Light Measurement Report

Print date: 15-5-2025
Measurement date and time: 15-5-2025 15:16:43 – Measurement no. VFR-250515-1278-MS
Measurement tracking No. and Link: VT250515-004821
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

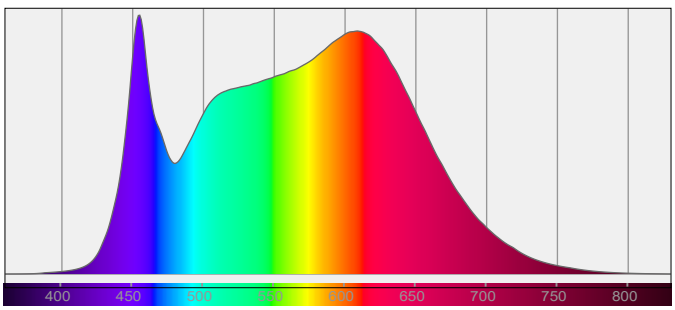
Number of C-planes and Resolution	20 planes – 18°
γ (gamma)-Resolution	5°
Test Distance	1,99 m
Input Power, Power and Displ. Factors	29,6 W – PF 0,99 – DPF 1,0
Input RMS Voltage and Current	230 V – 0,129 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 22 min 14 sec – 2,0%

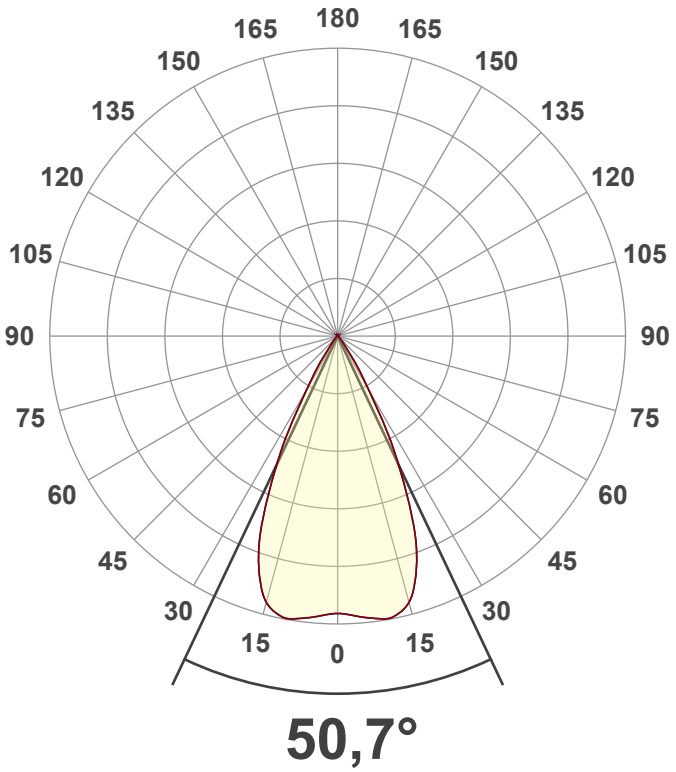
Tested Light Source

Product Name	848360-4000K
Item No. and Manufacturer	848360-4000K – Dutchfulfillment
Product Description (line 1)	3-FASE RAILSPOT ORCUS 15°-60° ZOOMABLE 30W ZWART DIMBAAR

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	1991 lm – 0,04% / 99,96%
Efficiency	67 lm/W
Peak Intensity and Beam Angle	3018 cd – 50,7°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4132 K
Color Rendering Index	CRI 92,8
Color Rendering TM30-18	R_f 90,1 – R_g 96,2
Color Shift, CIE duv and MacAdam Steps	Duv 0,0022 – SDCM 3,2
Flicker	SVM 0 – PstLM 0,08





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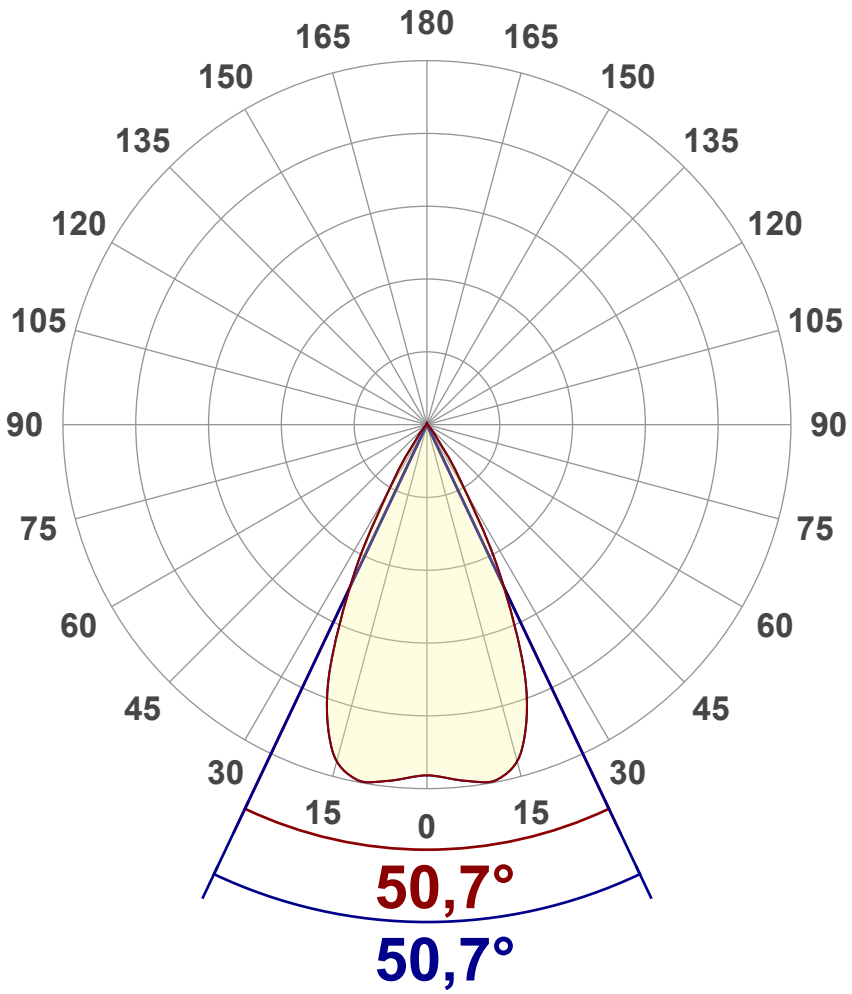
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1991 lm
Lumen Up% / Down%	0,04% / 99,96%
Peak Intensity	3018 cd
Beam Angle (50%)	50,7°
Beam Angle (90%)	50,7°
Beam Angle (10%)	50,7°

