

Light Measurement Report

Print date: 24-2-2025

Measurement date and time: 21-2-2025 16:44:08 – Measurement no. VFR-250221-0123-MS

Measurement tracking No. and Link: [VT250221-008964](#)

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°
12,10 m
19,3 W – PF 0,91 – DPF 0,93
230 V – 0,092 A
50 Hz
Lamp stabilized in 15 min 0 sec – 2,0%

Tested Light Source

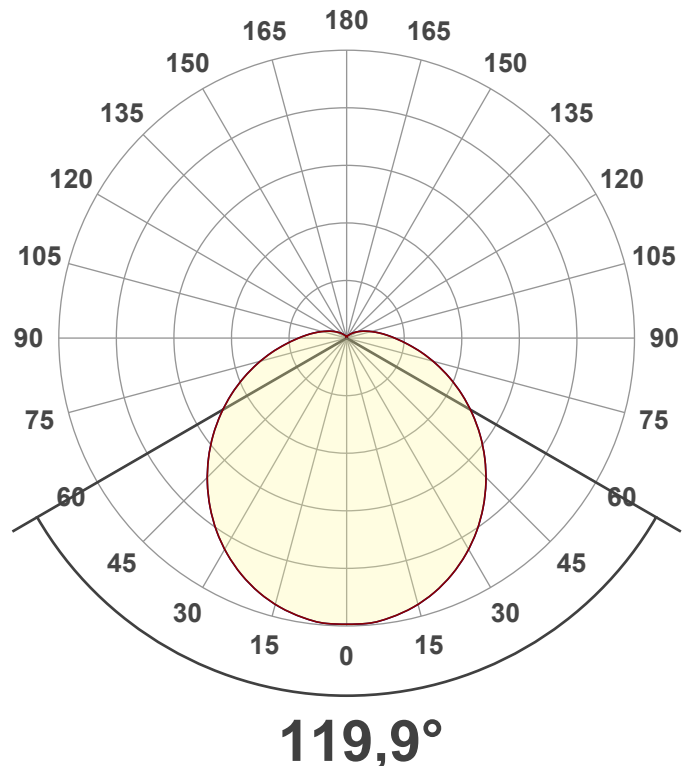
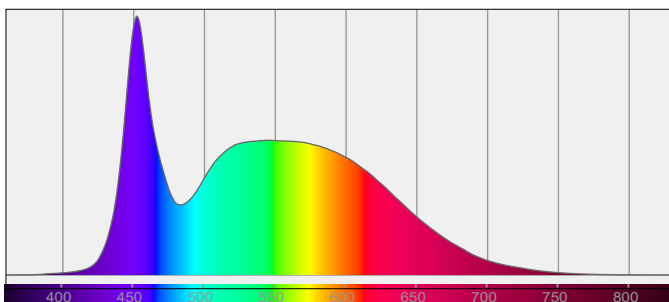
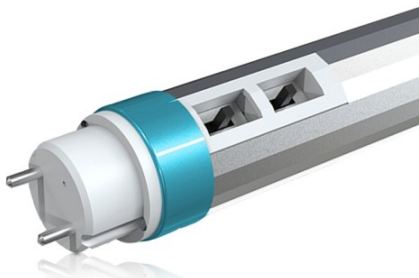
Product Name
Item No. and Manufacturer
Product Description (line 1)

276758-6000K-20W
276758-6000K-20W – Dutchfulfillment
LED TL-BUIS | T8 | 150CM | 18W/20W/25W | CCT-SWITCH

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

2384 lm – 9,91% / 90,09%
124 lm/W
649 cd – 119,9°
CCT = 6000 K / 6163 K
CRI 83,8
 R_f 84,3 – R_g 94,1
Duv 0,0041 – SDCM 10,3
SVM 2,34 – PstLM 0,09



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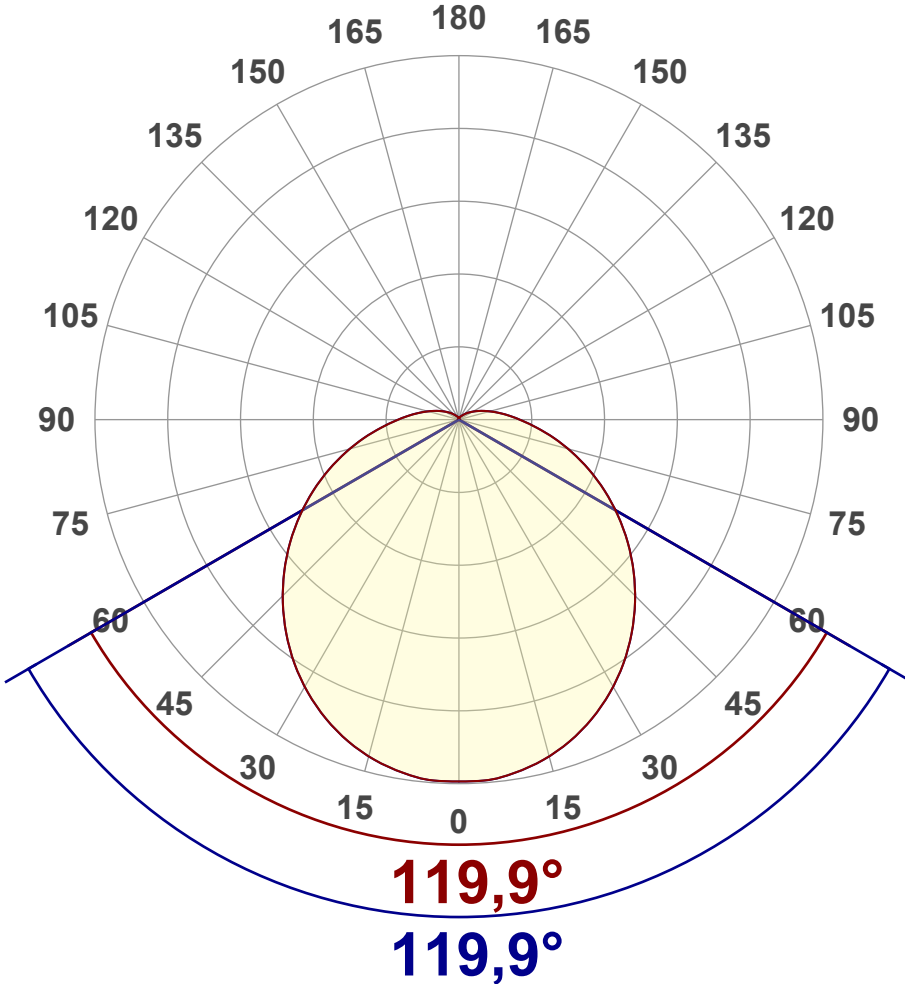
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2384 lm
Lumen Up% / Down%	9,91% / 90,09%
Peak Intensity	649 cd
Beam Angle (50%)	119,9°
Beam Angle (90%)	119,9°
Beam Angle (10%)	119,9°

