Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 09:22:35 – Measurement no. VFR-250424-0892-MS
Measurement tracking No. and Link: VT250424-001220
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

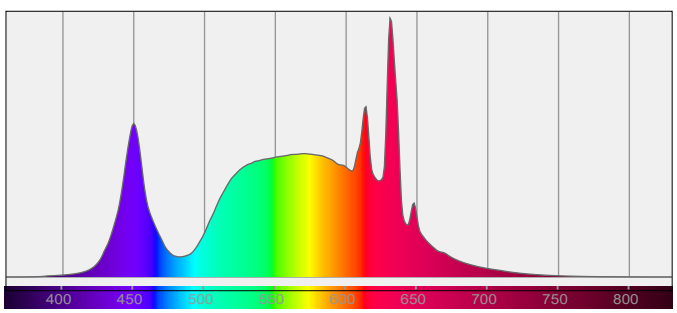
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,10 m
Input Power, Power and Displ. Factors	74,4 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,335 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 2 sec – 2,0%

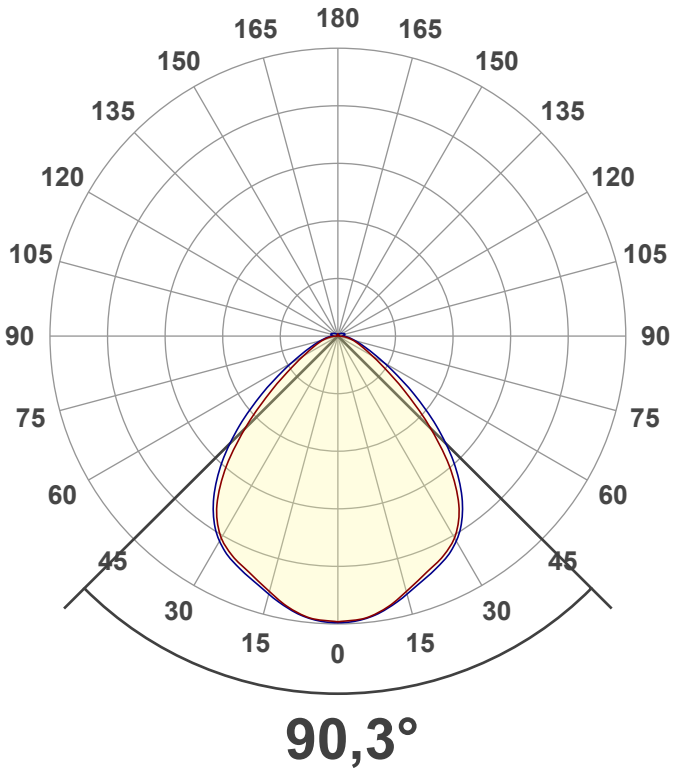
Tested Light Source

Product Name	270954-4000K BATCH 2505
Item No. and Manufacturer	270954-4000K BATCH 2505 – Dutchfulfillment
Product Description (line 1)	RETROFIT TITAN | LED MODULE | 32W/40W/48W/56W | 90°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	11862 lm – 3,33% / 96,67%
Efficiency	159 lm/W
Peak Intensity and Beam Angle	5615 cd – 90,3°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 3909 K
Color Rendering Index	CRI 83,4
Color Rendering TM30-18	R_f 83,0 – R_g 100,3
Color Shift, CIE duv and MacAdam Steps	Duv 0,0029 – SDCM 3,5
Flicker	SVM 0,03 – PstLM 0,02





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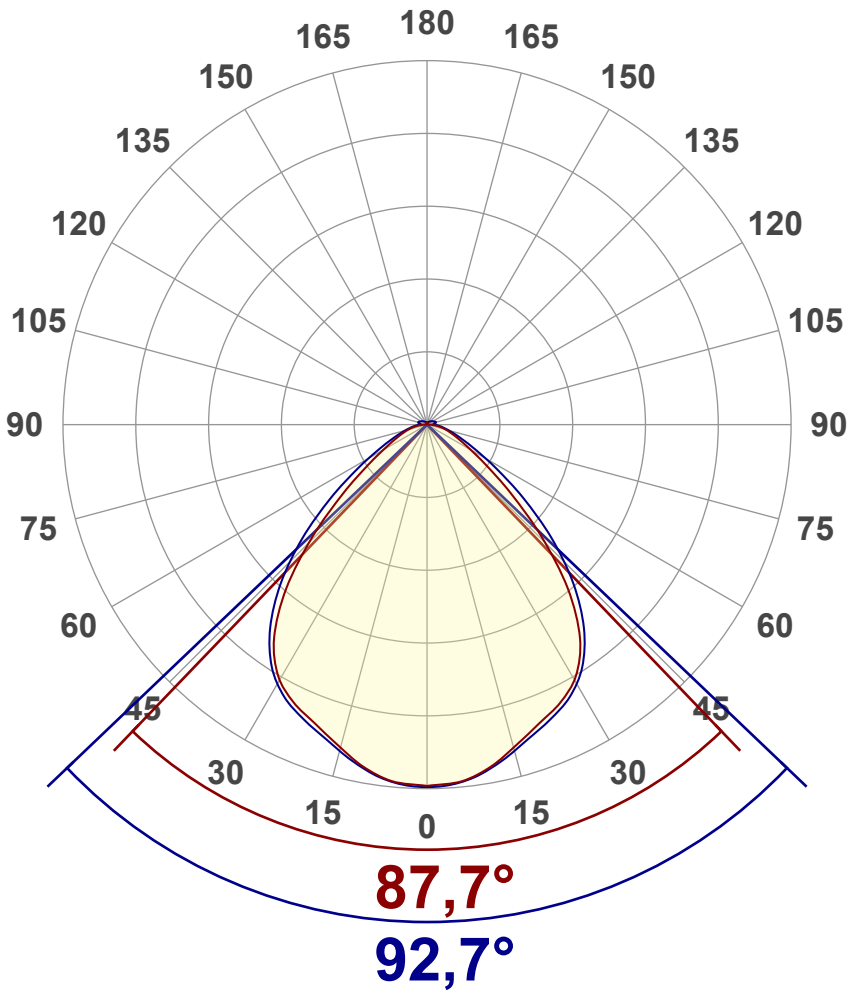
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	11862 lm
Lumen Up% / Down%	3,33% / 96,67%
Peak Intensity	5615 cd
Beam Angle (50%)	90,3°
Beam Angle (90%)	92,7°
Beam Angle (10%)	87,7°