Cut-off Angle

Average 2,5%	80,4°

Field Angle

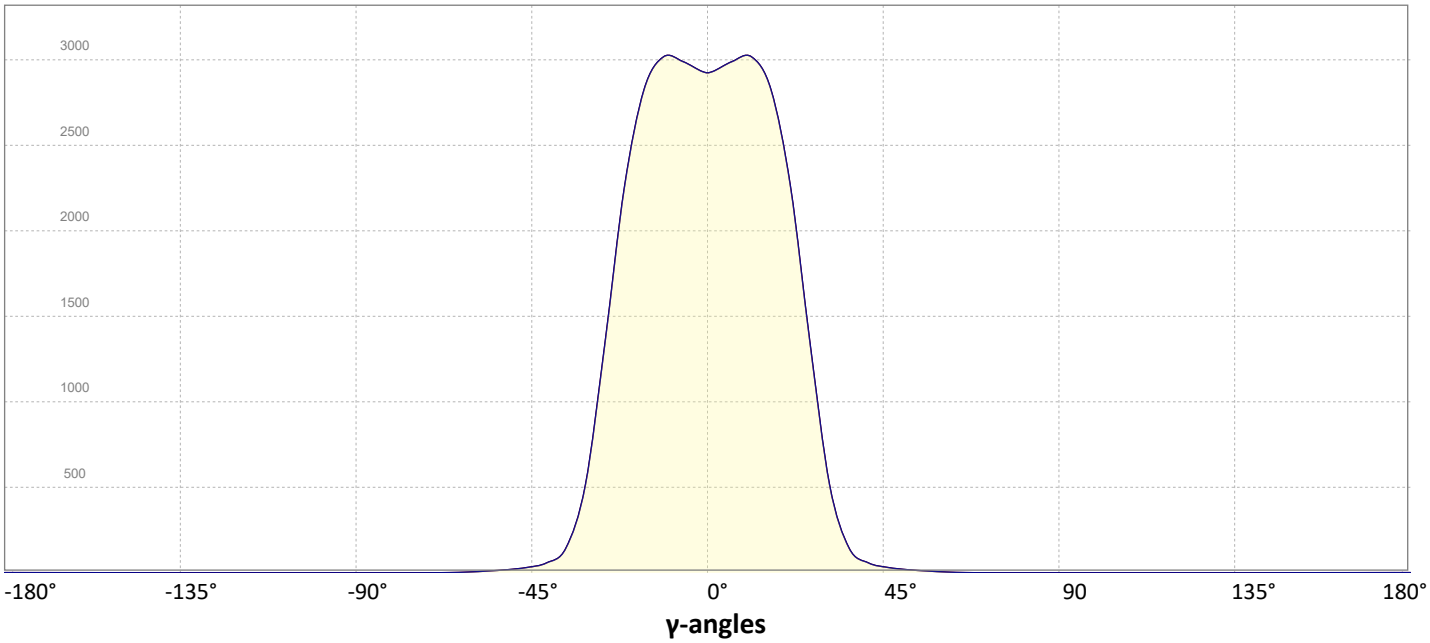
Average 10%	68,3°

Intensity Ratio

In 120° cone	99,8%
In 90° cone	98,7%

C000-C180
C090-C270

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



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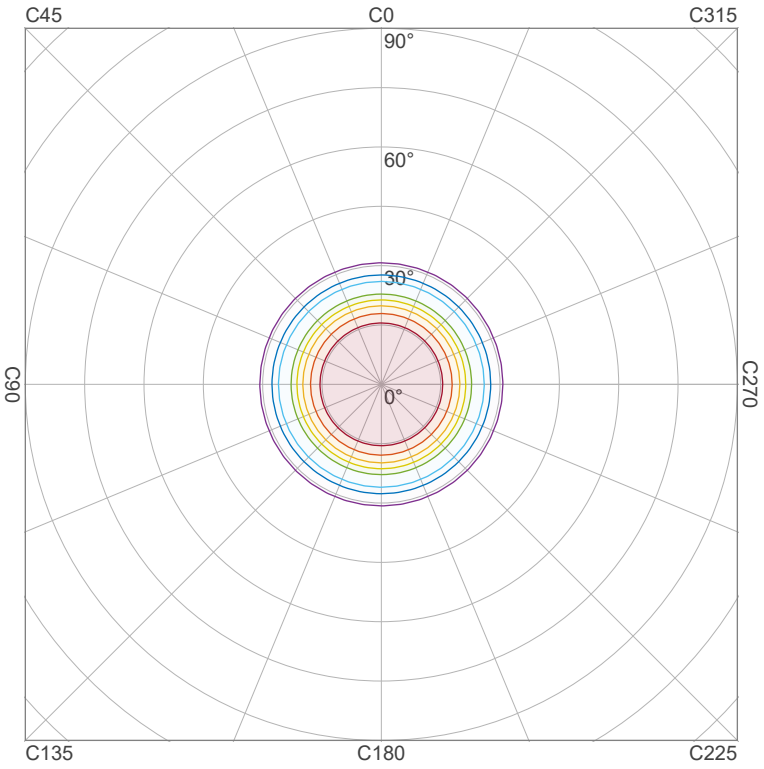
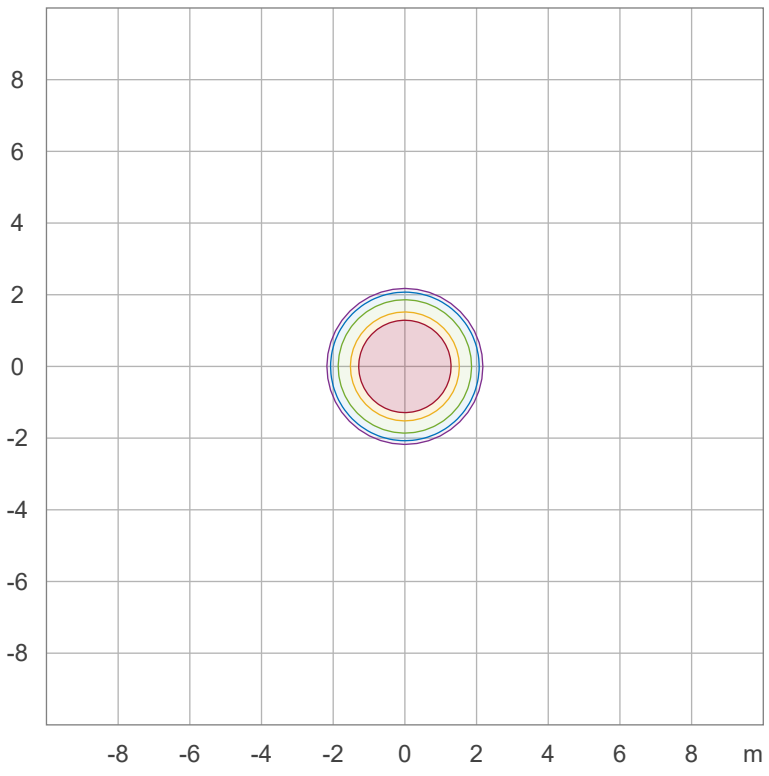
Iso-intensity Diagram (Iso-candela)



90 %	2714,6 cd
80 %	2412,9 cd
70 %	2111,3 cd
60 %	1809,7 cd
50 %	1508,1 cd
40 %	1206,5 cd
30 %	904,9 cd
20 %	603,2 cd
10 %	301,6 cd

Peak intensity: 3016,2 cd
Number of c-planes: 20

Iso-illuminance Diagram (Iso-lux)