Cut-off Angle

Average 2,5%	263,3°
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Field Angle

Average 10%	204,5°
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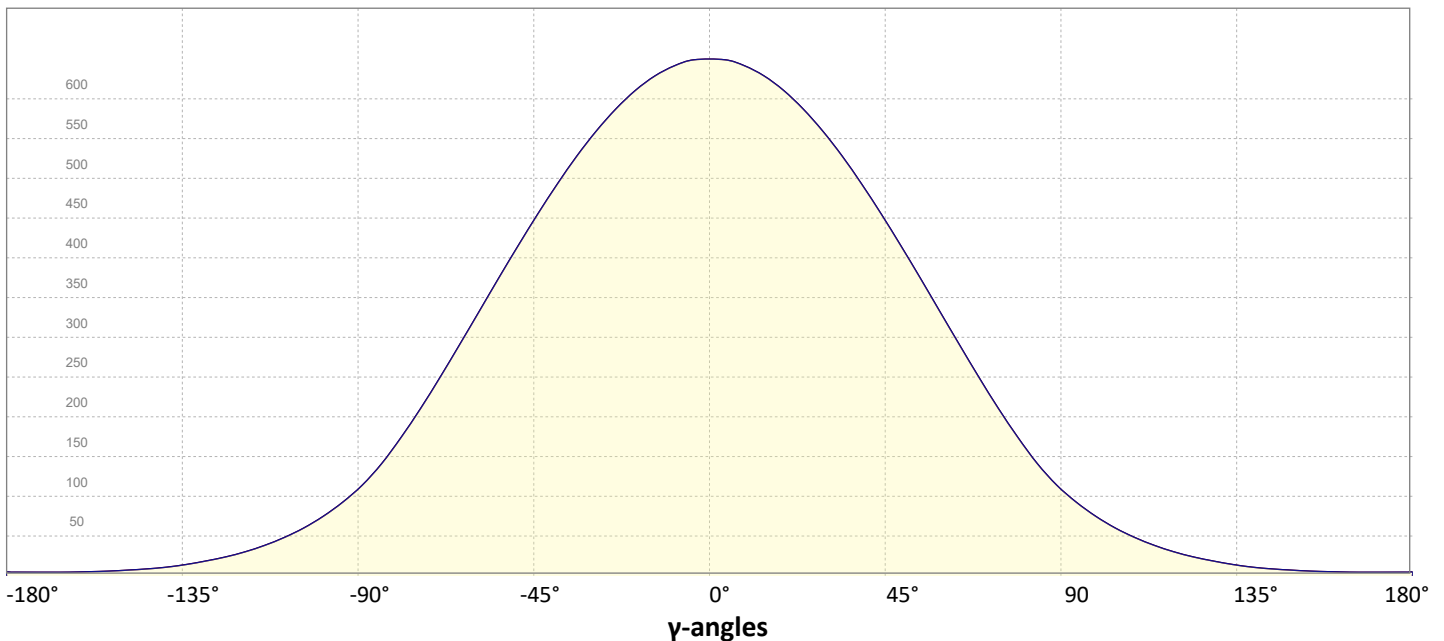
Intensity Ratio

In 120° cone	63,1%
In 90° cone	42,1%

C000-C180

C090-C270

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



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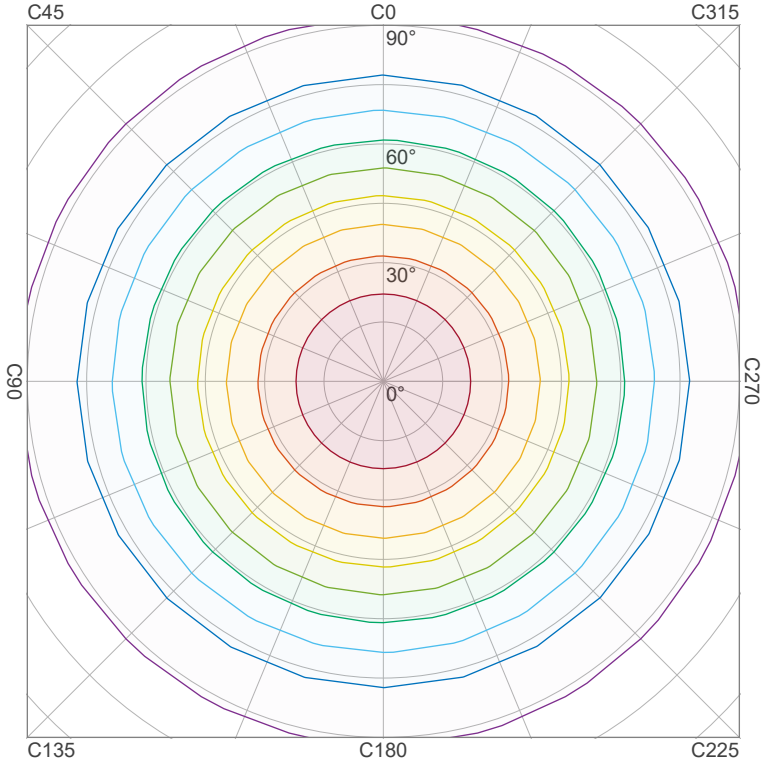
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Iso-intensity Diagram (Iso-candela)

