Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 08:28:42 – Measurement no. VFR-250424-0889-MS
Measurement tracking No. and Link: VT250424-008390
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

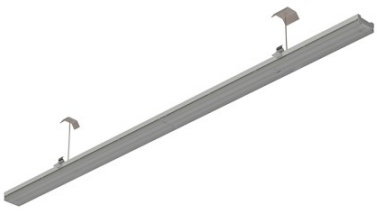
Number of C-planes and Resolution	16 planes – 22,5°
γ (gamma)-Resolution	5°
Test Distance	12,10 m
Input Power, Power and Displ. Factors	74,7 W – PF 0,98 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,333 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

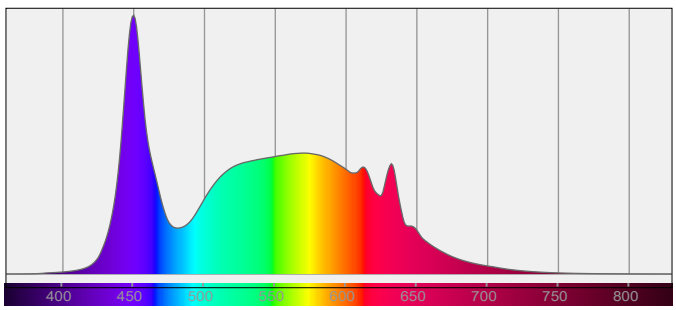
Tested Light Source

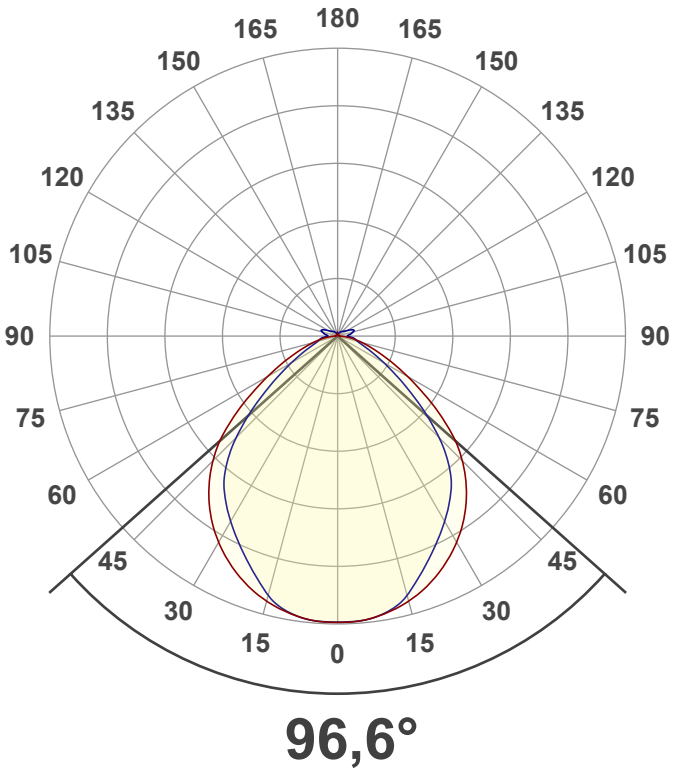
Product Name	805845-5700K BATCH 2502
Item No. and Manufacturer	805845-5700K BATCH 2502 – Dutchfulfillment
Product Description (line 1)	RETROFIT PLUTO | LED MODULE | 32W/40W/48W/55W | 90°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	12024 lm – 6,01% / 93,99%
Efficiency	161 lm/W
Peak Intensity and Beam Angle	5022 cd – 96,6°
Correlated Color Temperature, Target/Measured	CCT = 5700 K / 5848 K
Color Rendering Index	CRI 82,8
Color Rendering TM30-18	R_f 82,2 – R_g 97,1
Color Shift, CIE duv and MacAdam Steps	Duv 0,0010 – SDCM 2,7
Flicker	SVM 0,03 – PstLM 0,02







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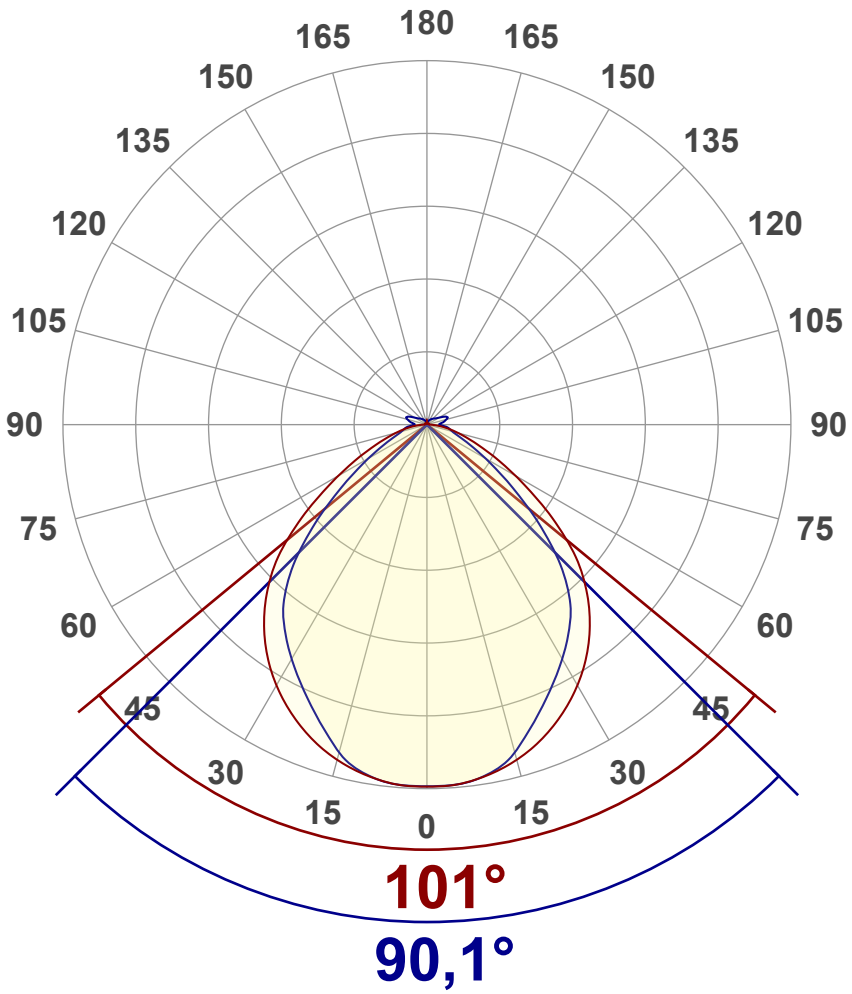
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	12024 lm
Lumen Up% / Down%	6,01% / 93,99%
Peak Intensity	5022 cd
Beam Angle (50%)	96,6°
Beam Angle (90%)	90,1°
Beam Angle (10%)	101°

Cut-off Angle

Average 2,5%	223,3°

Field Angle

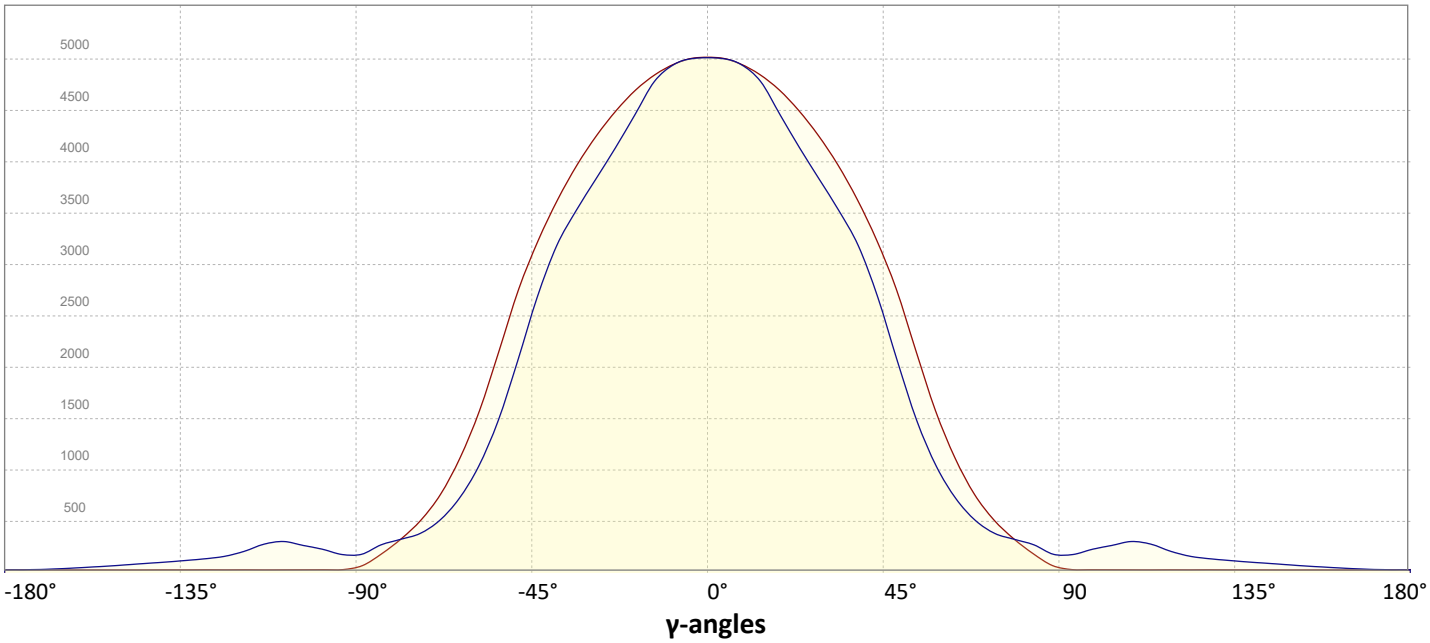
Average 10%	143,3°

Intensity Ratio

In 120° cone	81,3%
In 90° cone	59,9%

C000-C180
C090-C270

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



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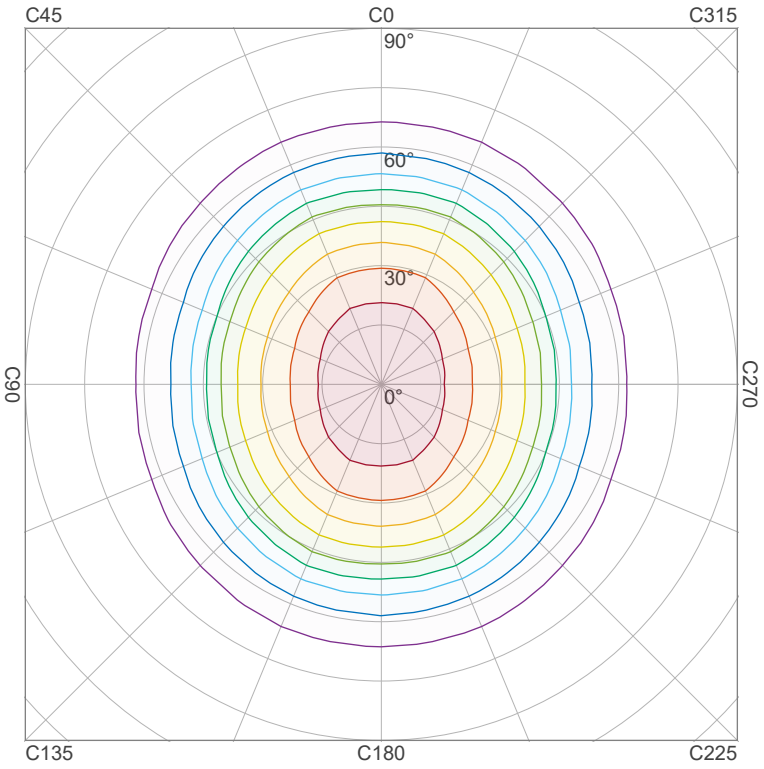
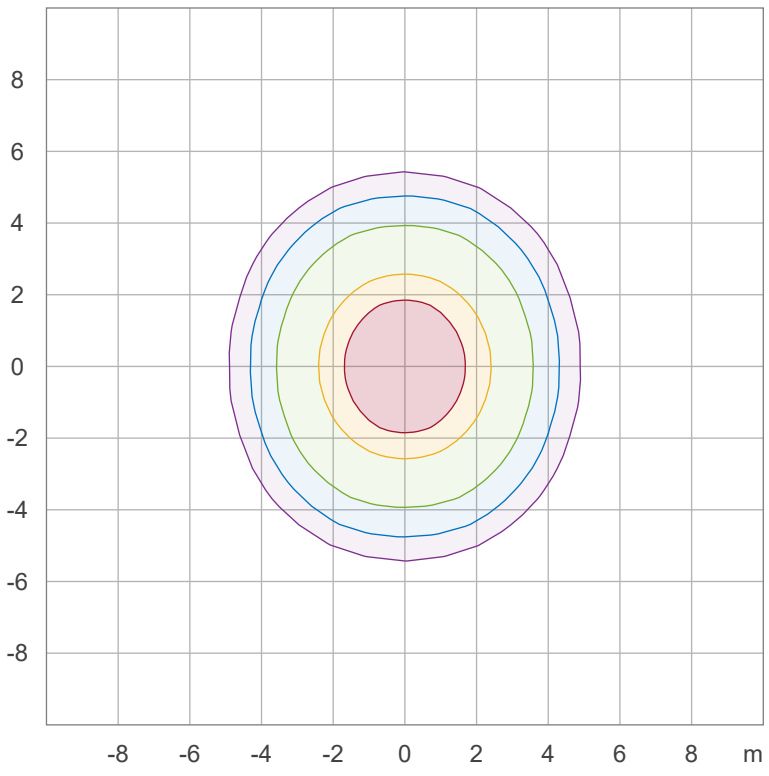
Iso-intensity Diagram (Iso-candela)



	90 %	4516,2 cd
	80 %	4014,4 cd
	70 %	3512,6 cd
	60 %	3010,8 cd
	50 %	2509,0 cd
	40 %	2007,2 cd
	30 %	1505,4 cd
	20 %	1003,6 cd
	10 %	501,8 cd

Peak intensity: 5018,0 cd
Number of c-planes: 16

Iso-illuminance Diagram (Iso-lux)



	50,0 %	278,7 lx
	30,0 %	167,2 lx
	10,0 %	55,7 lx
	5,0 %	27,9 lx
	3,0 %	16,7 lx

Peak illuminance: 557,5 lx
Mounting height: 3,0 m
Number of c-planes: 16

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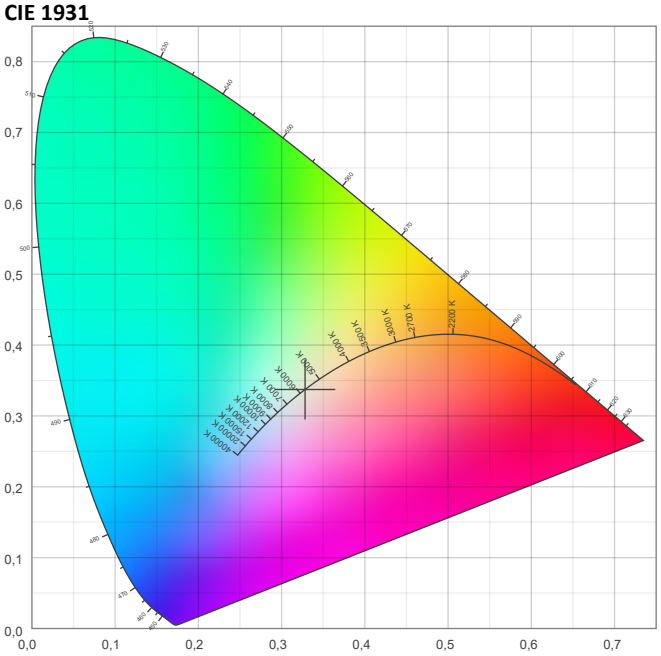
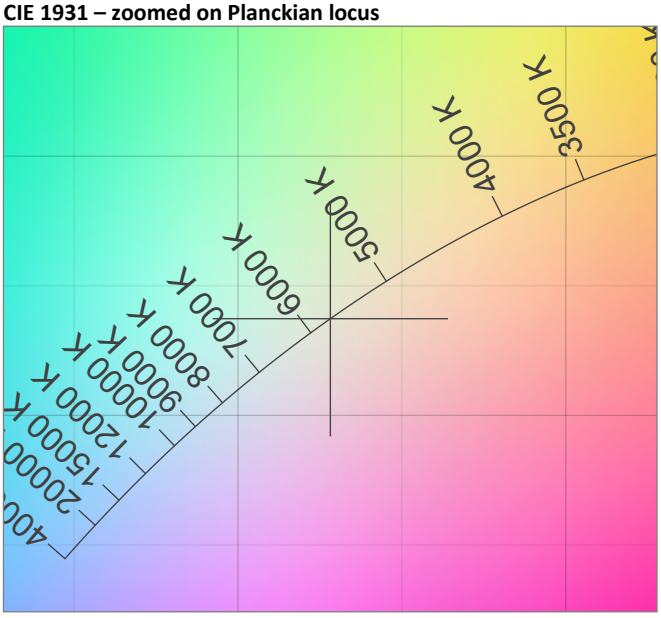
Color details

