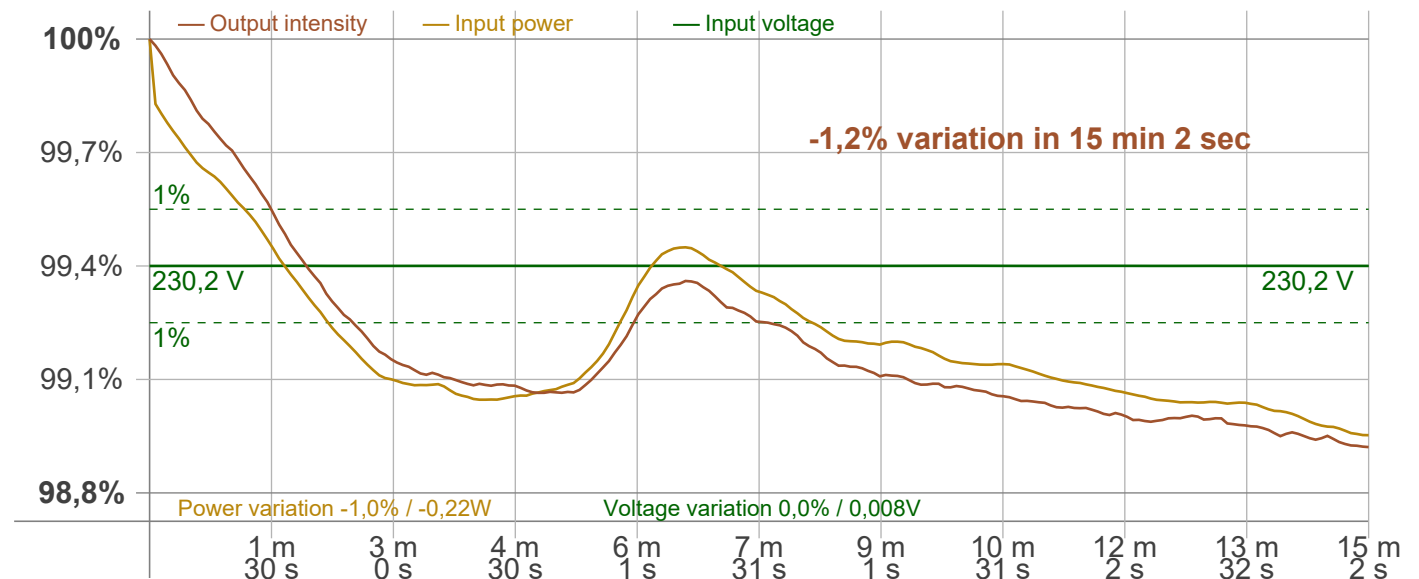
Warmup Result

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

Output Change

Output start	3094 lm
Output change	-34 lm
Output end	3060 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: 100 Hz
 Percent Flicker: 84,84 %
 Flicker index: 0,27

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

JA8/10 40 Hz: 0,26 %
 JA8/10 90 Hz: 0,82 %
 JA8/10 200 Hz: 86,39 %
 JA8/10 400 Hz: 84,87 %
 JA8/10 1000 Hz: 84,8 %

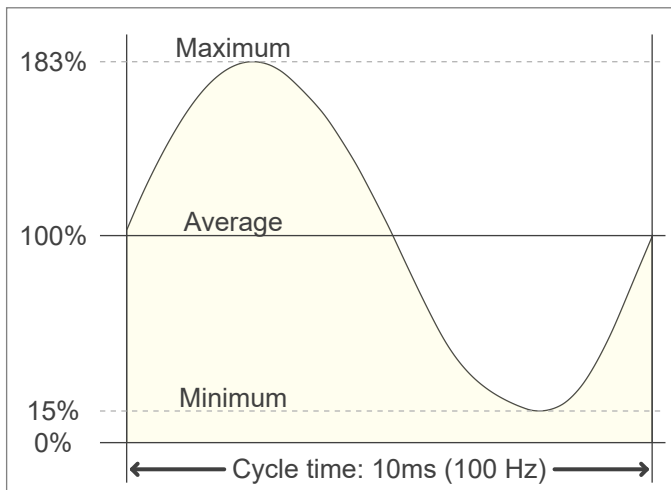
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,13
 SVM value (80 < F < 2000 Hz): 3,33

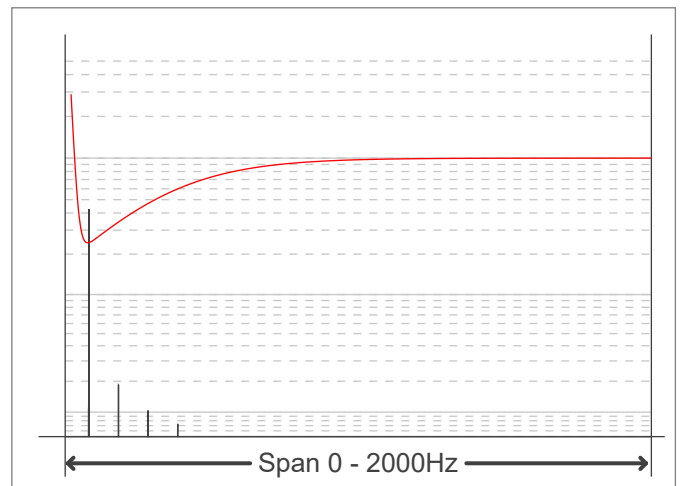
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,07

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