50,0 %	163,4 lx
30,0 %	98,0 lx
10,0 %	32,7 lx
5,0 %	16,3 lx
3,0 %	9,8 lx

Peak illuminance: 326,8 lx
Mounting height: 3,0 m
Number of c-planes: 20

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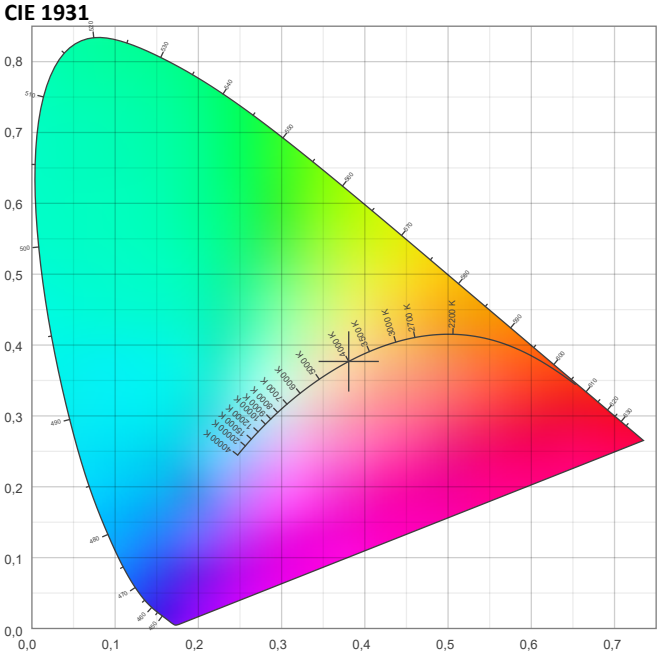
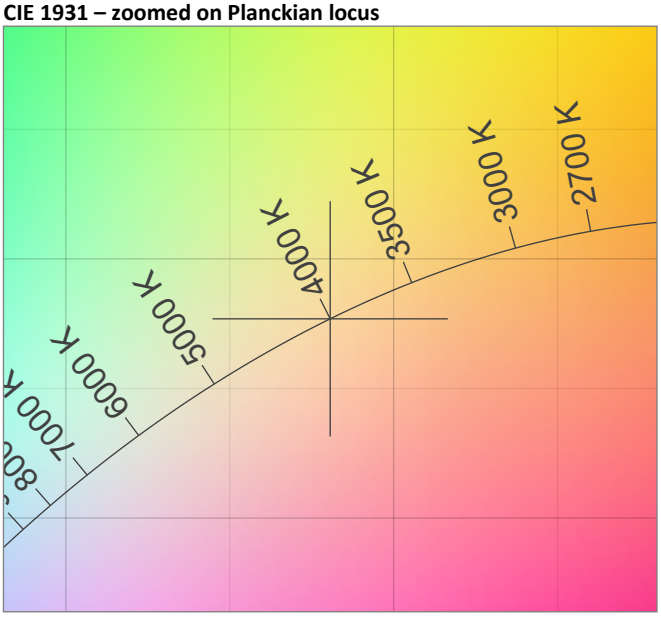
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4132 K
Color Rendering Index	CRI 92,8
Color Rendering Index, R9 (red component)	R9 = 53,9
Color Rendering TM30-18	R_f 90,1 – R_g 96,2
Color Quality Scale	CQS = 92,0
MacAdam Steps	SDCM = 3,2
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 = 0,0022
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