Cut-off Angle

Average 2,5%	180,2°

Field Angle

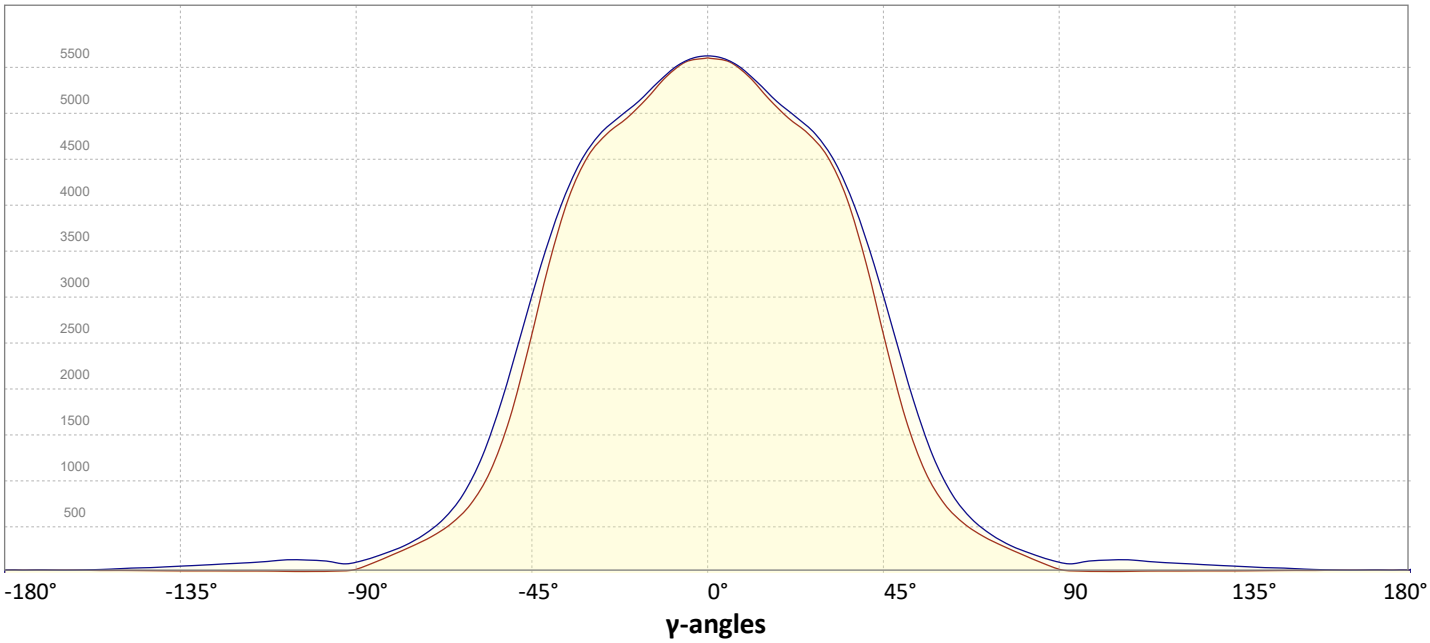
Average 10%	134,1°

Intensity Ratio

In 120° cone	86,5%
In 90° cone	67,7%

C000-C180
C090-C270

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



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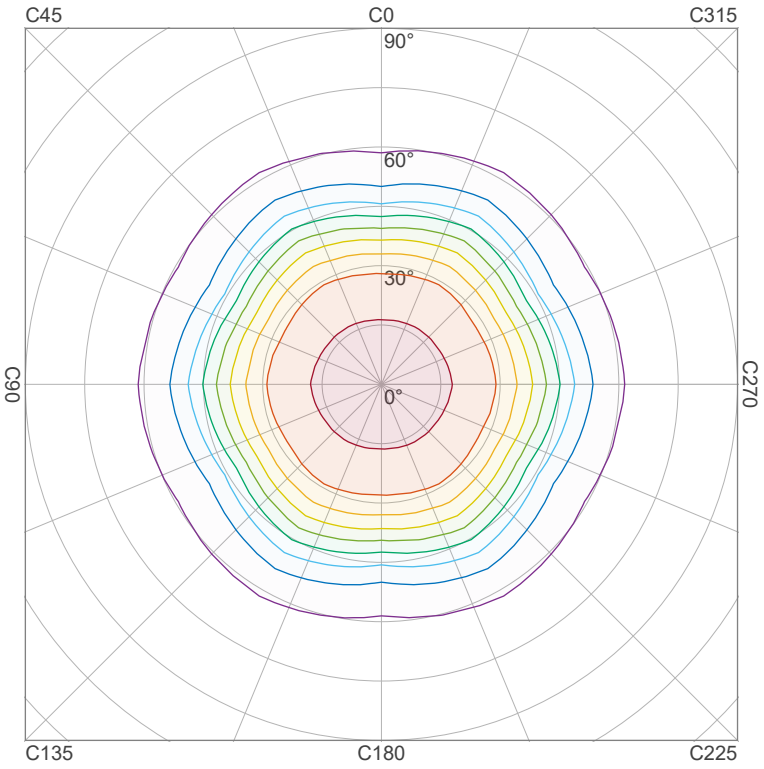
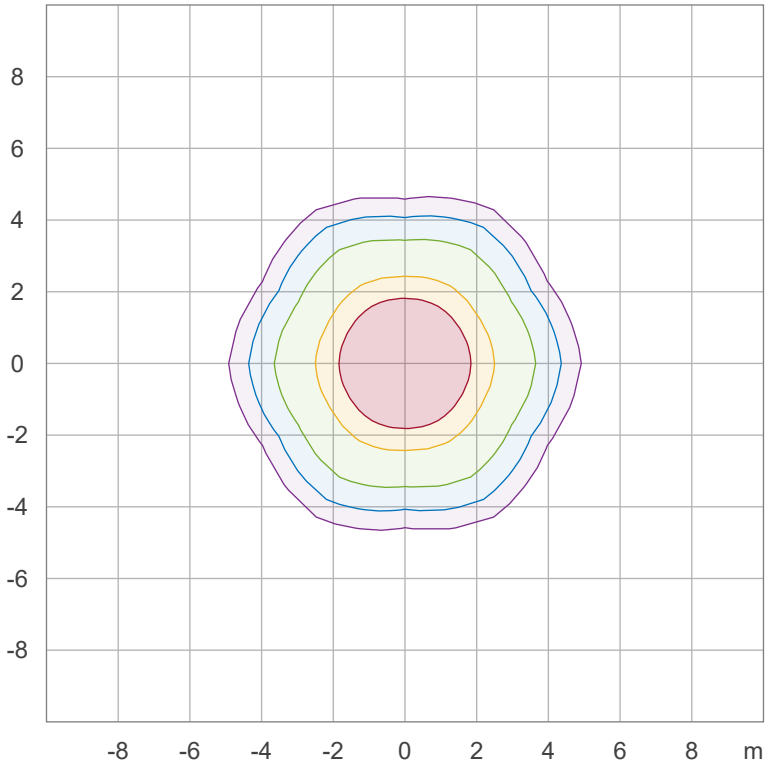
Iso-intensity Diagram (Iso-candela)



	90 %	5053,2 cd
	80 %	4491,7 cd
	70 %	3930,3 cd
	60 %	3368,8 cd
	50 %	2807,3 cd
	40 %	2245,9 cd
	30 %	1684,4 cd
	20 %	1122,9 cd
	10 %	561,5 cd

Peak intensity: 5614,7 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