Correlated Color Temperature, Target	CCT = 5700 K
Correlated Color Temperature, Measured	CCT = 5848 K
Color Rendering Index	CRI 82,8
Color Rendering Index, R9 (red component)	R9 = 14,8
Color Rendering TM30-18	R_f 82,2 – R_g 97,1
Color Quality Scale	CQS = 80,0
MacAdam Steps	SDCM = 2,7
Color coordinates CIE 1931	(x;y) = (0,328;0,337)
Color coordinate CIEs 1960	(u;v) = (0,205;0,317)
Color deviation from BBL	Duv = 0,0010
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,205;0,475)

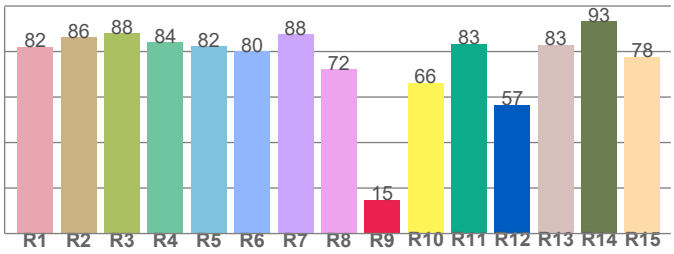
CIE 1931



CIE 1931 – zoomed on Planckian locus



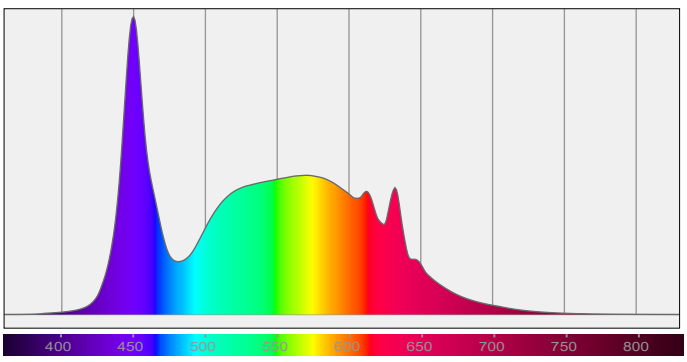
Color Rendering Index per reference color (CIE 1995)



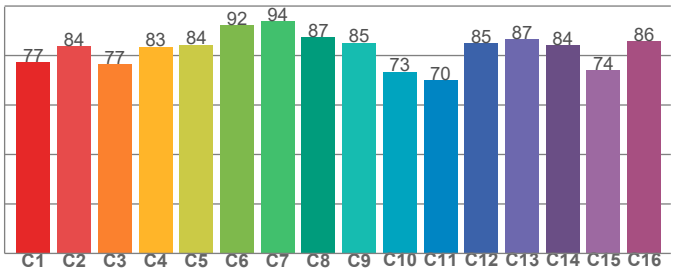
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,0	86,3	88,0	84,0	82,4	80,2	87,6	72,1	14,8	66,3	83,5	56,6	83,0	93,4	77,7

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



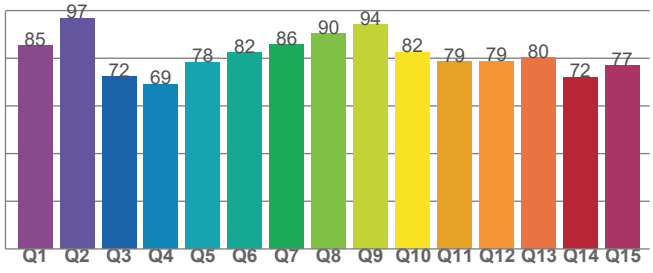
TM30-18 Rf-values per hue bin



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
77,3	83,7	76,6	83,5	84,3	92,2	93,9	87,4	85,2	73,4	69,9	85,1	86,6	84,2	74,1	85,9

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
85,2	96,7	72,2	69,1	78,2	82,4	85,6	90,2	94,0	82,4	78,6	78,7	80,2	72,0	76,9

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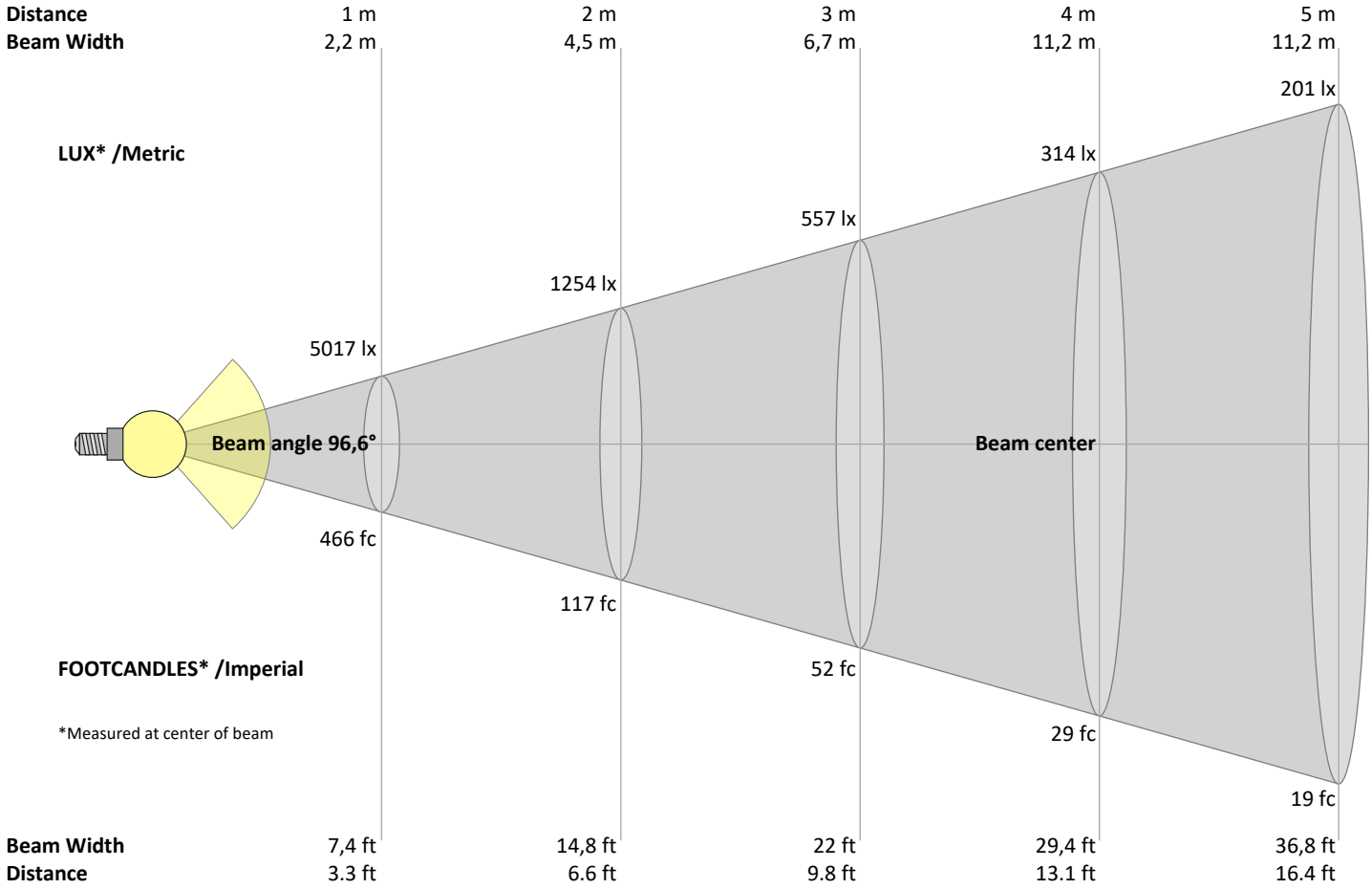
Beam Details



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
5017	1254	557	314	201	139	102	78	62	50	41	35	30	26	22	20	17	15	14	13	lux
466,1	116,5	51,8	29,1	18,6	12,9	9,5	7,3	5,8	4,7	3,9	3,2	2,8	2,4	2,1	1,8	1,6	1,4	1,3	1,2	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
5017	4992	4920	4801	4634	4420	4164	3860	3501	3078	2563	1970	1428	1002	681	454	285	148	57	30	cd
100%	99%	98%	96%	92%	88%	83%	77%	70%	61%	51%	39%	28%	20%	14%	9%	6%	3%	1%	1%	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
5017	4989	4900	4691	4366	4049	3746	3431	3044	2509	1899	1355	948	662	474	366	310	246	179	192	cd
100%	99%	98%	93%	87%	81%	75%	68%	61%	50%	38%	27%	19%	13%	9%	7%	6%	5%	4%	4%	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
5017	4992	4920	4801	4634	4420	4164	3860	3501	3078	2563	1970	1428	1002	681	454	285	148	57	30	cd
100%	99%	98%	96%	92%	88%	83%	77%	70%	61%	51%	39%	28%	20%	14%	9%	6%	3%	1%	1%	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
5017	4989	4900	4691	4366	4049	3746	3431	3044	2509	1899	1355	948	662	474	366	310	246	179	192	cd
100%	99%	98%	93%	87%	81%	75%	68%	61%	50%	38%	27%	19%	13%	9%	7%	6%	5%	4%	4%	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	26,4	27,5	26,7	27,9	28,2	25,7	26,7	26,0	27,1	27,4
	3H	26,9	28,0	27,4	28,3	28,6	26,2	27,2	26,6	27,6	27,9
	4H	27,1	28,1	27,5	28,5	28,8	26,5	27,5	27,0	27,9	28,2
	6H	27,2	28,1	27,6	28,5	29,0	26,9	27,8	27,3	28,2	28,7
	8H	27,2	28,1	27,7	28,5	29,0	27,2	28,0	27,6	28,5	29,0
	12H	27,2	28,1	27,7	28,5	29,0	27,5	28,3	27,9	28,7	29,3
4H	2H	26,5	27,6	27,0	27,9	28,3	25,9	26,9	26,4	27,3	27,7
	3H	27,3	28,1	27,7	28,6	29,1	26,7	27,5	27,1	27,9	28,5
	4H	27,5	28,3	28,0	28,8	29,4	27,0	27,8	27,5	28,3	28,9
	6H	27,7	28,4	28,2	28,9	29,3	27,5	28,3	28,1	28,7	29,2
	8H	27,7	28,4	28,3	28,9	29,3	27,8	28,5	28,4	29,0	29,5
	12H	27,7	28,3	28,3	28,8	29,4	28,2	28,8	28,8	29,3	29,9
8H	4H	27,5	28,2	28,1	28,7	29,1	27,1	27,8	27,7	28,2	28,7
	6H	27,8	28,3	28,4	28,9	29,5	27,7	28,2	28,3	28,8	29,4
	8H	28,0	28,4	28,6	29,0	29,7	28,2	28,6	28,8	29,2	29,9
	12H	28,0	28,4	28,7	29,0	29,7	28,7	29,1	29,4	29,7	30,3
12H	4H	27,5	28,1	28,1	28,6	29,2	27,1	27,6	27,6	28,1	28,7
	6H	27,9	28,3	28,5	28,9	29,6	27,8	28,2	28,4	28,8	29,5
	8H	28,0	28,4	28,7	29,0	29,7	28,2	28,6	28,9	29,2	29,9

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,2 / -0,3	0,2 / -0,3
S = 1.5H	0,8 / -1,1	0,6 / -0,7
S = 2.0H	1,7 / -1,9	1,2 / -1,2

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	114	114	114	114	108	108	108	102	102	102	97	97	97	94
1	108	104	100	97	105	101	98	95	96	93	91	91	89	87	87	85	83	81
2	100	92	86	81	97	90	84	79	85	81	77	81	78	74	78	74	72	69
3	92	82	75	69	89	80	73	68	76	71	66	73	68	64	70	66	62	60
4	84	73	65	59	82	72	64	59	69	62	57	66	60	56	63	58	54	52
5	78	66	58	52	76	65	57	51	62	55	50	60	54	49	57	52	48	46
6	72	60	52	46	70	59	51	45	56	50	44	54	48	44	52	47	43	41
7	67	55	46	41	65	54	46	40	52	45	40	50	44	39	48	42	38	36
8	63	50	42	37	61	49	42	36	47	41	36	46	40	35	44	39	35	33
9	59	46	38	33	57	45	38	33	44	37	32	42	36	32	41	35	31	30
10	55	43	35	30	54	42	35	30	41	34	29	39	33	29	38	33	29	27

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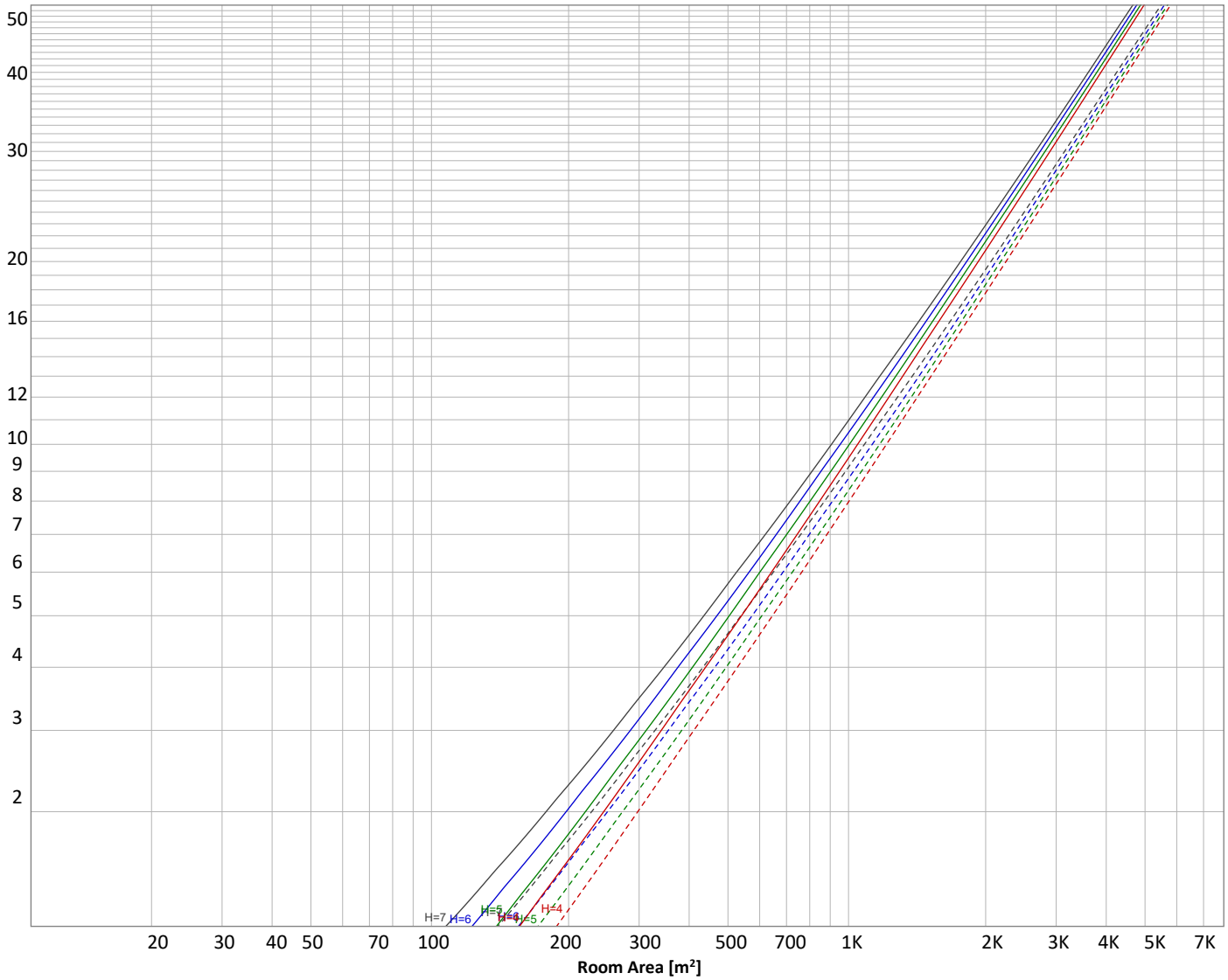
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 12024 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°
474 lm	1343 lm	1961 lm	2280 lm	2183 lm	1539 lm	842 lm	442 lm	236 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
167 lm	192 lm	146 lm	89,2 lm	59,2 lm	36,6 lm	20,4 lm	9,65 lm	2,74 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	474 lm	3,9%
10-20°	1343 lm	11,2%
20-30°	1961 lm	16,3%
30-40°	2280 lm	19,0%
40-50°	2183 lm	18,2%
50-60°	1539 lm	12,8%
60-70°	842 lm	7,0%
70-80°	442 lm	3,7%
80-90°	236 lm	2,0%
90-100°	167 lm	1,4%
100-110°	192 lm	1,6%
110-120°	146 lm	1,2%
120-130°	89 lm	0,7%
130-140°	59 lm	0,5%
140-150°	37 lm	0,3%
150-160°	20 lm	0,2%
160-170°	10 lm	0,1%
170-180°	3 lm	0,0%
Total	12024 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	3779 lm	31,4%
0-40°	6059 lm	50,4%
0-60°	9782 lm	81,3%
60-90°	1521 lm	12,6%
70-100°	845 lm	7,0%
90-120°	504 lm	4,2%
0-90°	11302 lm	94,0%
90-180°	722 lm	6,0%
0-180°	12024 lm	100,0%

Intensity peaks

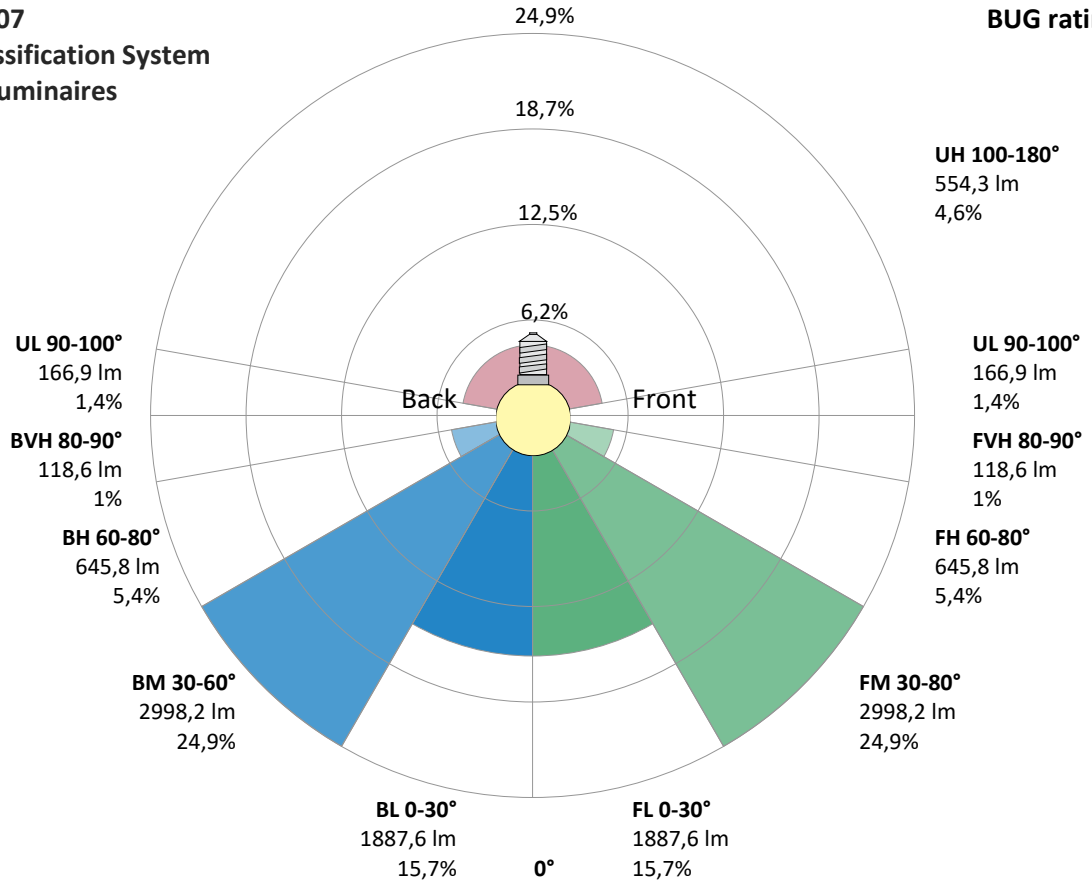
Max intensity	5022 cd
Intensity, 90°	57 cd
Intensity, 0°	5017 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1888 lm	15,7%
Medium(30-60°)	2998 lm	24,9%
High(60-80°)	646 lm	5,4%
Very high(80-90°)	119 lm	1,0%
Back light		
Low(0-30°)	1888 lm	15,7%
Medium(30-60°)	2998 lm	24,9%
High(60-80°)	646 lm	5,4%
Very high(80-90°)	119 lm	1,0%
Uplight		
Low(90-100°)	167 lm	1,4%
High(100-180°)	554 lm	4,6%

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

BUG rating B3 U4 G2



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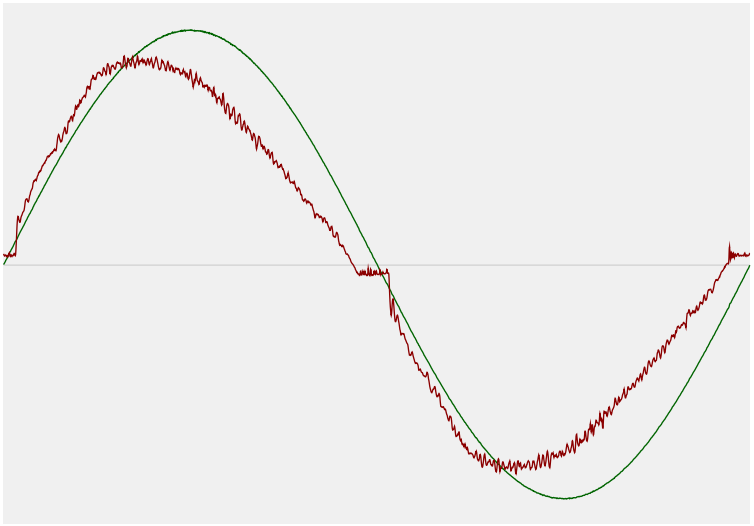
Power Details

Input Power

Power feed to light source	74,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,333 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	76,61 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,98
Total harmonic distortion of the current	10,42%
Total harmonic distortion of the voltage	0,07%

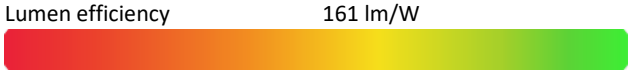
Input Power Curve



Efficiency

Radiated power efficiency 50,1%

Lumen efficiency 161 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5676 K
CCT shift	+24 K
CCT end	5700 K

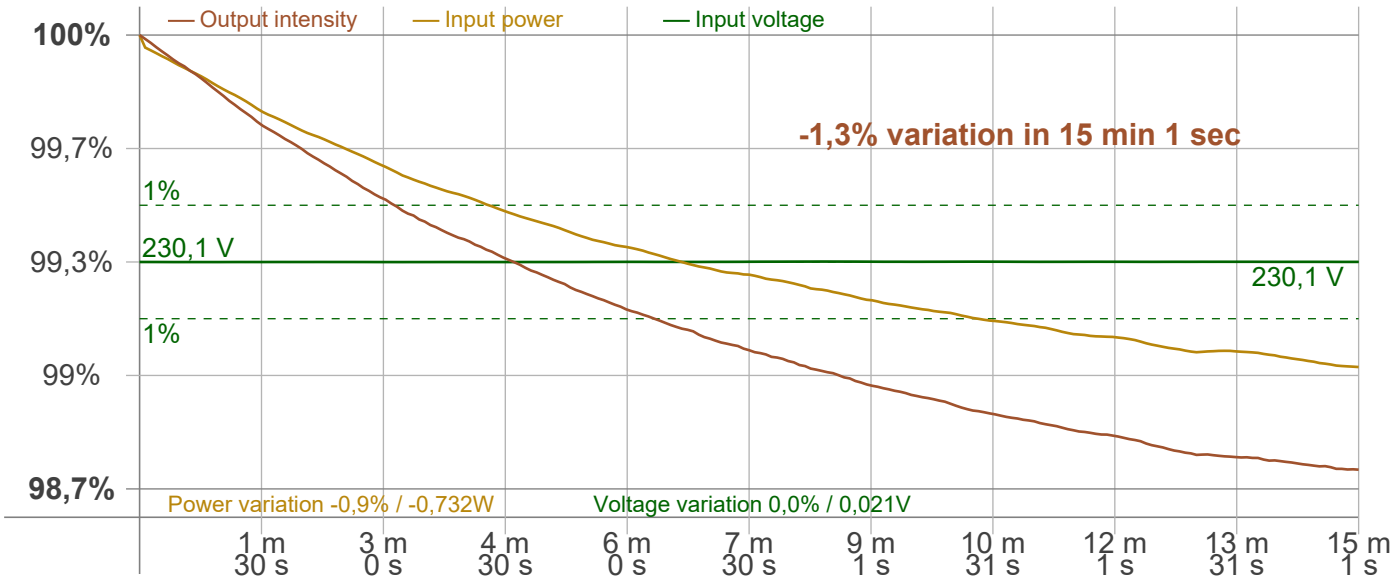
Warmup Result

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

Output Change

Output start	12182 lm
Output change	-158 lm
Output end	12024 lm

Stabilization Curve



Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 08:28:42 – Measurement no. VFR-250424-0889-MS
Measurement tracking No. and Link: VT250424-008390
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	100 Hz
Percent Flicker	0,84 %
Flicker index	0

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

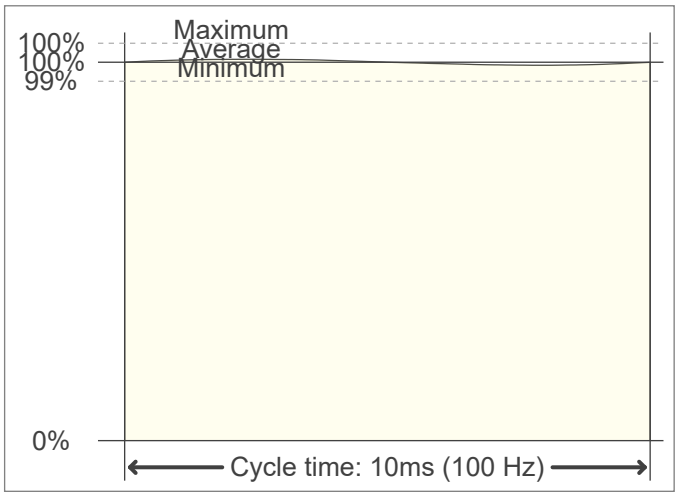
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,02 %
JA8/10 90 Hz	0,03 %
JA8/10 200 Hz	0,83 %
JA8/10 400 Hz	0,83 %
JA8/10 1000 Hz	0,83 %

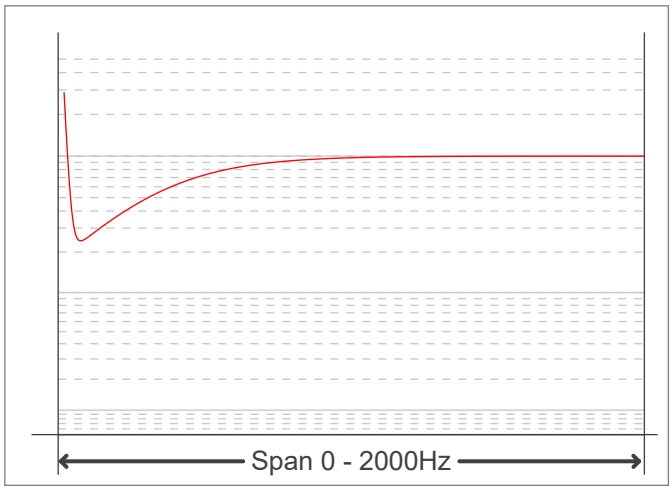
Flicker indices according to Lighting Research Center (2015)

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