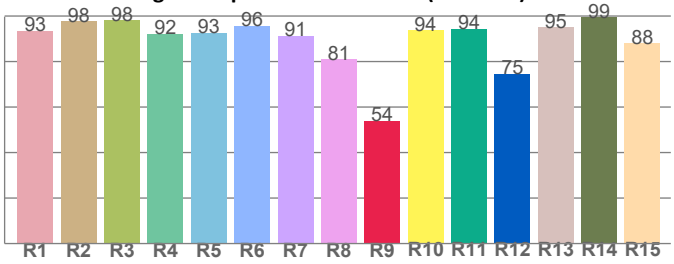
CIE 1931



CIE 1931 – zoomed on Planckian locus



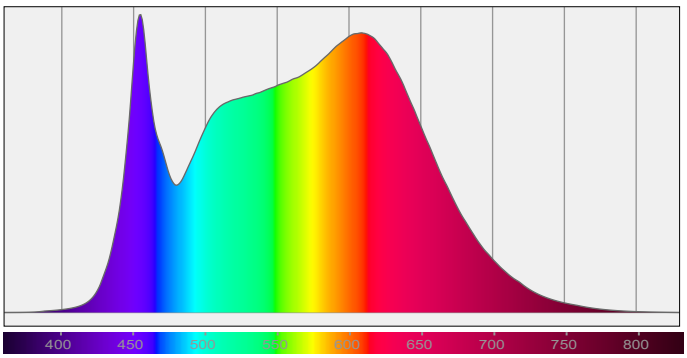
Color Rendering Index per reference color (CIE 1995)



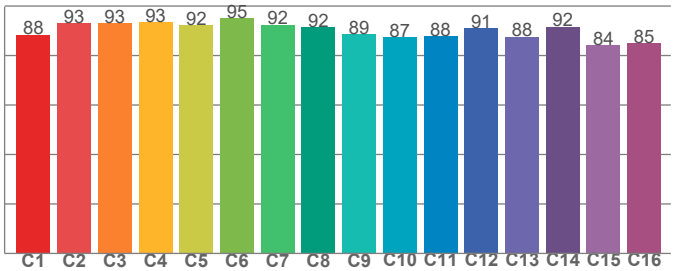
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
93,5	97,6	98,2	92,2	92,7	95,8	91,3	81,1	53,9	93,9	94,5	74,6	95,1	99,5	88,0

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



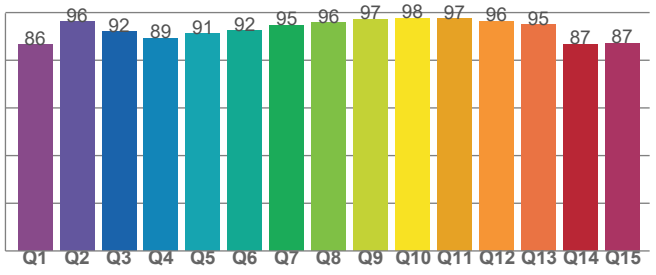
TM30-18 Rf-values per hue bin



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
88,4	93,1	93,1	93,5	92,2	95,2	92,4	91,5	88,6	87,3	87,8	91,0	87,6	91,6	84,1	85,0

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
86,5	96,2	91,9	89,3	91,2	92,5	94,7	95,8	97,2	97,6	97,5	96,3	95,0	86,6	87,0