	50,0 %	311,8 lx
	30,0 %	187,1 lx
	10,0 %	62,4 lx
	5,0 %	31,2 lx
	3,0 %	18,7 lx

Peak illuminance: 623,6 lx
Mounting height: 3,0 m
Number of c-planes: 12

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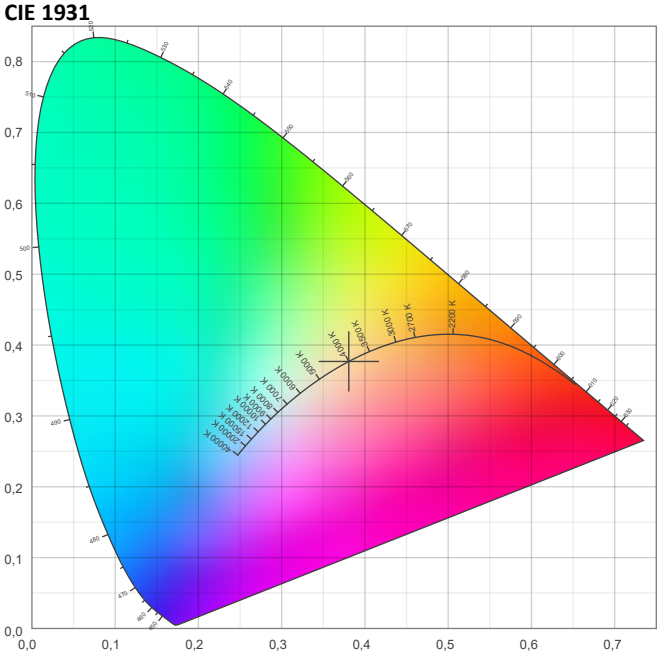
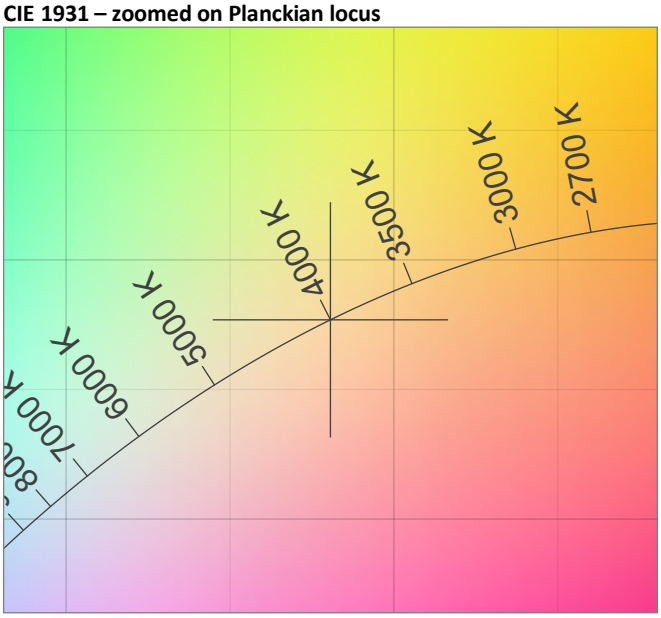
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 3909 K
Color Rendering Index	CRI 83,4
Color Rendering Index, R9 (red component)	R9 = 40,2
Color Rendering TM30-18	R_f 83,0 – R_g 100,3
Color Quality Scale	CQS = 83,3
MacAdam Steps	SDCM = 3,5
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 = 0,0029
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