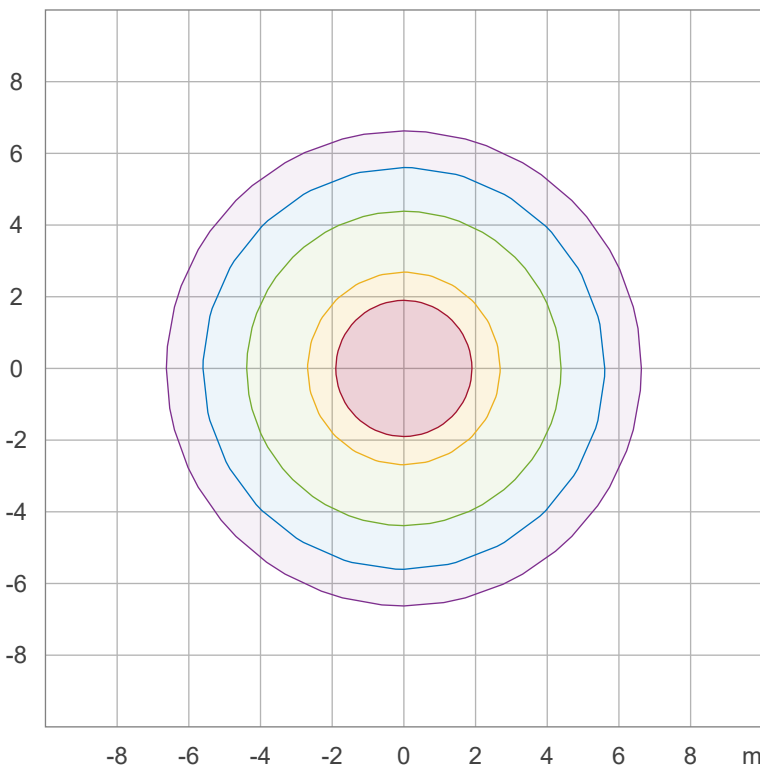


90 %	584,2 cd
80 %	519,3 cd
70 %	454,4 cd
60 %	389,5 cd
50 %	324,5 cd
40 %	259,6 cd
30 %	194,7 cd
20 %	129,8 cd
10 %	64,9 cd

Peak intensity: 649,1 cd

Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	36,1 lx
30,0 %	21,6 lx
10,0 %	7,2 lx
5,0 %	3,6 lx
3,0 %	2,2 lx

Peak illuminance: 72,1 lx

Mounting height: 3,0 m

Number of c-planes: 12

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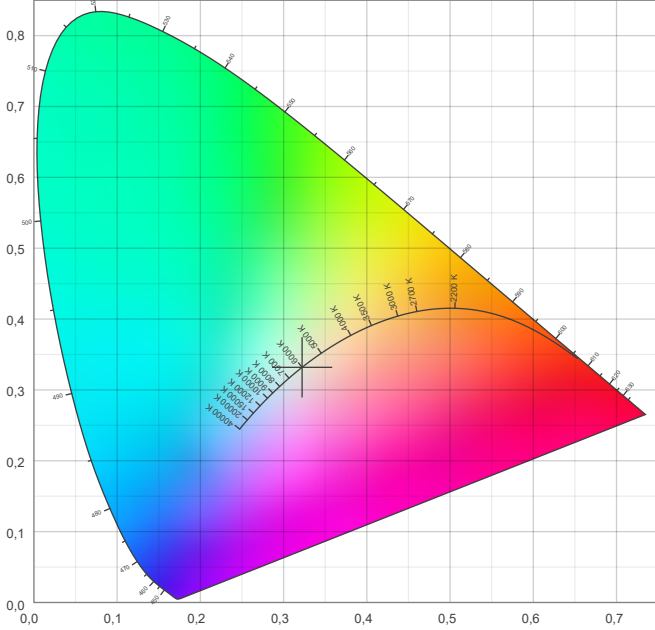


Color details

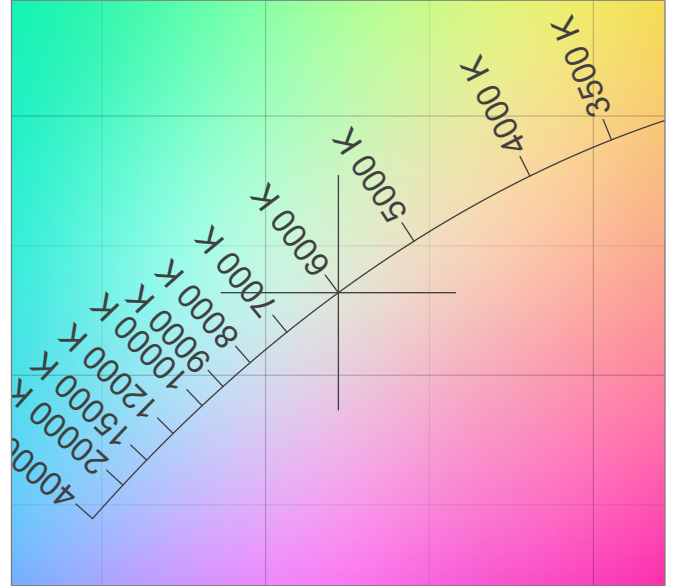
Correlated Color Temperature, Target CCT = 6000 K
 Correlated Color Temperature, Measured CCT = 6163 K
 Color Rendering Index CRI 83,8
 Color Rendering Index, R9 (red component) R9 = 11,5
 Color Rendering TM30-18 R_f 84,3 – R_g 94,1
 Color Quality Scale CQS = 82,7