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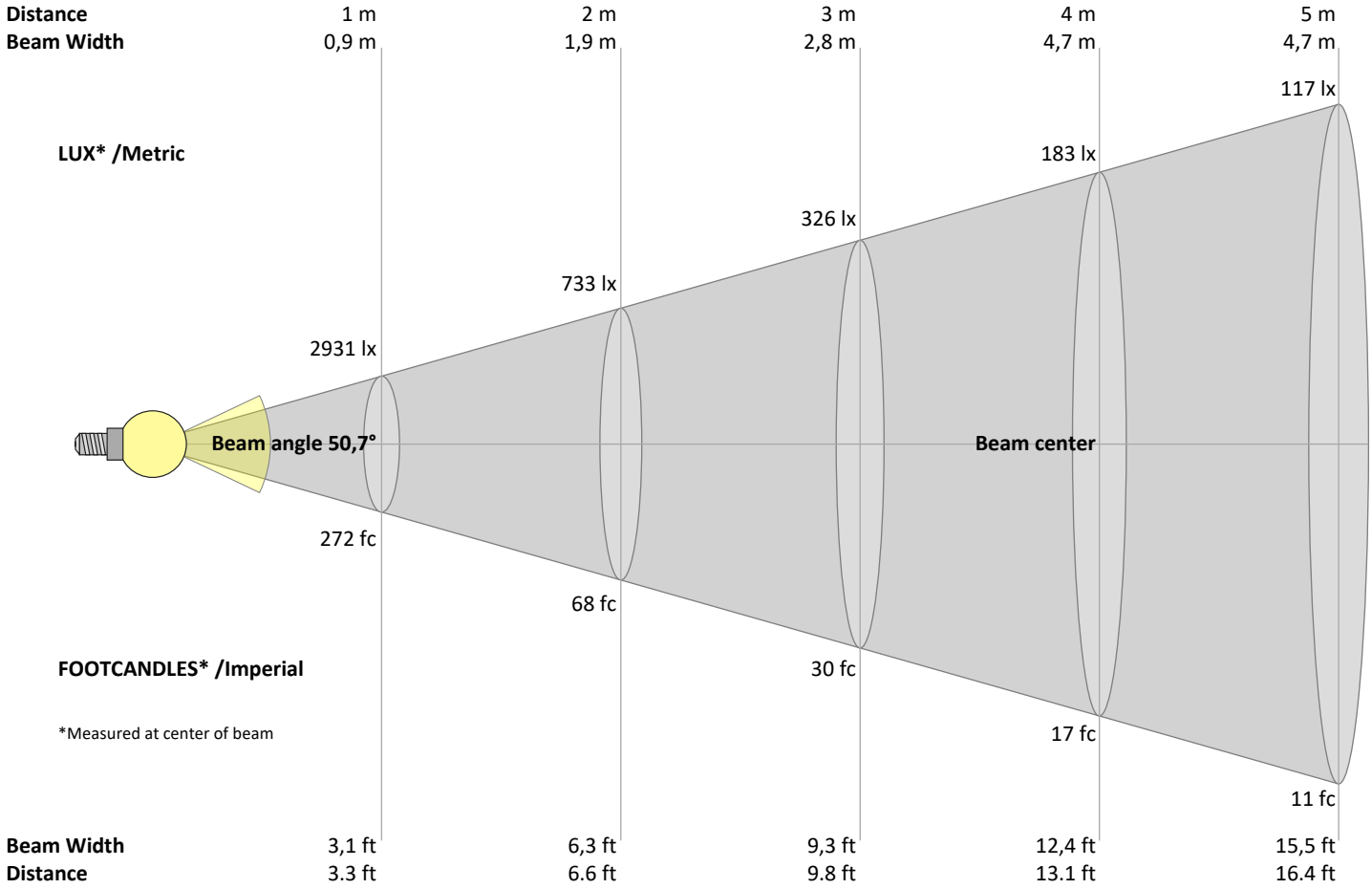
Beam Details



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
2931	733	326	183	117	81	60	46	36	29	24	20	17	15	13	11	10	9	8	7	lux
272,3	68,1	30,3	17	10,9	7,6	5,6	4,3	3,4	2,7	2,3	1,9	1,6	1,4	1,2	1,1	0,9	0,8	0,8	0,7	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
2931	2940	2963	2986	2999	3011	2989	2912	2835	2628	2401	2122	1756	1390	1054	723	460	312	163	114	cd
100%	100%	101%	102%	102%	103%	102%	99%	97%	90%	82%	72%	60%	47%	36%	25%	16%	11%	6%	4%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
2931	2940	2963	2986	2999	3011	2989	2912	2835	2628	2401	2122	1756	1390	1054	723	460	312	163	114	cd
100%	100%	101%	102%	102%	103%	102%	99%	97%	90%	82%	72%	60%	47%	36%	25%	16%	11%	6%	4%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
2931	2940	2963	2986	2999	3011	2989	2912	2835	2628	2401	2122	1756	1390	1054	723	460	312	163	114	cd
100%	100%	101%	102%	102%	103%	102%	99%	97%	90%	82%	72%	60%	47%	36%	25%	16%	11%	6%	4%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
2931	2940	2963	2986	2999	3011	2989	2912	2835	2628	2401	2122	1756	1390	1054	723	460	312	163	114	cd
100%	100%	101%	102%	102%	103%	102%	99%	97%	90%	82%	72%	60%	47%	36%	25%	16%	11%	6%	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	17,5	18,0	17,6	18,3	18,4	17,5	18,0	17,6	18,3	18,4
	3H	17,2	17,9	17,6	18,1	18,3	17,2	17,9	17,6	18,1	18,3
	4H	17,1	17,8	17,5	18,0	18,2	17,1	17,8	17,5	18,0	18,2
	6H	17,1	17,7	17,4	17,9	18,3	17,1	17,7	17,4	17,9	18,3
	8H	17,1	17,6	17,4	17,9	18,3	17,1	17,6	17,4	17,9	18,3
	12H	17,0	17,5	17,4	17,9	18,3	17,0	17,5	17,4	17,9	18,3
4H	2H	17,1	17,8	17,5	18,0	18,2	17,1	17,8	17,5	18,0	18,2
	3H	17,0	17,5	17,4	17,9	18,3	17,0	17,5	17,4	17,9	18,3
	4H	16,9	17,3	17,3	17,8	18,3	16,9	17,3	17,3	17,8	18,3
	6H	16,8	17,3	17,3	17,6	18,0	16,8	17,3	17,3	17,6	18,0
	8H	16,7	17,2	17,2	17,5	17,9	16,7	17,2	17,2	17,5	17,9
	12H	16,7	17,0	17,2	17,4	17,9	16,7	17,0	17,2	17,4	17,9
8H	4H	16,7	17,2	17,2	17,5	17,9	16,7	17,2	17,2	17,5	17,9
	6H	16,7	17,0	17,2	17,4	18,0	16,7	17,0	17,2	17,4	18,0
	8H	16,7	16,9	17,2	17,4	18,0	16,7	16,9	17,2	17,4	18,0
	12H	16,6	16,8	17,2	17,3	17,9	16,6	16,8	17,2	17,3	17,9
12H	4H	16,7	17,0	17,2	17,4	17,9	16,7	17,0	17,2	17,4	17,9
	6H	16,7	16,9	17,2	17,4	18,0	16,7	16,9	17,2	17,4	18,0
	8H	16,6	16,8	17,2	17,3	17,9	16,6	16,8	17,2	17,3	17,9

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	6,2 / -11,1	6,2 / -11,1
S = 1.5H	9,0 / -16,6	9,0 / -16,6
S = 2.0H	10,9 / -23,0	10,9 / -23,0