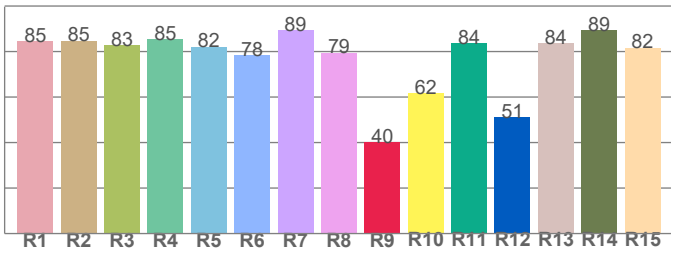
CIE 1931



CIE 1931 – zoomed on Planckian locus



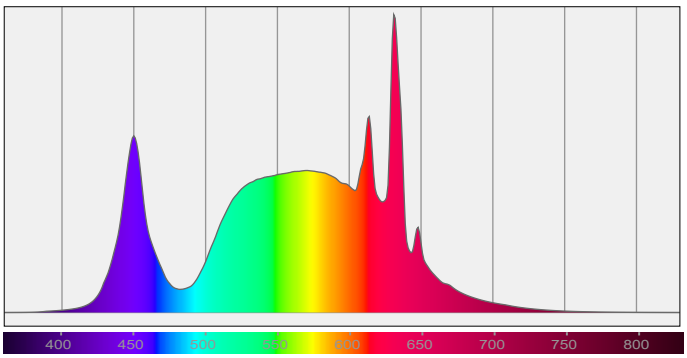
Color Rendering Index per reference color (CIE 1995)



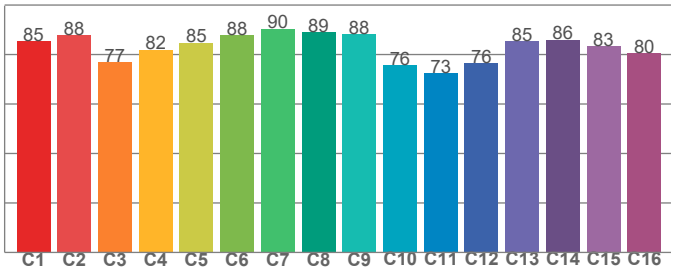
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84,6	84,8	82,8	85,4	82,1	78,5	89,4	79,4	40,2	61,6	83,6	51,2	83,6	89,4	81,6

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



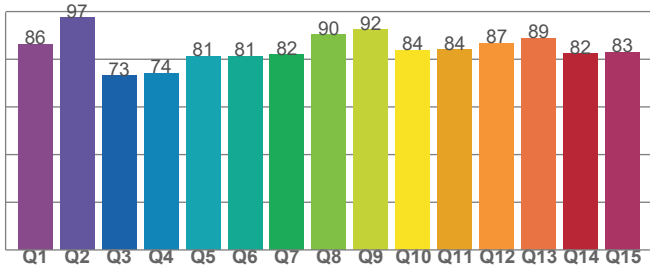
TM30-18 Rf-values per hue bin



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
85,3	87,7	76,8	82,0	84,8	87,8	90,5	88,9	88,2	75,7	72,5	76,5	85,5	86,0	83,3	80,5

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
86,2	97,4	73,2	74,2	81,4	81,3	81,9	90,4	92,4	83,9	84,1	86,6	88,8	82,3	83,0

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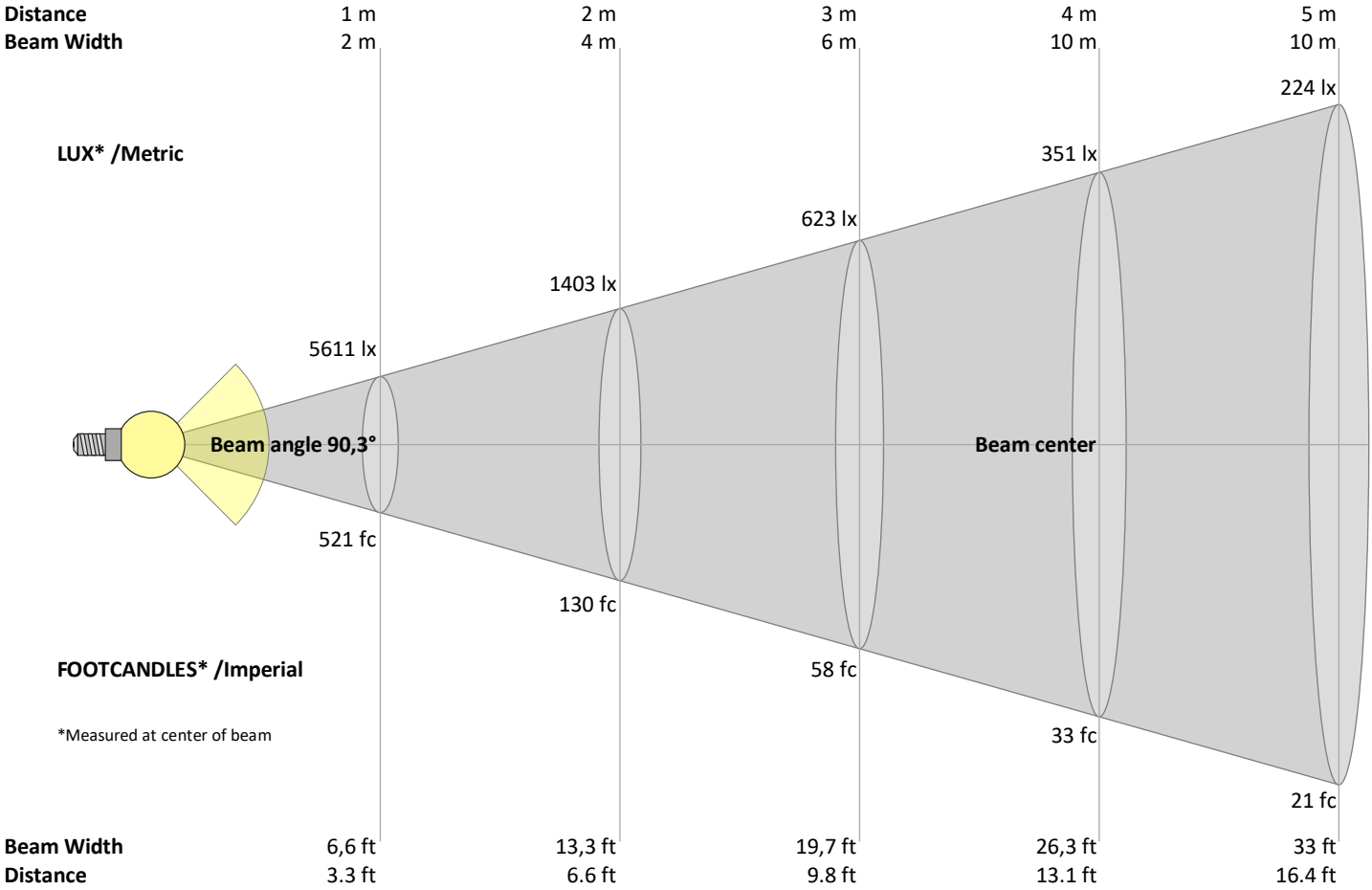
Beam Details