MacAdam Steps
 Color coordinates CIE 1931 (x;y) = (0,322;0,332)
 Color coordinate CIEs 1960 (u;v) = (0,203;0,314)
 Color deviation from BBL Duv = 0,0041
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,203;0,471)

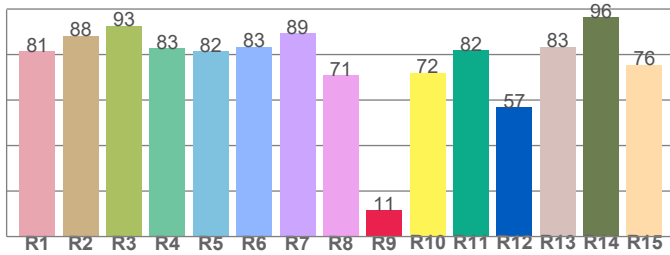
CIE 1931



CIE 1931 – zoomed on Planckian locus



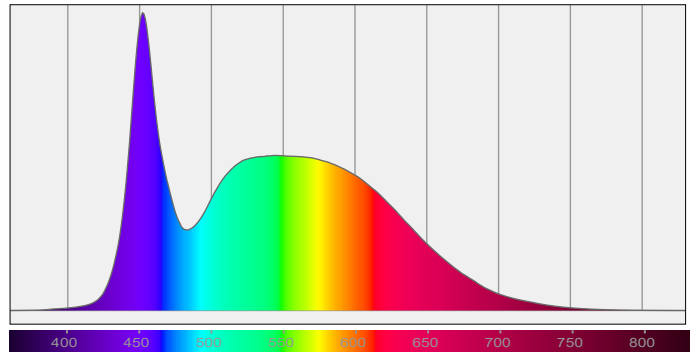
Color Rendering Index per reference color (CIE 1995)



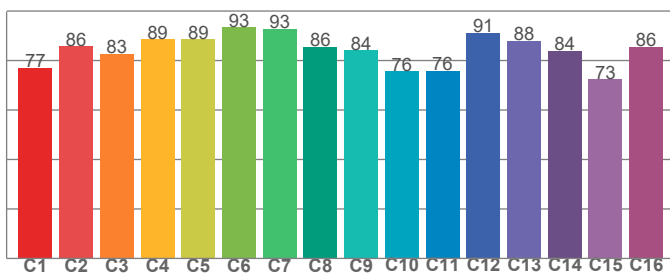
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,3	88,3	92,7	82,7	81,6	83,4	89,4	70,9	11,5	72,0	81,8	57,0	83,4	96,3	75,5

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



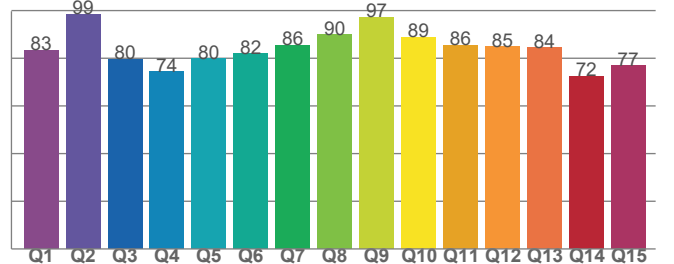
TM30-18 R_f-values per hue bin



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
77,1	85,8	82,7	88,5	88,5	93,4	92,9	85,6	84,2	75,7	75,9	91,3	87,9	83,9	72,5	85,5

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
83,3	98,6	79,6	74,4	79,7	81,9	85,6	89,9	97,2	88,8	85,6	84,9	84,4	72,5	77,0