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	111	106	106	106	102	102	102	100
1	114	112	109	107	112	110	108	106	106	104	103	102	101	99	98	97	97	95
2	109	105	102	99	107	103	100	97	100	98	95	97	95	93	95	93	91	90
3	105	99	95	91	103	98	94	91	95	92	89	93	90	88	91	88	87	85
4	100	94	89	85	99	93	88	85	91	87	84	89	86	83	87	84	82	81
5	96	89	84	80	95	88	83	80	86	82	79	85	81	78	83	80	78	76
6	92	85	79	76	91	84	79	75	82	78	75	81	77	74	80	76	74	73
7	89	80	75	72	87	80	75	71	79	74	71	77	74	71	76	73	70	69
8	85	77	71	68	84	76	71	68	75	71	67	74	70	67	73	70	67	66
9	82	73	68	65	81	73	68	64	72	67	64	71	67	64	70	67	64	63
10	78	70	65	62	78	70	65	61	69	64	61	68	64	61	67	64	61	60

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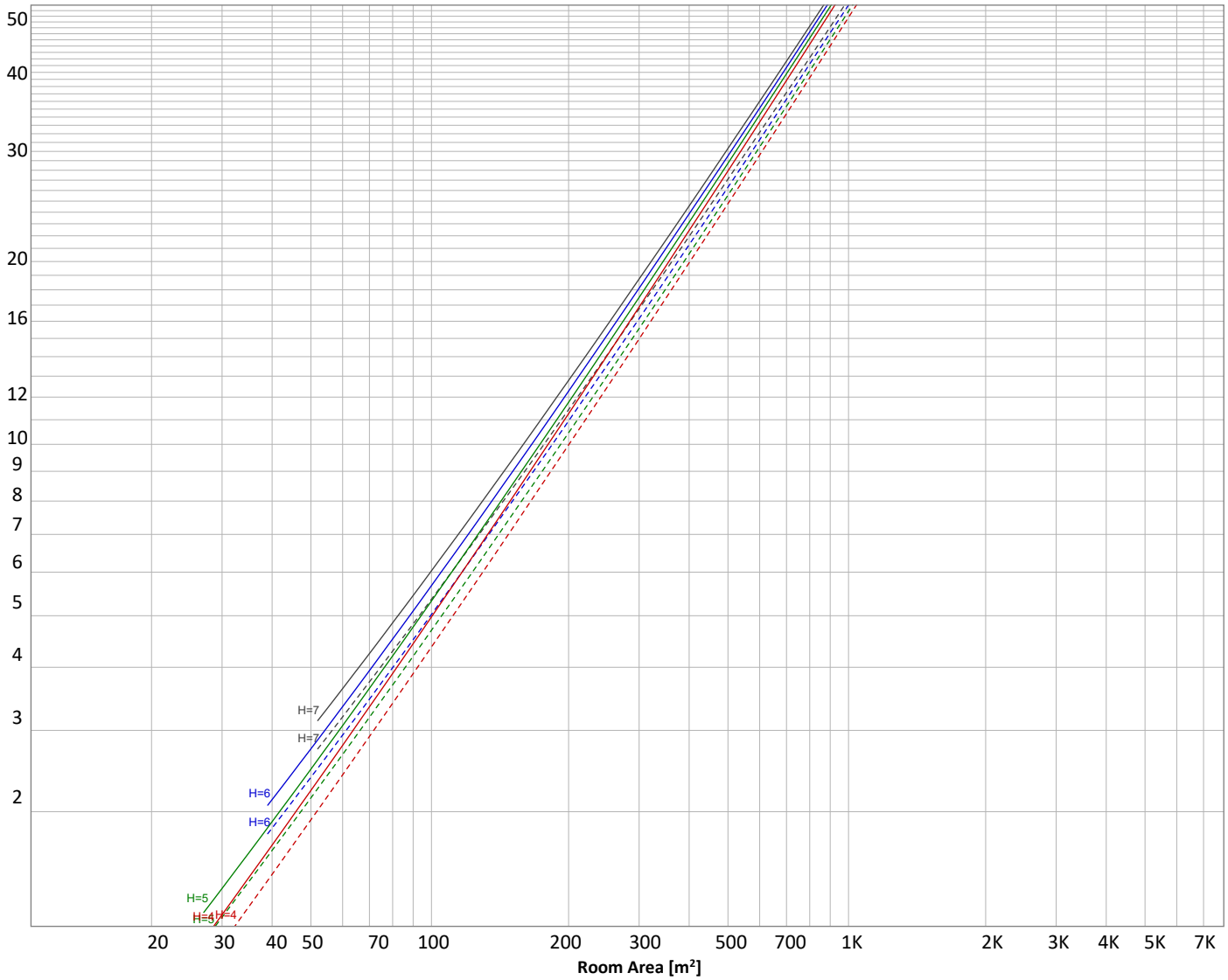
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1991 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°
285 lm	792 lm	707 lm	164 lm	29,8 lm	11,0 lm	2,14 lm	0,127 lm	0,013 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,009 lm	0,002 lm	0,001 lm	0,005 lm	0,023 lm	0,148 lm	0,276 lm	0,229 lm	0,097 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	285 lm	14,3%
10-20°	792 lm	39,8%
20-30°	707 lm	35,5%
30-40°	164 lm	8,2%
40-50°	30 lm	1,5%
50-60°	11 lm	0,6%
60-70°	2 lm	0,1%
70-80°	0 lm	0,0%
80-90°	0 lm	0,0%
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	1991 lm	100,0%