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
5611	1403	623	351	224	156	115	88	69	56	46	39	33	29	25	22	19	17	16	14	lux
521,3	130,3	57,9	32,6	20,9	14,5	10,6	8,1	6,4	5,2	4,3	3,6	3,1	2,7	2,3	2	1,8	1,6	1,4	1,3	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
5611	5563	5416	5188	4976	4803	4564	4130	3447	2596	1785	1180	794	562	413	303	208	118	41	19	cd
100%	99%	97%	92%	89%	86%	81%	74%	61%	46%	32%	21%	14%	10%	7%	5%	4%	2%	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
5611	5570	5436	5242	5050	4870	4626	4239	3686	3004	2270	1595	1073	724	504	358	255	178	120	111	cd
100%	99%	97%	93%	90%	87%	82%	76%	66%	54%	40%	28%	19%	13%	9%	6%	5%	3%	2%	2%	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
5611	5563	5416	5188	4976	4803	4564	4130	3447	2596	1785	1180	794	562	413	303	208	118	41	19	cd
100%	99%	97%	92%	89%	86%	81%	74%	61%	46%	32%	21%	14%	10%	7%	5%	4%	2%	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
5611	5570	5436	5242	5050	4870	4626	4239	3686	3004	2270	1595	1073	724	504	358	255	178	120	111	cd
100%	99%	97%	93%	90%	87%	82%	76%	66%	54%	40%	28%	19%	13%	9%	6%	5%	3%	2%	2%	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	23,3	24,3	23,5	24,6	24,9	23,3	24,4	23,6	24,7	25,0
	3H	23,6	24,7	24,0	25,0	25,2	23,8	24,9	24,3	25,2	25,4
	4H	23,8	24,8	24,2	25,1	25,4	24,1	25,1	24,6	25,4	25,7
	6H	24,0	24,9	24,4	25,2	25,6	24,5	25,3	24,8	25,7	26,1
	8H	24,1	24,9	24,4	25,3	25,7	24,6	25,5	25,0	25,8	26,3
	12H	24,1	24,9	24,5	25,3	25,8	24,8	25,6	25,2	26,0	26,5
4H	2H	23,4	24,4	23,8	24,7	25,0	23,4	24,5	23,9	24,8	25,1
	3H	24,1	24,9	24,5	25,3	25,8	24,2	25,1	24,6	25,4	25,9
	4H	24,3	25,1	24,8	25,5	26,1	24,6	25,3	25,0	25,8	26,4
	6H	24,6	25,3	25,1	25,7	26,1	25,0	25,7	25,5	26,1	26,6
	8H	24,7	25,3	25,2	25,8	26,2	25,2	25,9	25,8	26,3	26,8
	12H	24,7	25,3	25,3	25,8	26,3	25,5	26,0	26,0	26,5	27,0
8H	4H	24,4	25,1	25,0	25,5	25,9	24,7	25,3	25,2	25,8	26,2
	6H	24,9	25,3	25,4	25,9	26,5	25,3	25,8	25,8	26,3	26,9
	8H	25,1	25,5	25,6	26,1	26,7	25,7	26,1	26,2	26,6	27,3
	12H	25,2	25,6	25,9	26,1	26,8	26,1	26,4	26,7	27,0	27,6
12H	4H	24,4	25,0	25,0	25,4	26,0	24,7	25,2	25,2	25,7	26,2
	6H	24,9	25,4	25,5	25,9	26,6	25,4	25,8	25,9	26,3	27,0
	8H	25,2	25,5	25,8	26,1	26,7	25,7	26,1	26,4	26,7	27,3

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,4 / -0,6	0,3 / -0,4
S = 1.5H	1,0 / -1,3	0,9 / -0,9
S = 2.0H	1,9 / -1,9	1,7 / -1,3