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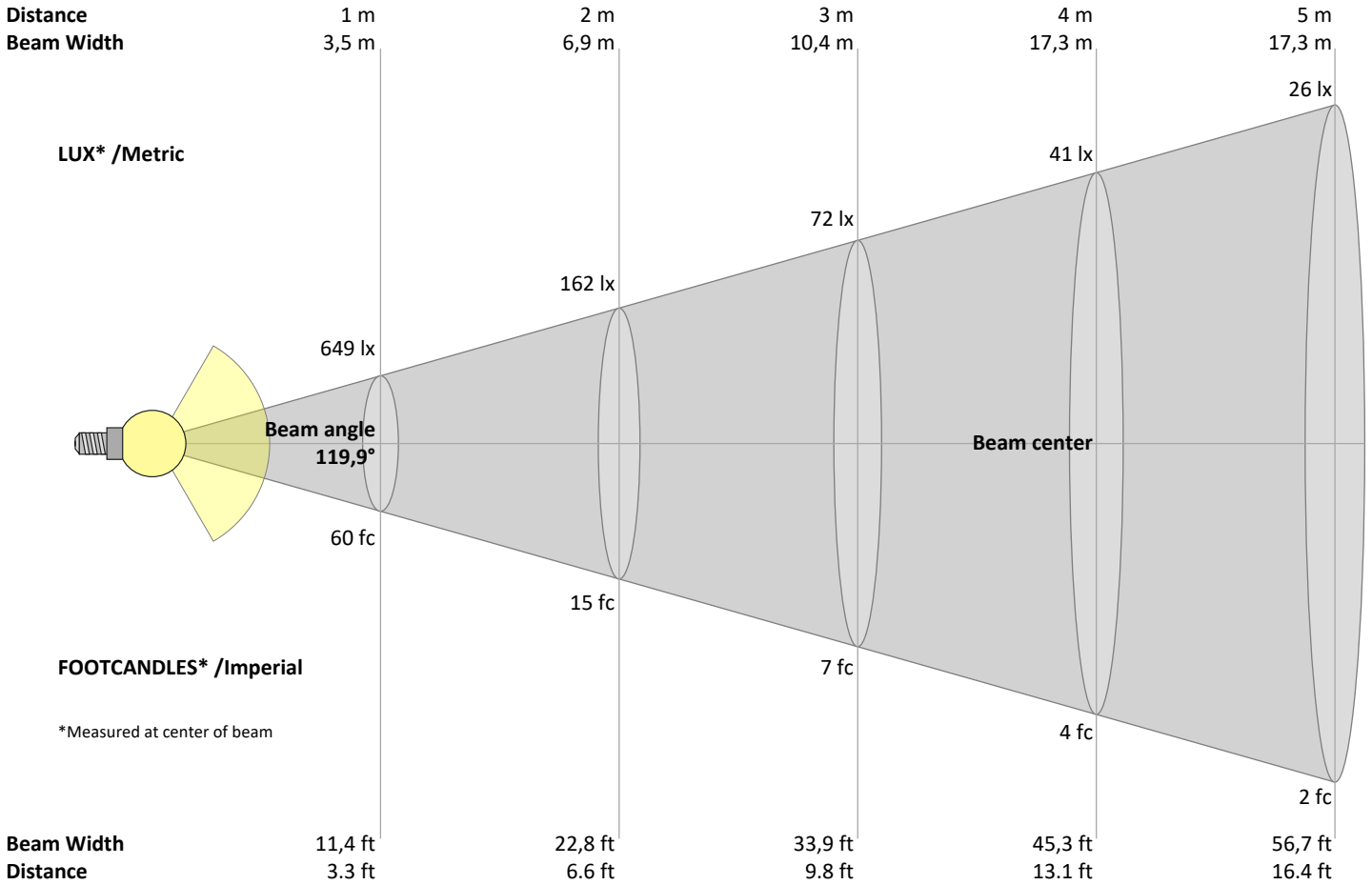
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Operator:



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
649	162	72	41	26	18	13	10	8	6	5	5	4	3	3	3	2	2	2	2	lux
60,3	15,1	6,7	3,8	2,4	1,7	1,2	0,9	0,7	0,6	0,5	0,4	0,4	0,3	0,3	0,2	0,2	0,2	0,2	0,2	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
649	641	614	570	514	447	374	299	226	161	109	75	50	33	22	13	9	6	5	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	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
649	641	614	570	514	447	374	299	226	161	109	75	50	33	22	13	9	6	5	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	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
649	641	614	570	514	447	374	299	226	161	109	75	50	33	22	13	9	6	5	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	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
649	641	614	570	514	447	374	299	226	161	109	75	50	33	22	13	9	6	5	4	cd
100%	99%	95%	88%	79%	69%	58%	46%	35%	25%	17%	11%	8%	5%	3%	2%	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	21,2	22,4	21,6	22,9	23,3	20,3	21,5	20,7	21,9	22,4
	3H	23,1	24,4	23,7	24,8	25,2	21,9	23,1	22,4	23,6	24,0
	4H	24,2	25,4	24,7	25,8	26,3	22,7	23,8	23,2	24,3	24,7
	6H	25,3	26,4	25,8	26,8	27,4	23,4	24,5	23,9	24,9	25,5
	8H	25,9	26,9	26,4	27,4	28,0	23,8	24,8	24,2	25,3	25,8
	12H	26,5	27,6	27,0	28,0	28,6	24,1	25,1	24,6	25,5	26,2
4H	2H	21,7	22,9	22,2	23,3	23,8	21,0	22,2	21,5	22,6	23,1
	3H	23,9	25,0	24,4	25,4	26,0	22,9	23,9	23,4	24,4	25,0
	4H	25,0	26,1	25,6	26,5	27,2	23,7	24,8	24,3	25,2	25,9
	6H	26,3	27,2	26,9	27,7	28,2	24,6	25,5	25,2	26,0	26,6
	8H	26,9	27,7	27,6	28,3	28,8	25,0	25,8	25,6	26,3	26,9
	12H	27,7	28,3	28,3	28,9	29,6	25,4	26,1	26,0	26,6	27,3
8H	4H	25,3	26,1	25,9	26,7	27,2	24,2	25,0	24,8	25,5	26,1
	6H	26,8	27,4	27,4	28,0	28,7	25,3	25,9	25,9	26,5	27,2
	8H	27,5	28,1	28,2	28,8	29,6	25,8	26,4	26,5	27,0	27,8
	12H	28,4	28,9	29,1	29,6	30,3	26,3	26,8	27,0	27,5	28,2
12H	4H	25,3	26,0	26,0	26,6	27,2	24,3	25,0	24,9	25,5	26,2
	6H	26,8	27,4	27,5	28,1	28,8	25,5	26,0	26,1	26,7	27,5
	8H	27,7	28,2	28,4	28,8	29,6	26,1	26,5	26,8	27,2	27,9

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	0,1 / -0,1
S = 2.0H	0,3 / -0,3	0,2 / -0,3

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	117	117	117	117	113	113	113	113	106	106	106	99	99	99	93	93	93	90
1	104	99	93	89	100	95	91	86	89	85	82	83	80	78	78	76	74	71
2	94	85	77	71	90	82	75	69	77	71	66	72	67	63	67	64	60	57
3	85	74	65	58	82	71	63	57	67	60	54	63	57	52	59	54	50	47
4	78	65	56	49	75	63	54	48	59	52	46	56	49	44	52	47	43	40
5	71	58	48	42	68	56	47	41	53	45	39	50	43	38	47	41	37	34
6	66	52	43	36	63	50	42	35	48	40	34	45	38	33	42	37	32	30
7	61	47	38	32	59	46	37	31	43	36	30	41	34	29	39	33	28	26
8	57	43	34	28	54	42	33	28	39	32	27	37	31	26	36	30	25	23
9	53	39	31	25	51	38	30	25	36	29	24	35	28	24	33	27	23	21
10	50	36	28	23	48	35	28	22	34	27	22	32	26	21	30	25	21	19

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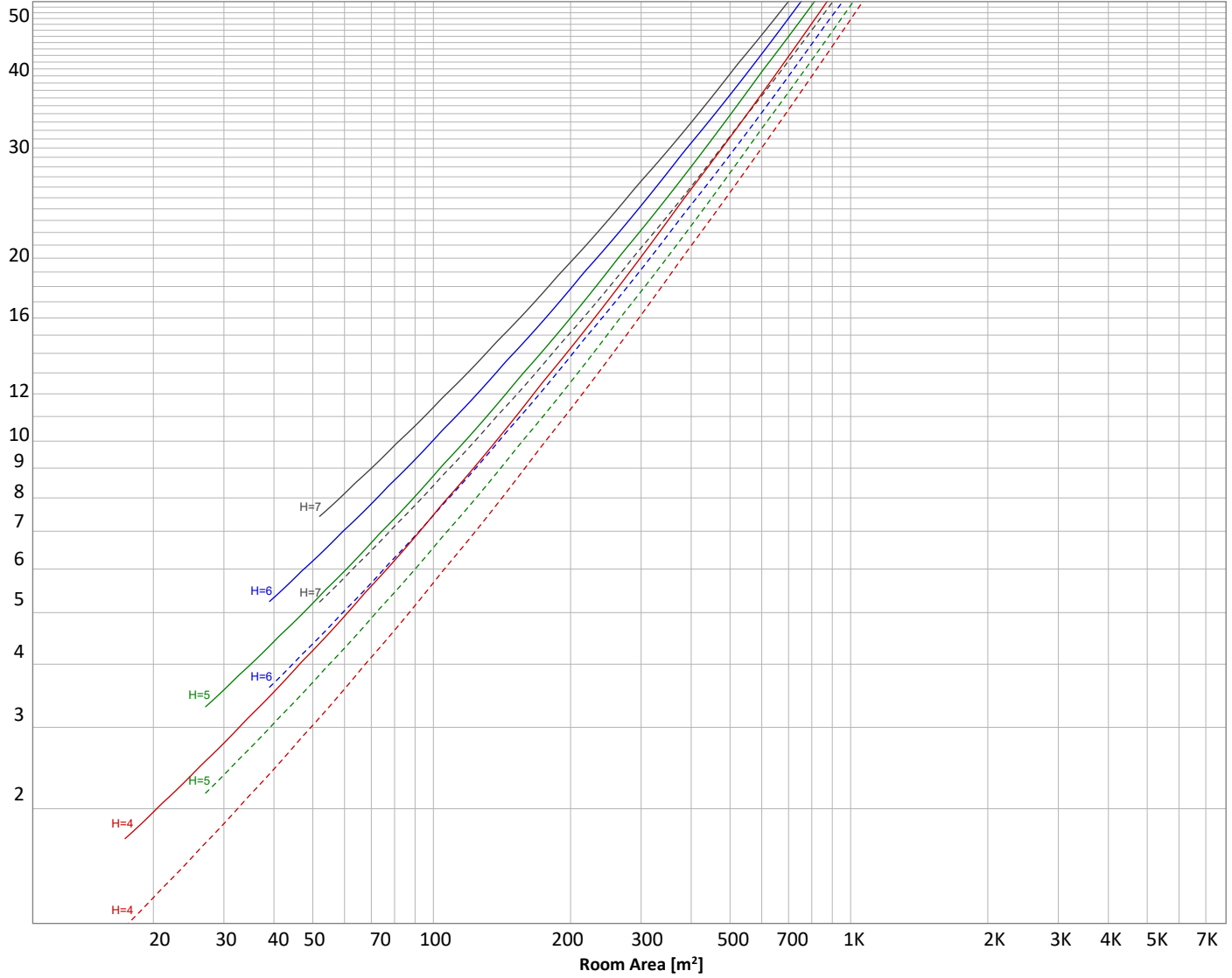
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2384 lm				
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) 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°
61,5 lm	176 lm	268 lm	326 lm	345 lm	327 lm	280 lm	215 lm	149 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
97,4 lm	61,3 lm	36,6 lm	20,5 lm	10,7 lm	5,33 lm	2,69 lm	1,31 lm	0,427 lm

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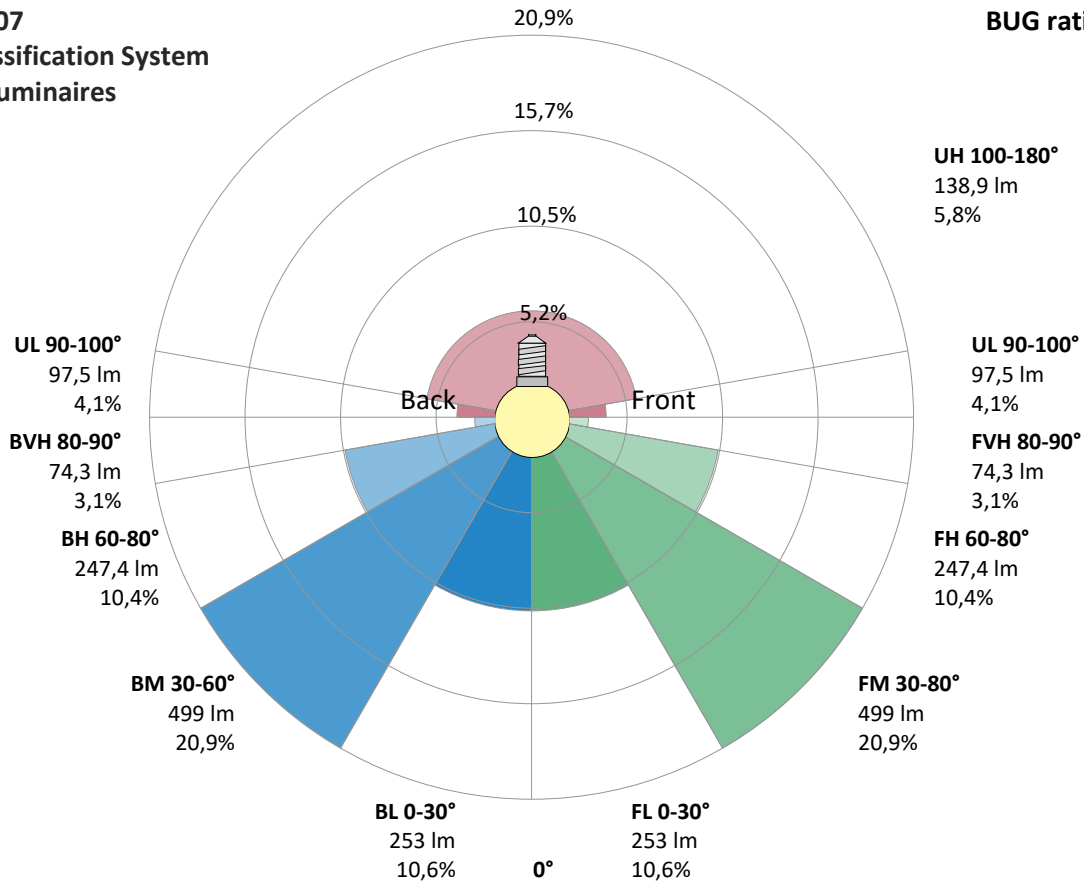
Operator:



Outdoor Light Planning			Zonal Lumen summary		
Zone (y)	Lumen	% Total	Zone (y)	Lumen	% Total
0-10°	62 lm	2,6%	0-30°	506 lm	21,2%
10-20°	176 lm	7,4%	0-40°	832 lm	34,9%
20-30°	268 lm	11,2%	0-60°	1504 lm	63,1%
30-40°	326 lm	13,7%	60-90°	643 lm	27,0%
40-50°	345 lm	14,5%	70-100°	461 lm	19,3%
50-60°	327 lm	13,7%	90-120°	195 lm	8,2%
60-70°	280 lm	11,7%	0-90°	2148 lm	90,1%
70-80°	215 lm	9,0%	90-180°	236 lm	9,9%
80-90°	149 lm	6,2%	0-180°	2384 lm	100,0%
90-100°	97 lm	4,1%	BUG rating		
100-110°	61 lm	2,6%	Lumen % Total		
110-120°	37 lm	1,5%	Forward light		
120-130°	21 lm	0,9%	Low(0-30°)	253 lm	10,6%
130-140°	11 lm	0,4%	Medium(30-60°)	499 lm	20,9%
140-150°	5 lm	0,2%	High(60-80°)	247 lm	10,4%
150-160°	3 lm	0,1%	Very high(80-90°)	74 lm	3,1%
160-170°	1 lm	0,1%	Back light		
170-180°	0 lm	0,0%	Low(0-30°)	253 lm	10,6%
Total	2384 lm	100,0%	Medium(30-60°)	499 lm	20,9%
Intensity peaks			High(60-80°)	247 lm	10,4%
Max intensity	649 cd		Very high(80-90°)	74 lm	3,1%
Intensity, 90°	109 cd		Uplight		
Intensity, 0°	649 cd		Low(90-100°)	97 lm	4,1%
			High(100-180°)	139 lm	5,8%

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

BUG rating B1 U3 G1



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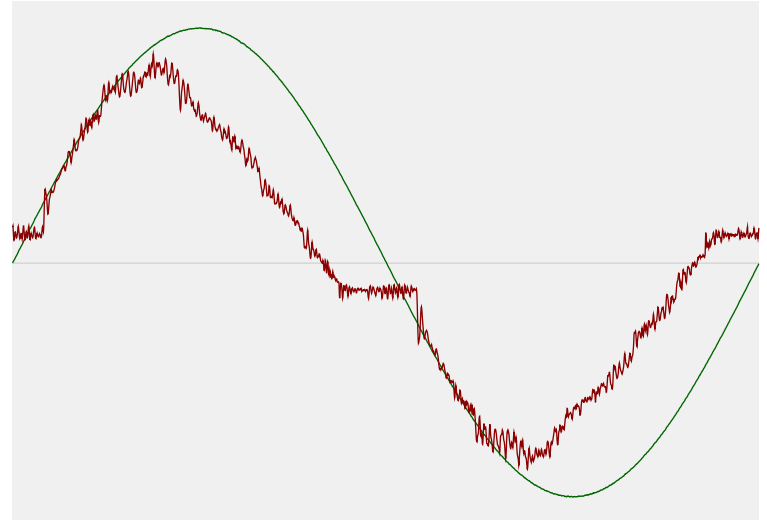


Power Details

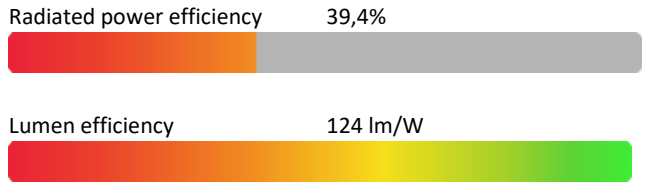
Input Power

Power feed to light source	19,3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,092 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	21,27 VA
Displacement factor of AC power feed	0,93
Power factor of AC current feed	0,91
Total harmonic distortion of the current	21,19%
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	5990 K
CCT shift	+10 K
CCT end	6000 K

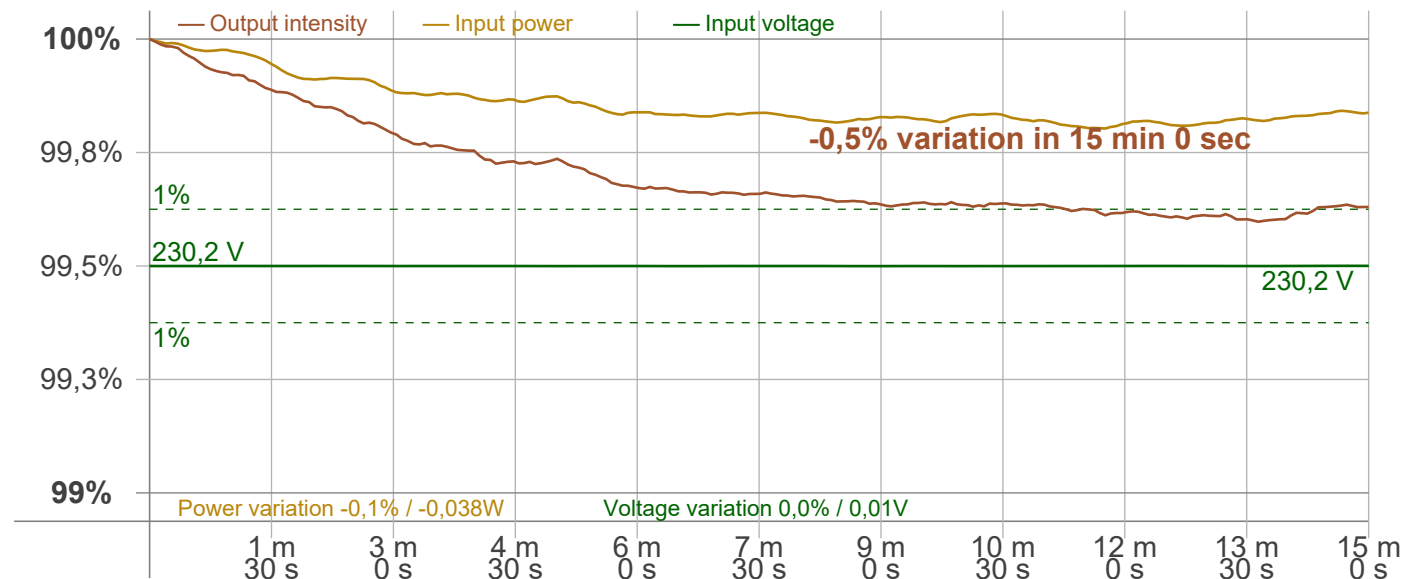
Warmup Result

Total warmup time	Lamp stabilized in 15 min 0 sec
Warmup variation	-0,5%

Output Change

Output start	2393 lm
Output change	-9 lm
Output end	2384 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: 59,76 %
 Flicker index: 0,19

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

JA8/10 40 Hz: 0,13 %
 JA8/10 90 Hz: 0,36 %
 JA8/10 200 Hz: 60,11 %
 JA8/10 400 Hz: 59,63 %
 JA8/10 1000 Hz: 59,78 %

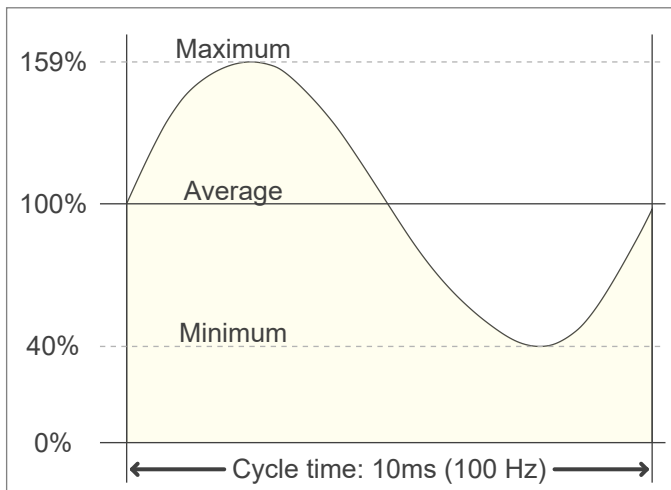
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,09
 SVM value (80 < F < 2000 Hz): 2,34

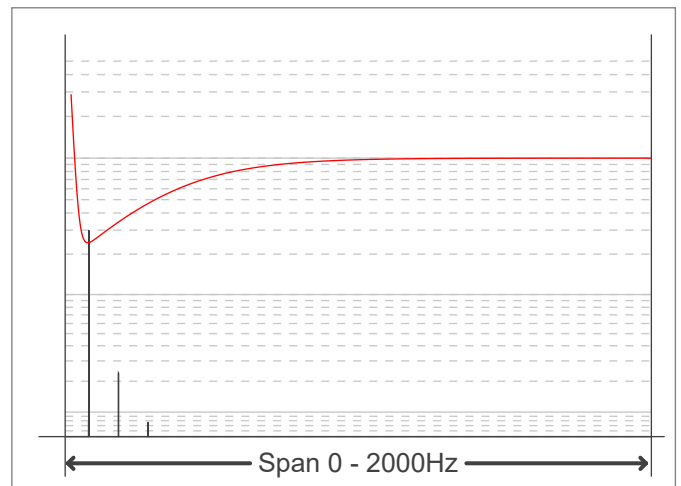
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,06

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