Intensity peaks

Max intensity	3018 cd
Intensity, 90°	0 cd
Intensity, 0°	2931 cd

Zonal Lumen summary

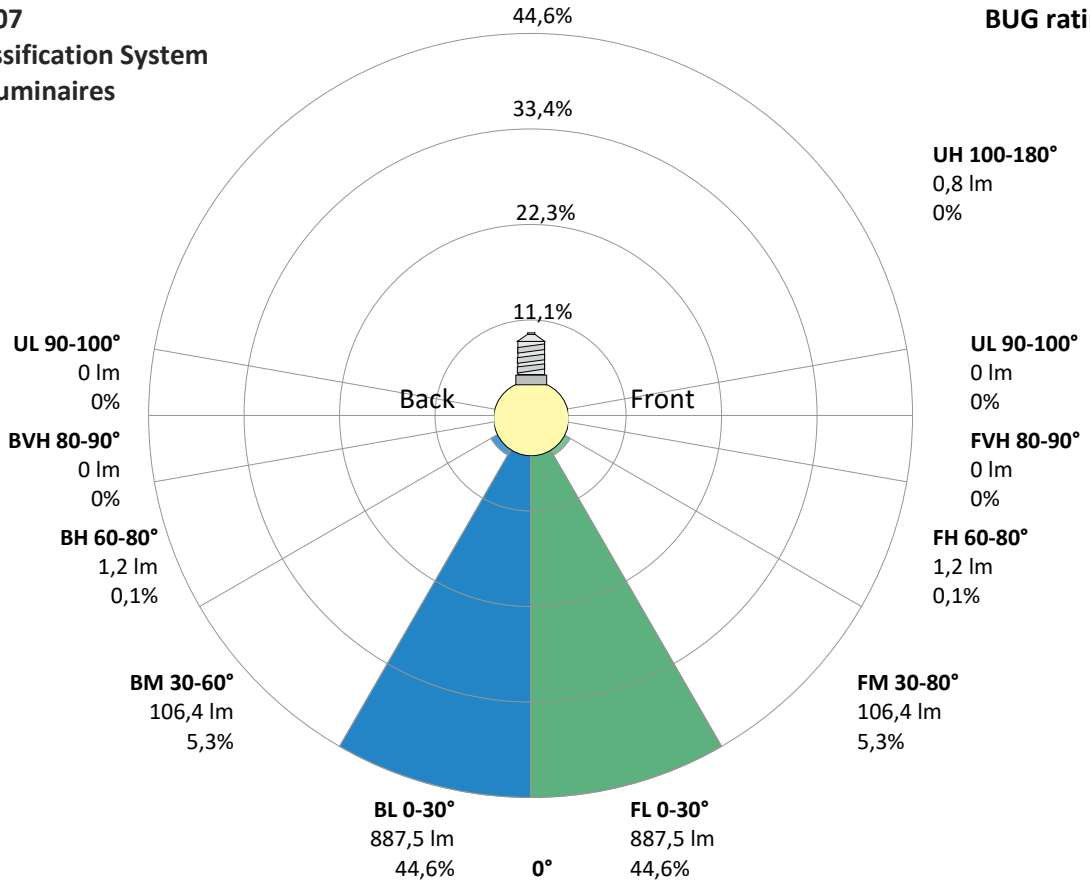
Zone (γ)	Lumen	% Total
0-30°	1783 lm	89,6%
0-40°	1947 lm	97,8%
0-60°	1988 lm	99,8%
60-90°	2 lm	0,1%
70-100°	0 lm	0,0%
90-120°	0 lm	0,0%
0-90°	1990 lm	100,0%
90-180°	1 lm	0,0%
0-180°	1991 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	887 lm	44,6%
Medium(30-60°)	106 lm	5,3%
High(60-80°)	1 lm	0,1%
Very high(80-90°)	0 lm	0,0%
Back light		
Low(0-30°)	887 lm	44,6%
Medium(30-60°)	106 lm	5,3%
High(60-80°)	1 lm	0,1%
Very high(80-90°)	0 lm	0,0%
Uplight		
Low(90-100°)	0 lm	0,0%
High(100-180°)	1 lm	0,0%

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

BUG rating B2 U1 G0



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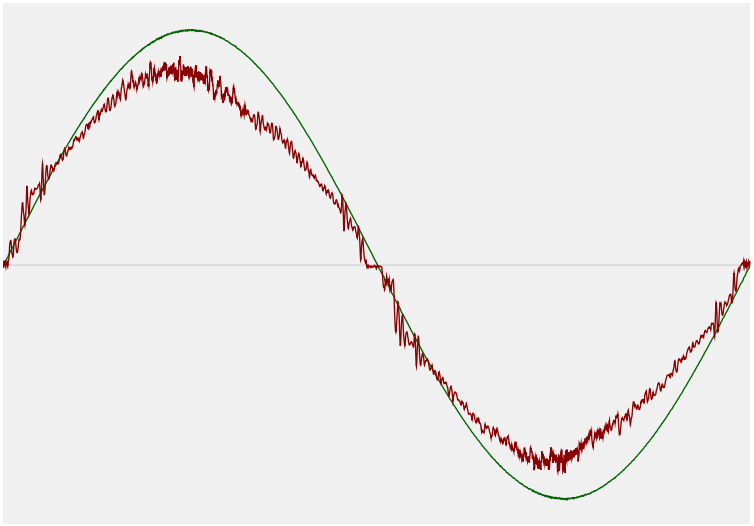
Power Details

Input Power

Power feed to light source	29,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,129 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	29,78 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,99
Total harmonic distortion of the current	5,21%
Total harmonic distortion of the voltage	0,12%

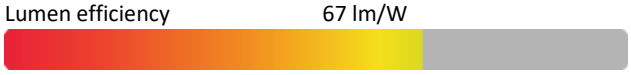
Input Power Curve



Efficiency

Radiated power efficiency 21,8%

Lumen efficiency 67 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3957 K
CCT shift	+43 K
CCT end	4000 K