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	118	118	118	118	115	115	115	115	109	109	109	104	104	104	99	99	99	97
1	110	106	102	99	107	103	100	97	98	96	93	94	92	90	90	88	87	84
2	101	94	88	84	99	92	87	82	88	84	80	85	81	78	81	78	76	73
3	94	85	78	72	91	83	76	71	79	74	69	76	72	68	74	70	66	64
4	87	76	69	63	84	75	68	62	72	66	61	69	64	60	67	62	59	57
5	80	69	61	55	78	68	60	55	65	59	54	63	57	53	61	56	52	50
6	75	63	55	49	73	62	54	49	60	53	48	58	52	47	56	51	47	45
7	70	57	49	44	68	57	49	44	55	48	43	53	47	43	52	46	42	40
8	65	53	45	40	63	52	45	39	50	44	39	49	43	39	48	42	38	36
9	61	49	41	36	60	48	41	36	47	40	35	45	39	35	44	39	35	33
10	57	45	38	33	56	44	37	33	43	37	32	42	36	32	41	36	32	30

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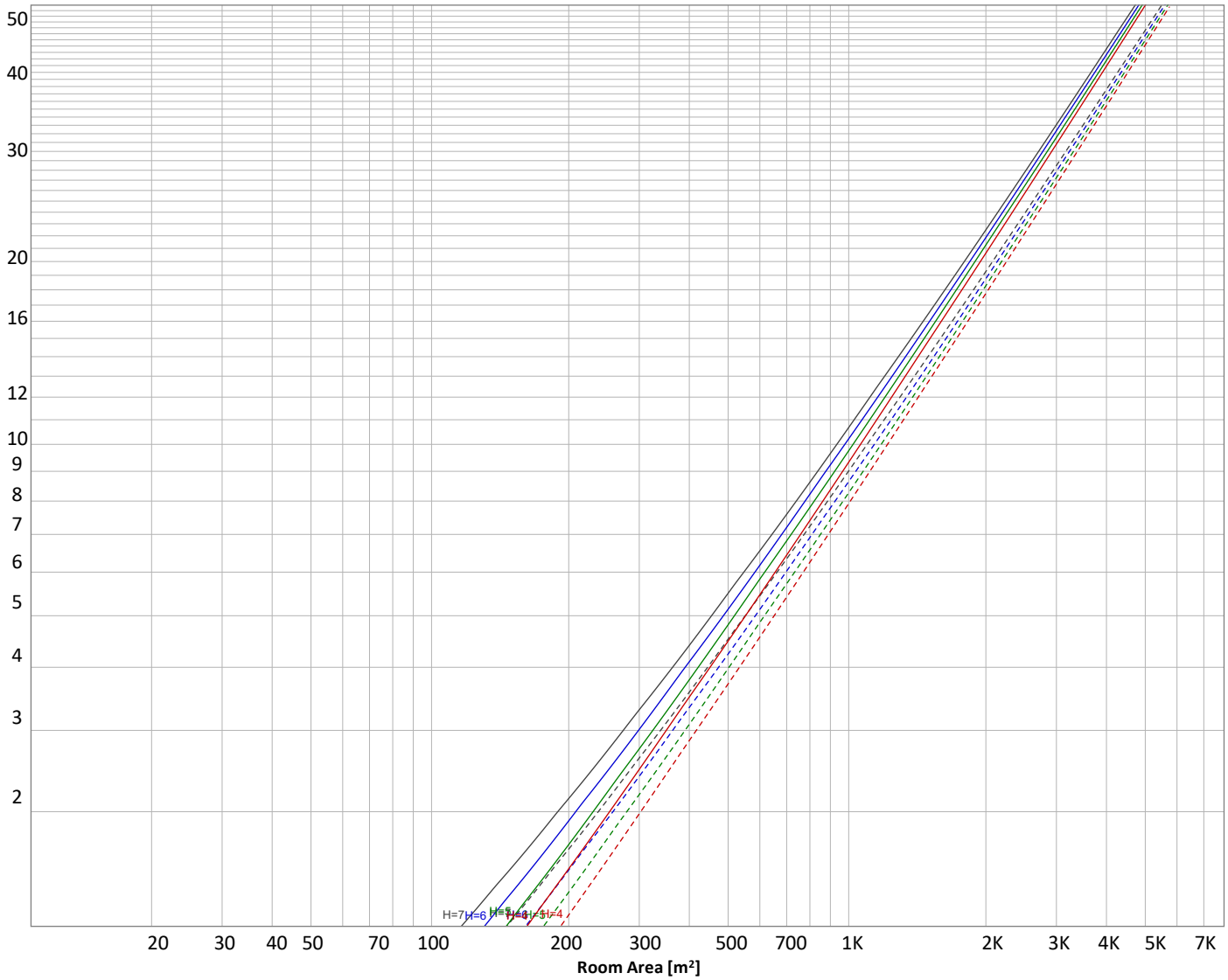
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 11862 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°
529 lm	1473 lm	2231 lm	2611 lm	2162 lm	1259 lm	654 lm	367 lm	182 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
84,7 lm	95,6 lm	76,2 lm	55,0 lm	36,4 lm	23,0 lm	13,6 lm	7,93 lm	2,81 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	529 lm	4,5%
10-20°	1473 lm	12,4%
20-30°	2231 lm	18,8%
30-40°	2611 lm	22,0%
40-50°	2162 lm	18,2%
50-60°	1259 lm	10,6%
60-70°	654 lm	5,5%
70-80°	367 lm	3,1%
80-90°	182 lm	1,5%
90-100°	85 lm	0,7%
100-110°	96 lm	0,8%
110-120°	76 lm	0,6%
120-130°	55 lm	0,5%
130-140°	36 lm	0,3%
140-150°	23 lm	0,2%
150-160°	14 lm	0,1%
160-170°	8 lm	0,1%
170-180°	3 lm	0,0%
Total	11862 lm	100,0%

Intensity peaks

Max intensity	5615 cd
Intensity, 90°	41 cd
Intensity, 0°	5611 cd

Zonal Lumen summary

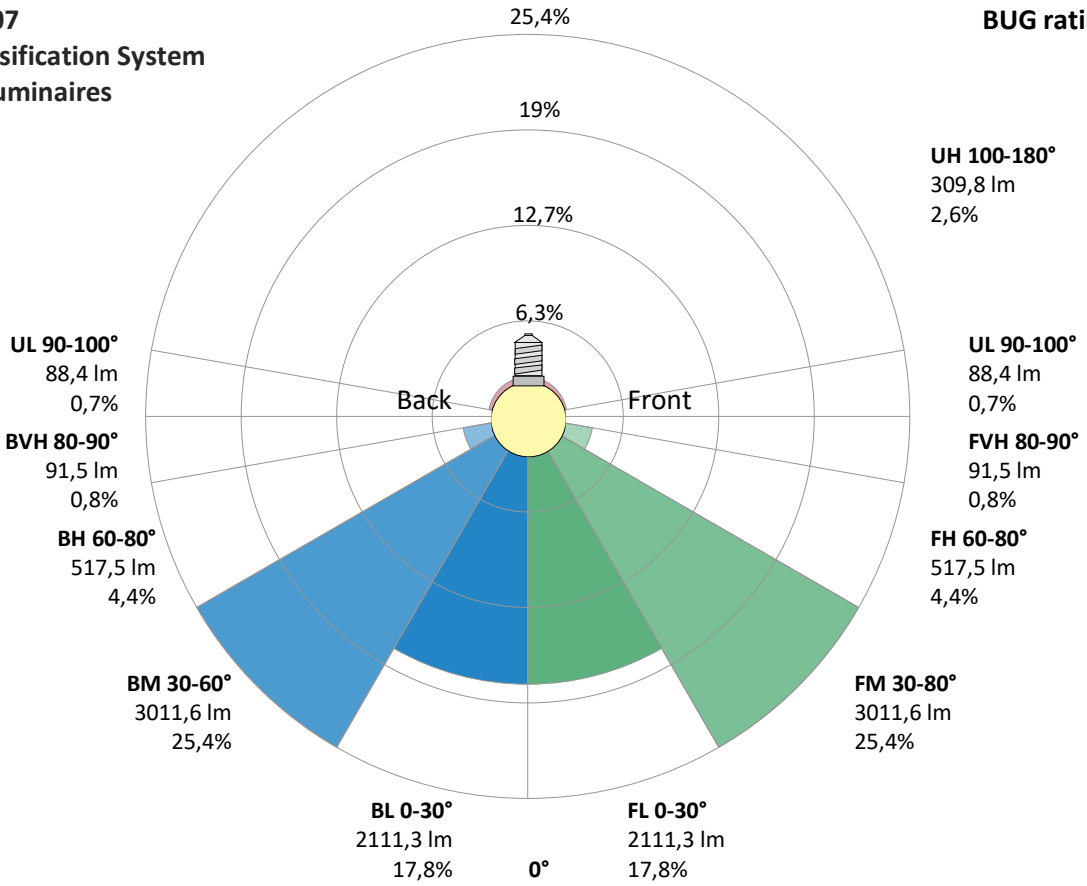
Zone (γ)	Lumen	% Total
0-30°	4232 lm	35,7%
0-40°	6843 lm	57,7%
0-60°	10264 lm	86,5%
60-90°	1203 lm	10,1%
70-100°	633 lm	5,3%
90-120°	257 lm	2,2%
0-90°	11467 lm	96,7%
90-180°	395 lm	3,3%
0-180°	11862 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	2111 lm	17,8%
Medium(30-60°)	3012 lm	25,4%
High(60-80°)	518 lm	4,4%
Very high(80-90°)	92 lm	0,8%
Back light		
Low(0-30°)	2111 lm	17,8%
Medium(30-60°)	3012 lm	25,4%
High(60-80°)	518 lm	4,4%
Very high(80-90°)	92 lm	0,8%
Uplight		
Low(90-100°)	88 lm	0,7%
High(100-180°)	310 lm	2,6%

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

BUG rating B3 U3 G1



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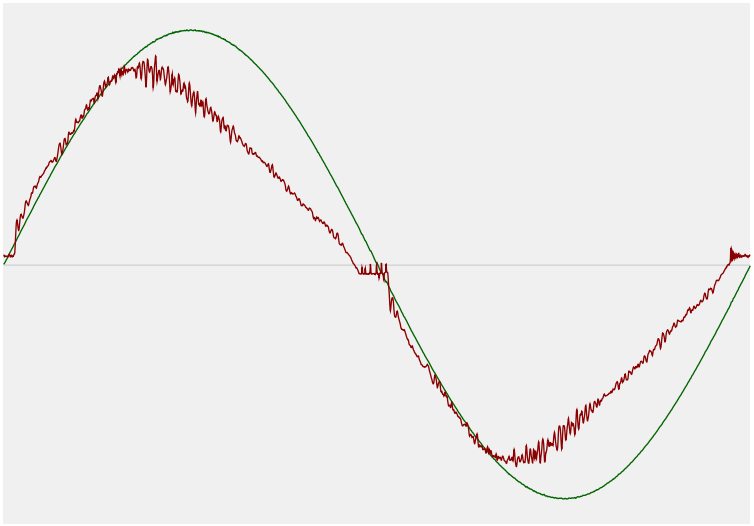
Power Details

Input Power

Power feed to light source	74,4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,335 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	77,09 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	12,21%
Total harmonic distortion of the voltage	0,13%

Input Power Curve



Efficiency

Radiated power efficiency 45,7%

Lumen efficiency 159 lm/W

Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	4007 K
CCT shift	-7 K
CCT end	4000 K

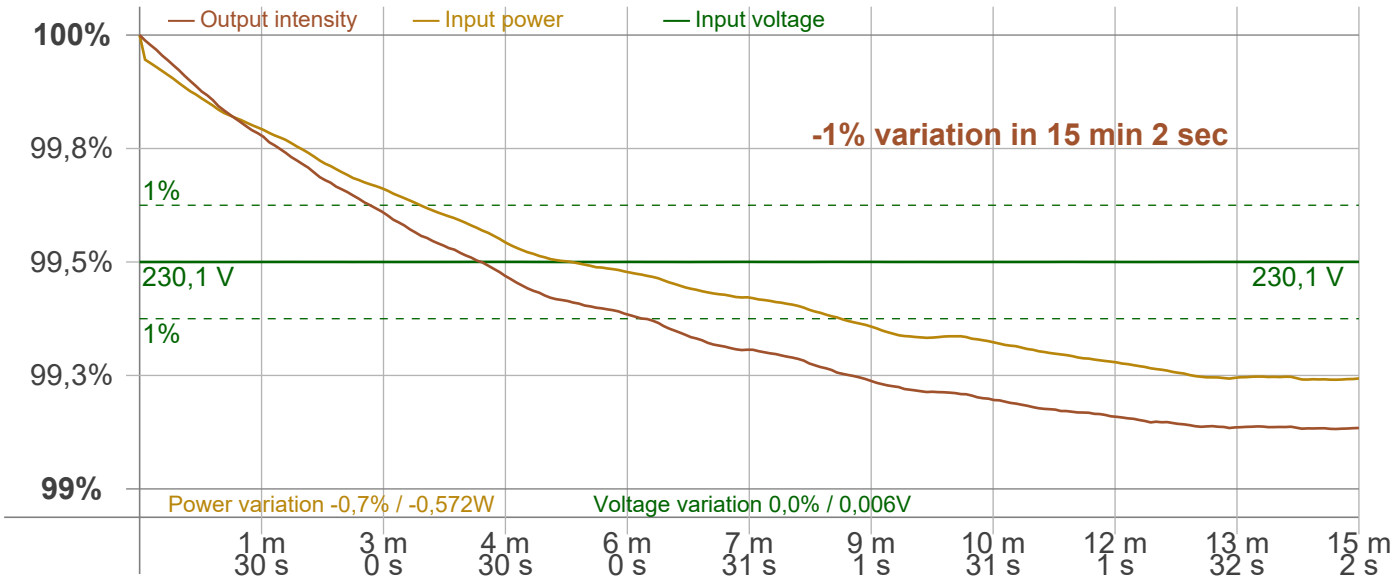
Warmup Result

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

Output Change

Output start	11970 lm
Output change	-108 lm
Output end	11862 lm

Stabilization Curve



Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 09:22:35 – Measurement no. VFR-250424-0892-MS
Measurement tracking No. and Link: VT250424-001220
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	99,01 Hz
Percent Flicker	0,8 %
Flicker index	0

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

JA8/10 40 Hz	0,03 %
JA8/10 90 Hz	0,03 %
JA8/10 200 Hz	0,78 %
JA8/10 400 Hz	0,79 %
JA8/10 1000 Hz	0,79 %

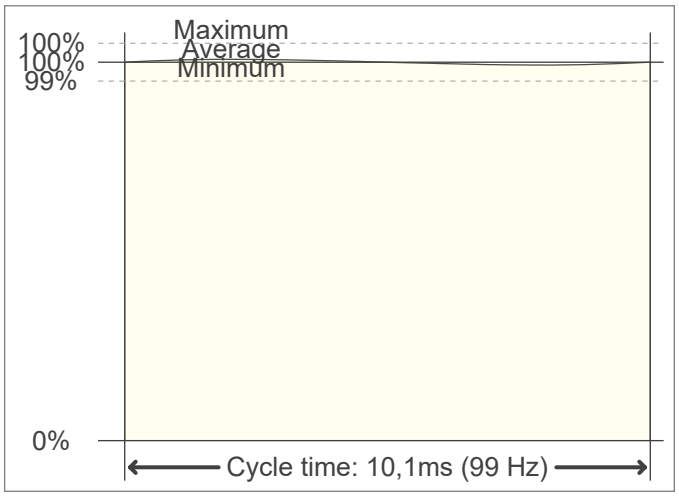
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz)	0,02
SVM value (80 < F < 2000 Hz)	0,03

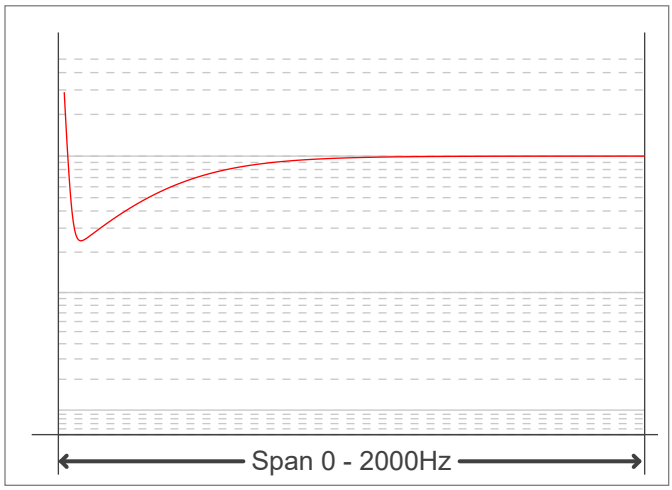
Flicker indices according to Lighting Research Center (2015)

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