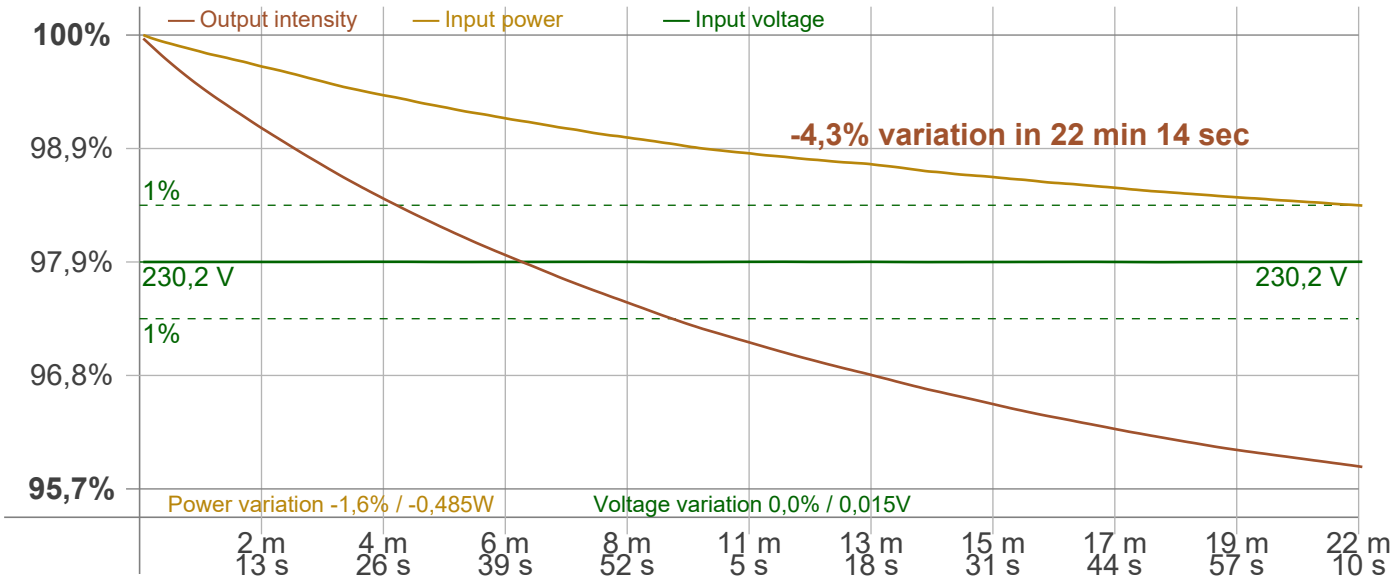
Warmup Result

Total warmup time	Lamp stabilized in 22 min 14 sec
Warmup variation	-4,3%

Output Change

Output start	2079 lm
Output change	-88 lm
Output end	1991 lm

Stabilization Curve



Light Measurement Report

Print date: 15-5-2025
Measurement date and time: 15-5-2025 15:16:43 – Measurement no. VFR-250515-1278-MS
Measurement tracking No. and Link: VT250515-004821
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	93,46 Hz
Percent Flicker	0,31 %
Flicker index	0

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

PstLM value (F < 80 Hz)	0,08
SVM value (80 < F < 2000 Hz)	0

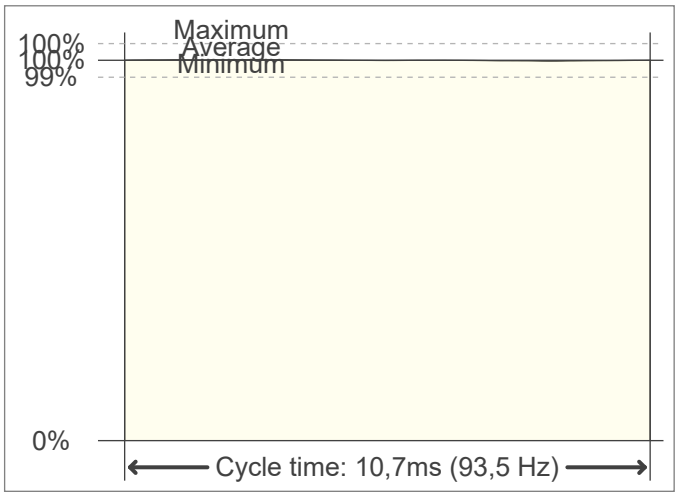
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,09 %
JA8/10 90 Hz	0,15 %
JA8/10 200 Hz	0,25 %
JA8/10 400 Hz	0,3 %
JA8/10 1000 Hz	0,3 %

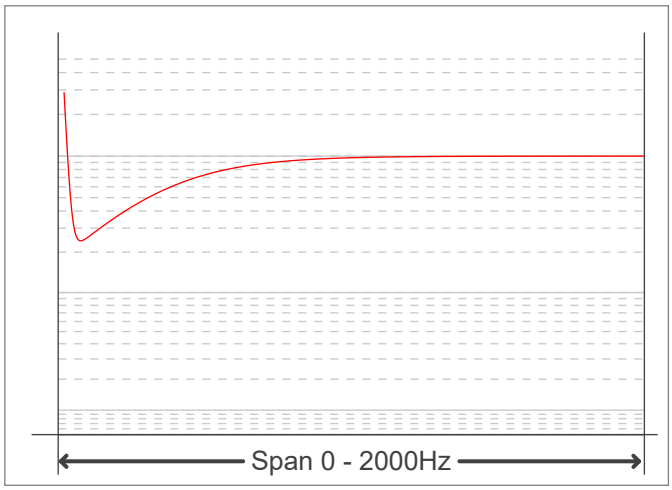
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0,05

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot