Light Measurement Report

Print date: 13-5-2025
Measurement date and time: 13-5-2025 16:25:51 – Measurement no. VFR-250513-1237-MS
Measurement tracking No. and Link: VT250513-000329
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

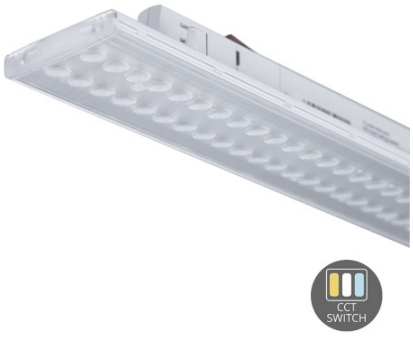
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	4,79 m
Input Power, Power and Displ. Factors	18,2 W – PF 0,97 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,082 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

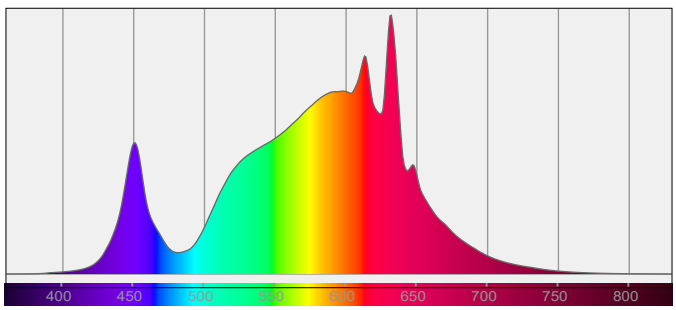
Tested Light Source

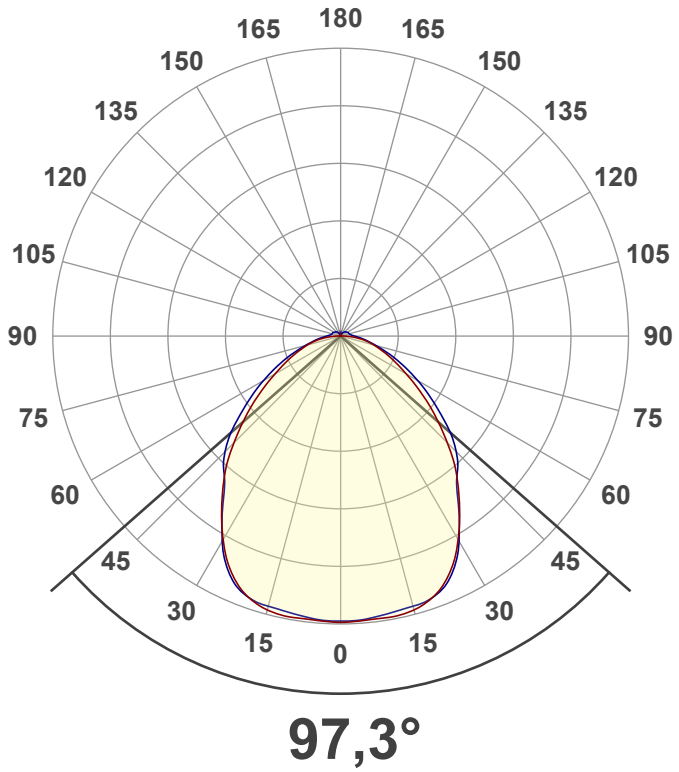
Product Name	803209-3000K-18W
Item No. and Manufacturer	803209-3000K-18W – Dutchfulfillment
Product Description (line 1)	3-FASE RAILARMATUUR | TARVOS | 60CM | WIT | CCT SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	2480 lm – 3,95% / 96,05%
Efficiency	136 lm/W
Peak Intensity and Beam Angle	981 cd – 97,3°
Correlated Color Temperature, Target/Measured	CCT = 3000 K / 3123 K
Color Rendering Index	CRI 81,2
Color Rendering TM30-18	R_f 81,7 – R_g 98,9
Color Shift, CIE duv and MacAdam Steps	Duv 0,0012 – SDCM 4,2
Flicker	SVM 0,04 – PstLM 0,06







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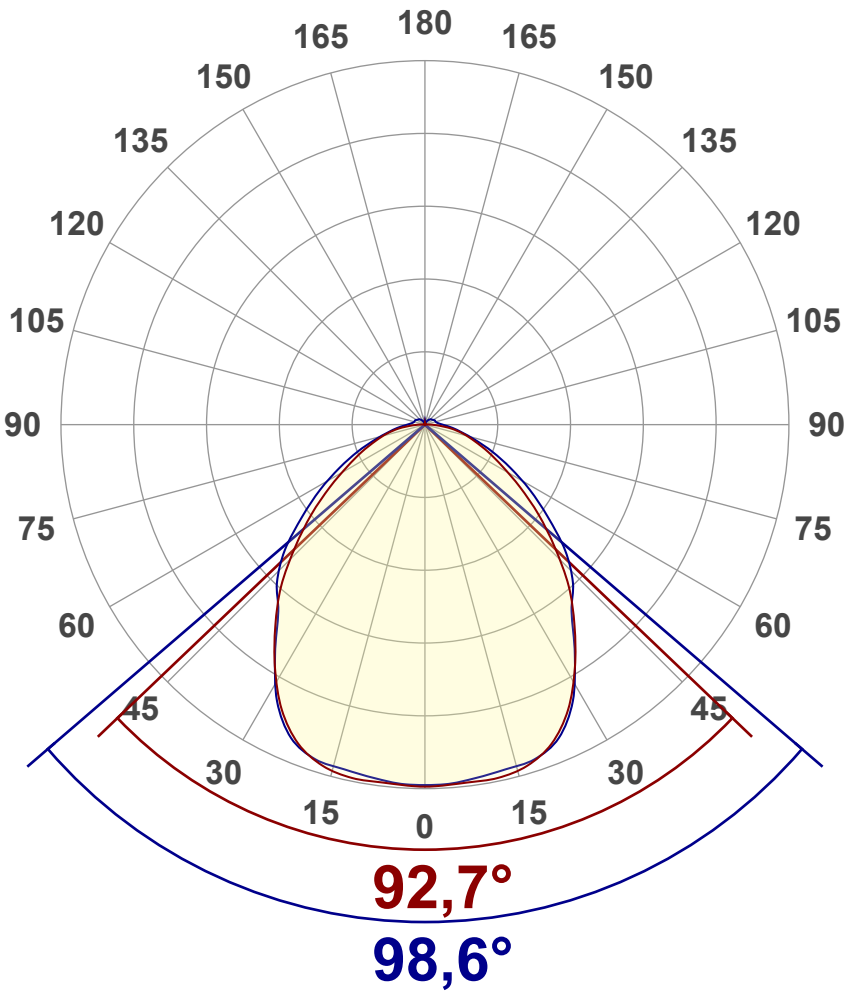
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2480 lm
Lumen Up% / Down%	3,95% / 96,05%
Peak Intensity	981 cd
Beam Angle (50%)	97,3°
Beam Angle (90%)	98,6°
Beam Angle (10%)	92,7°

Cut-off Angle

Average 2,5%	208,5°

Field Angle

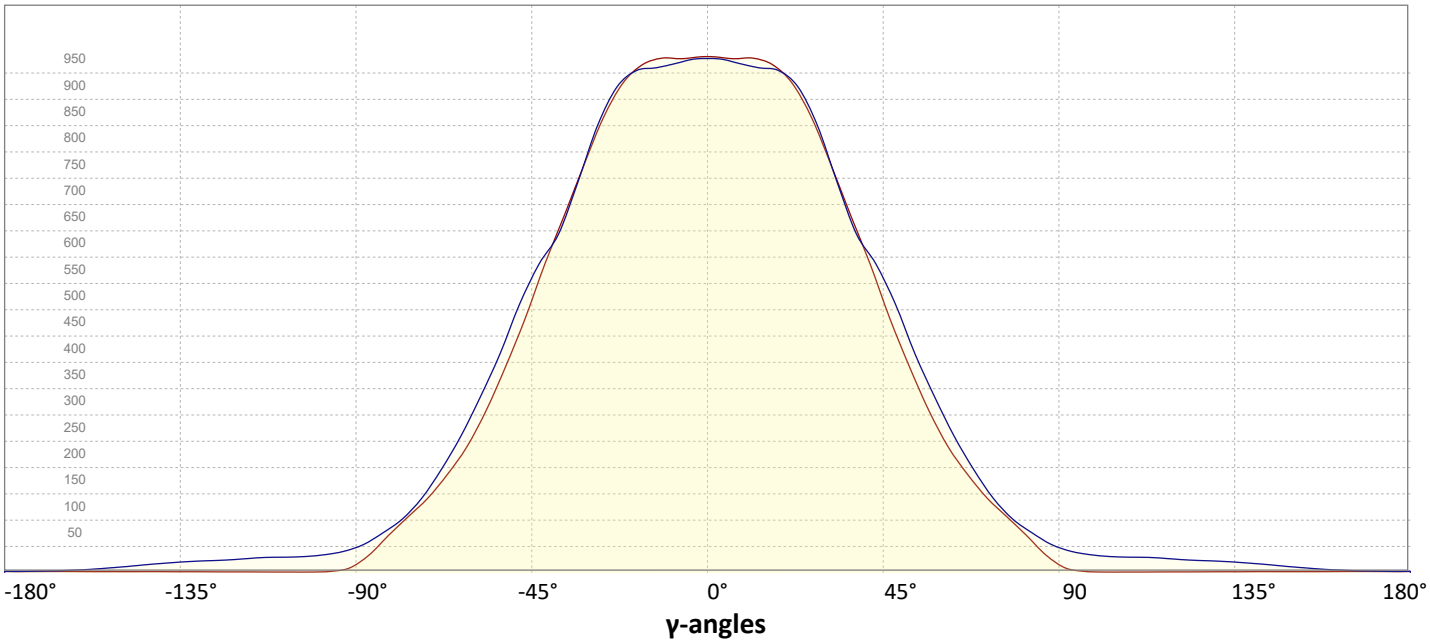
Average 10%	156°

Intensity Ratio

In 120° cone	79,4%
In 90° cone	57,6%

C000-C180
C090-C270

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



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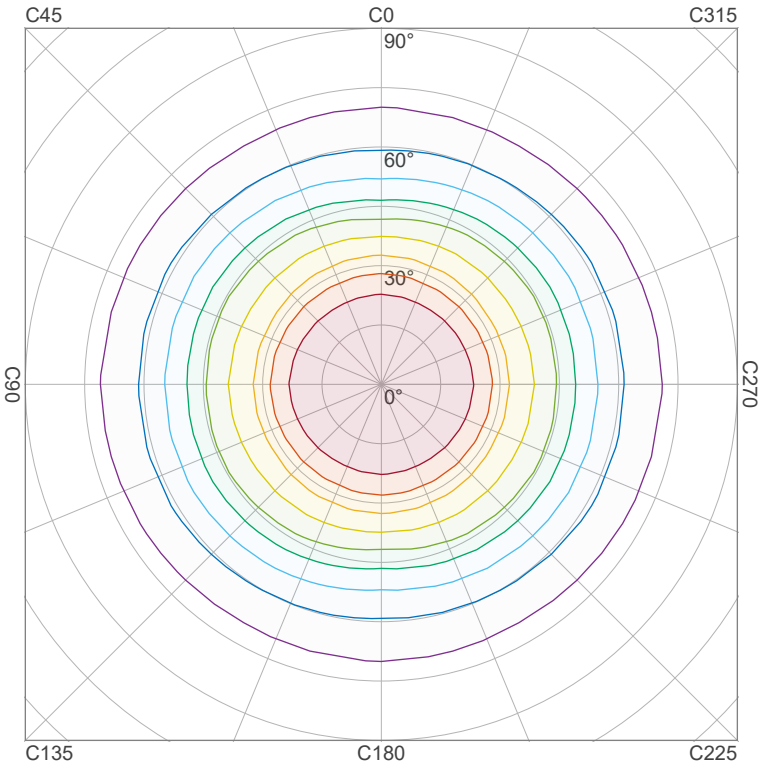
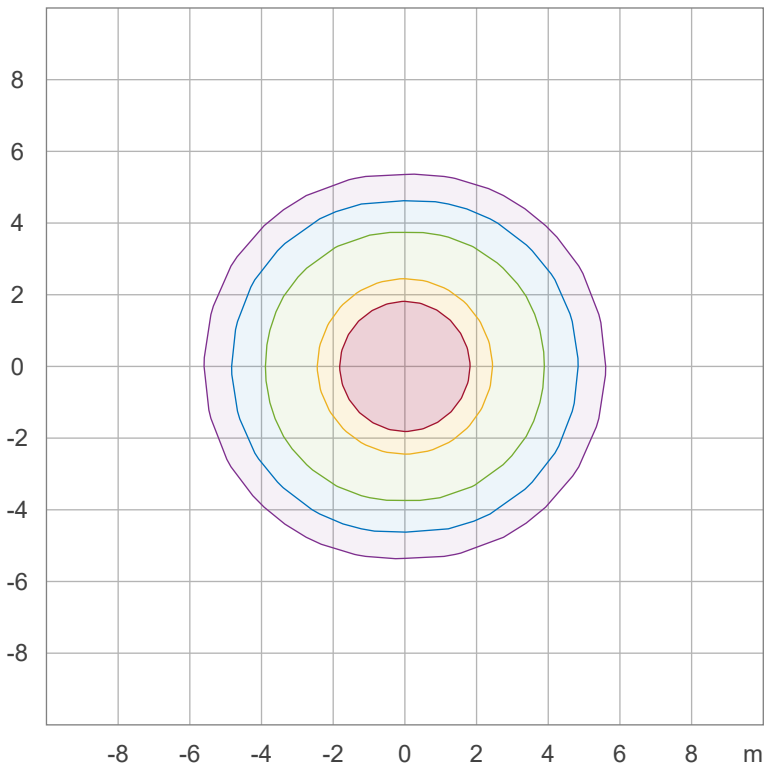
Iso-intensity Diagram (Iso-candela)



90 %	882,8 cd
80 %	784,7 cd
70 %	686,6 cd
60 %	588,5 cd
50 %	490,4 cd
40 %	392,3 cd
30 %	294,3 cd
20 %	196,2 cd
10 %	98,1 cd

Peak intensity: 980,8 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	54,5 lx
30,0 %	32,7 lx
10,0 %	10,9 lx
5,0 %	5,4 lx
3,0 %	3,3 lx

Peak illuminance: 108,9 lx
Mounting height: 3,0 m
Number of c-planes: 12

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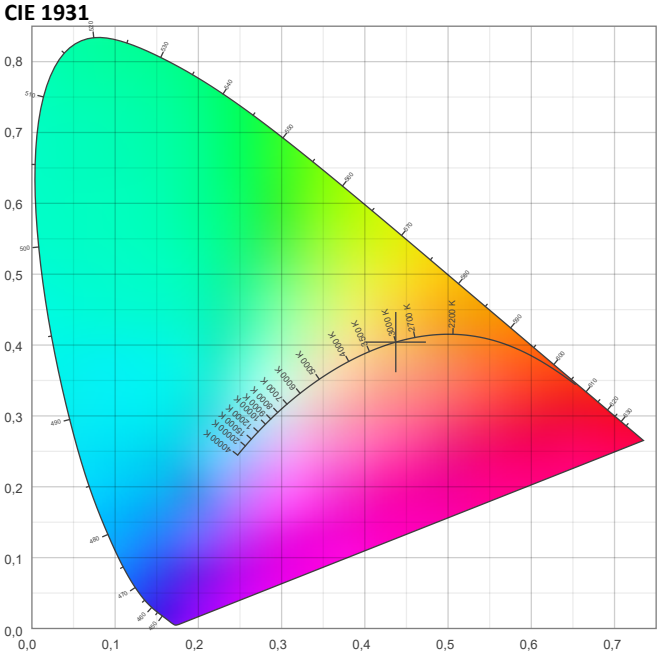
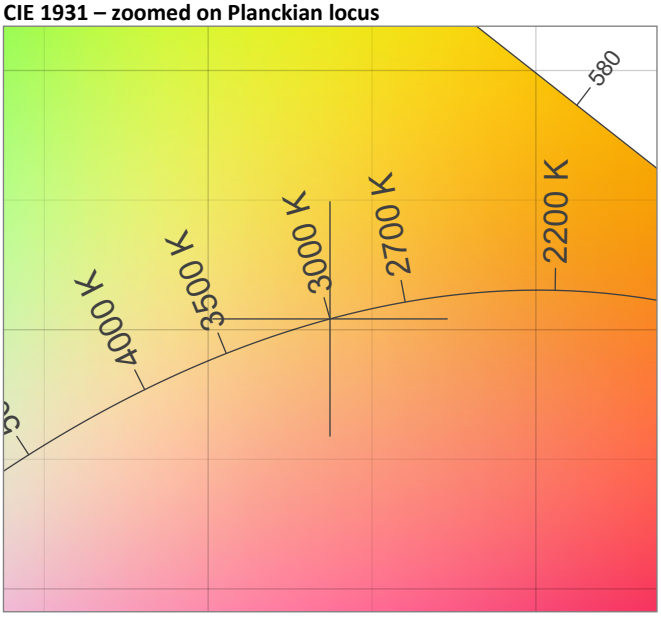
Color details

Correlated Color Temperature, Target	CCT = 3000 K
Correlated Color Temperature, Measured	CCT = 3123 K
Color Rendering Index	CRI 81,2
Color Rendering Index, R9 (red component)	R9 = 13,0
Color Rendering TM30-18	R_f 81,7 – R_g 98,9
Color Quality Scale	CQS = 80,0
MacAdam Steps	SDCM = 4,2
Color coordinates CIE 1931	(x;y) = (0,437;0,404)
Color coordinate CIEs 1960	(u;v) = (0,251;0,348)
Color deviation from BBL	Duv = 0,0012
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,251;0,521)

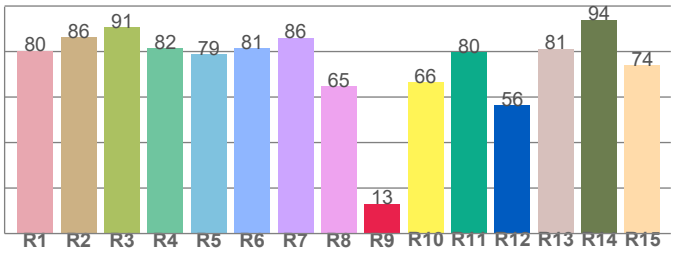
CIE 1931



CIE 1931 – zoomed on Planckian locus



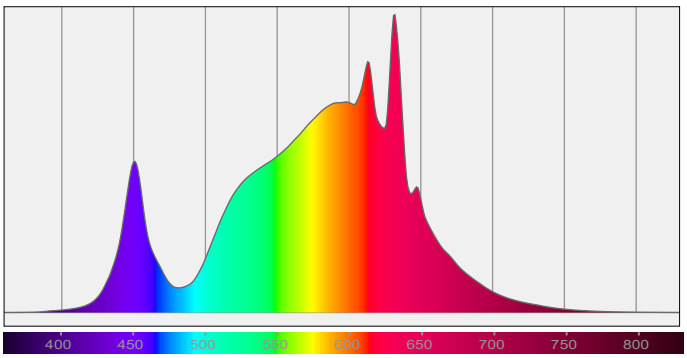
Color Rendering Index per reference color (CIE 1995)



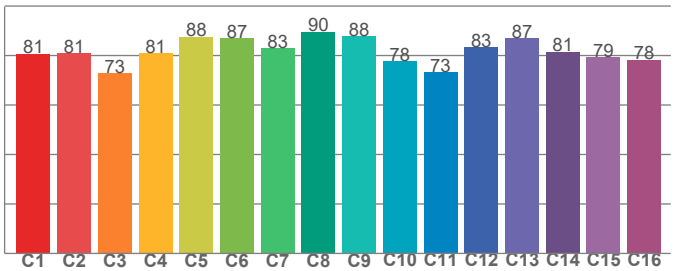
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,4	86,2	90,6	81,6	78,7	81,4	86,0	64,7	13,0	66,5	79,7	56,5	81,2	93,9	74,0

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



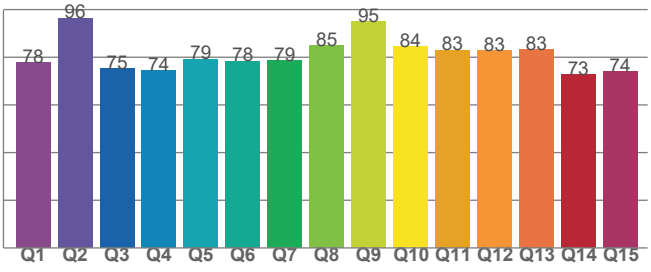
TM30-18 Rf-values per hue bin



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
80,7	81,0	72,9	81,0	87,5	87,0	83,0	89,6	87,9	77,7	73,2	83,4	87,0	81,5	79,3	78,3

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
77,8	96,4	75,1	74,4	79,2	78,3	78,6	84,8	95,0	84,4	82,9	82,7	83,2	72,7	74,0

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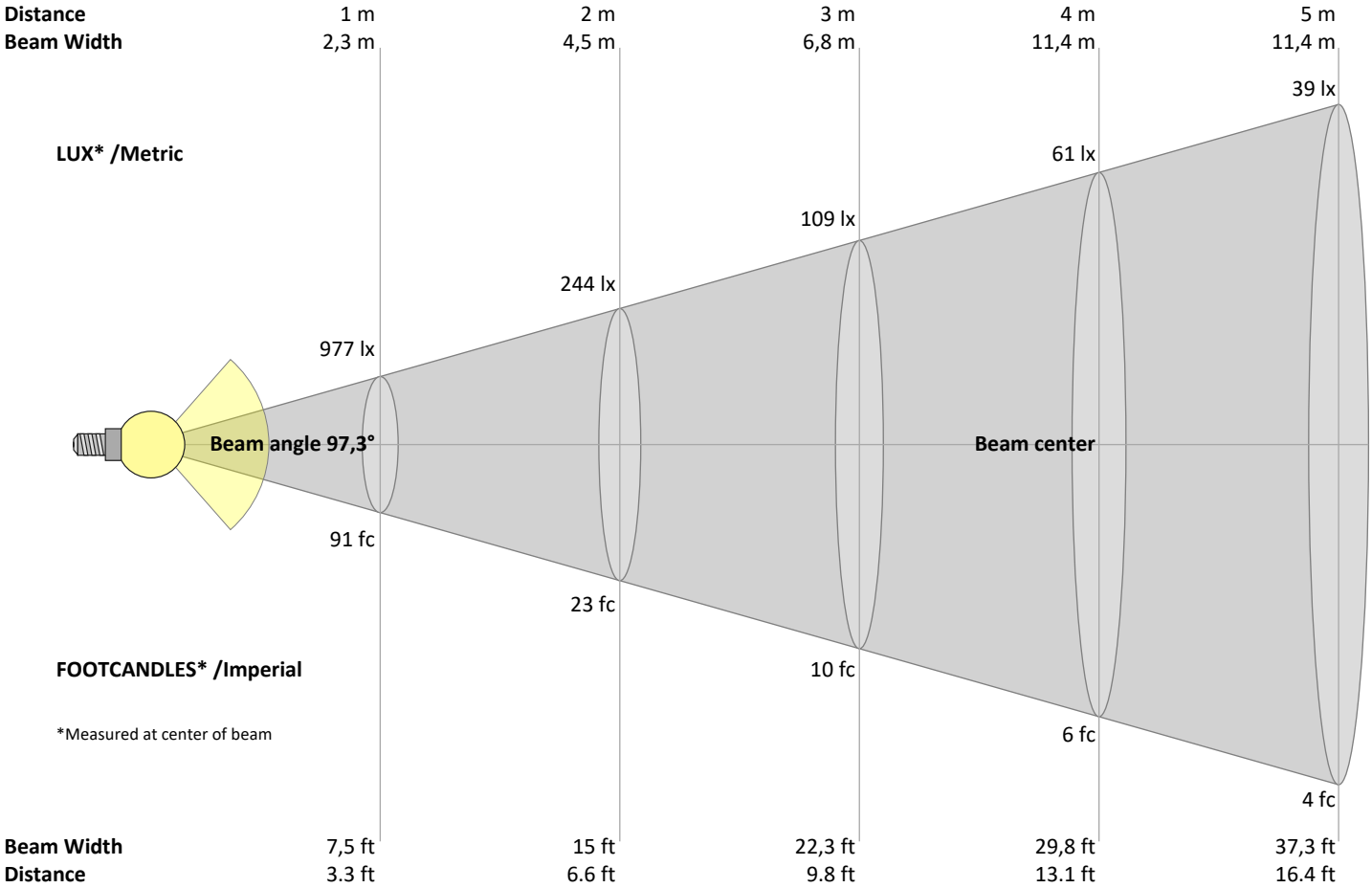
Beam Details



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
977	244	109	61	39	27	20	15	12	10	8	7	6	5	4	4	3	3	3	2	lux
90,8	22,7	10,1	5,7	3,6	2,5	1,9	1,4	1,1	0,9	0,8	0,6	0,5	0,5	0,4	0,4	0,3	0,3	0,3	0,2	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
977	978	978	970	942	887	805	711	617	518	423	337	262	204	156	118	83	46	17	5	cd
100%	100%	100%	99%	96%	91%	82%	73%	63%	53%	43%	34%	27%	21%	16%	12%	8%	5%	2%	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
977	973	965	958	943	897	811	706	623	558	475	386	307	236	176	127	92	67	49	38	cd
100%	100%	99%	98%	97%	92%	83%	72%	64%	57%	49%	39%	31%	24%	18%	13%	9%	7%	5%	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
977	978	978	970	942	887	805	711	617	518	423	337	262	204	156	118	83	46	17	5	cd
100%	100%	100%	99%	96%	91%	82%	73%	63%	53%	43%	34%	27%	21%	16%	12%	8%	5%	2%	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
977	973	965	958	943	897	811	706	623	558	475	386	307	236	176	127	92	67	49	38	cd
100%	100%	99%	98%	97%	92%	83%	72%	64%	57%	49%	39%	31%	24%	18%	13%	9%	7%	5%	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	21,5	22,6	21,8	22,9	23,2	22,1	23,3	22,4	23,6	23,9
	3H	22,4	23,6	22,9	23,9	24,2	23,2	24,4	23,7	24,7	25,0
	4H	22,9	24,0	23,3	24,3	24,6	23,8	24,9	24,2	25,2	25,5
	6H	23,3	24,3	23,7	24,6	25,1	24,3	25,3	24,7	25,6	26,1
	8H	23,5	24,4	23,9	24,8	25,3	24,6	25,5	25,0	25,9	26,4
	12H	23,6	24,5	24,0	24,9	25,4	24,8	25,8	25,3	26,1	26,7
4H	2H	22,0	23,0	22,4	23,4	23,7	22,5	23,6	23,0	23,9	24,3
	3H	23,2	24,1	23,6	24,5	25,0	23,9	24,8	24,4	25,2	25,7
	4H	23,7	24,6	24,2	25,0	25,6	24,5	25,4	25,0	25,8	26,4
	6H	24,2	25,1	24,8	25,5	25,9	25,1	25,9	25,7	26,4	26,8
	8H	24,5	25,2	25,0	25,6	26,1	25,5	26,2	26,0	26,6	27,1
	12H	24,6	25,2	25,2	25,7	26,3	25,8	26,4	26,4	26,9	27,5
8H	4H	24,0	24,7	24,5	25,1	25,6	24,7	25,4	25,2	25,8	26,3
	6H	24,7	25,2	25,2	25,7	26,4	25,5	26,0	26,0	26,6	27,2
	8H	25,0	25,5	25,6	26,1	26,8	26,0	26,4	26,5	27,0	27,7
	12H	25,3	25,7	25,9	26,2	26,9	26,5	26,9	27,1	27,4	28,1
12H	4H	24,0	24,6	24,6	25,1	25,6	24,7	25,3	25,2	25,8	26,3
	6H	24,8	25,3	25,3	25,8	26,5	25,6	26,0	26,1	26,6	27,3
	8H	25,1	25,5	25,8	26,1	26,8	26,0	26,5	26,7	27,0	27,7

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,1 / -0,2	0,1 / -0,1
S = 1.5H	0,3 / -0,5	0,2 / -0,3
S = 2.0H	0,6 / -0,8	0,5 / -0,6

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	103	103	103	98	98	98	96
1	108	104	100	96	105	101	97	94	96	93	90	92	89	87	87	85	84	81
2	99	91	85	79	96	89	83	78	85	80	76	81	77	73	78	74	71	69
3	91	81	73	67	88	79	72	66	76	69	64	72	67	63	69	65	61	59
4	84	72	64	58	81	71	63	57	68	61	56	65	59	55	62	57	53	51
5	77	65	56	50	75	64	56	50	61	54	49	59	53	48	57	51	47	45
6	72	59	50	44	69	58	50	44	56	48	43	53	47	42	52	46	42	40
7	67	54	45	39	65	53	45	39	51	44	38	49	43	38	47	42	37	35
8	62	49	41	35	60	48	40	35	47	40	35	45	39	34	44	38	34	32
9	58	45	37	32	57	44	37	32	43	36	31	42	35	31	40	35	31	29
10	55	42	34	29	53	41	34	29	40	33	29	39	33	28	38	32	28	26

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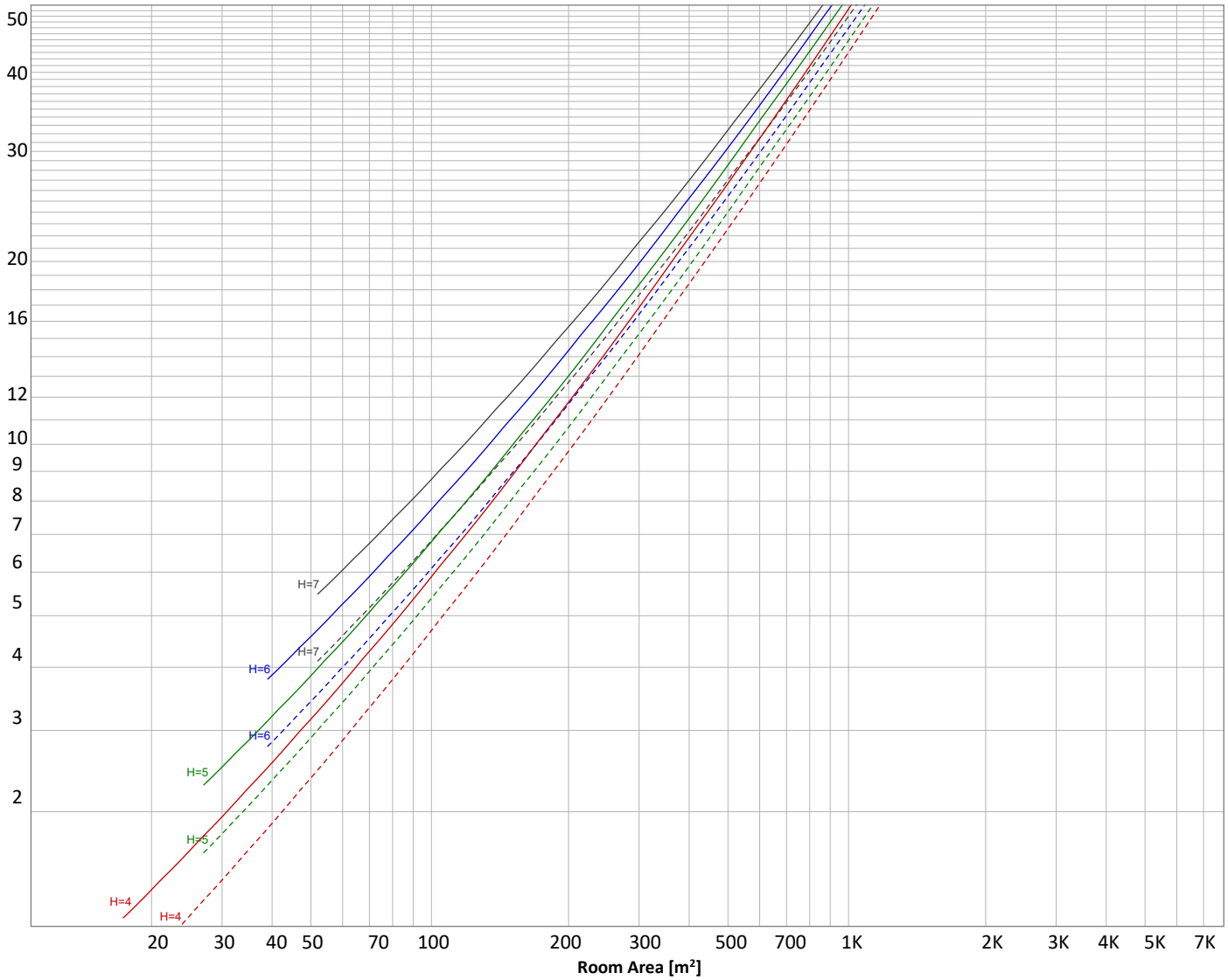
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2480 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°
93,0 lm	272 lm	407 lm	441 lm	421 lm	334 lm	223 lm	129 lm	61,9 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
27,3 lm	22,2 lm	17,8 lm	13,0 lm	9,05 lm	5,03 lm	2,35 lm	0,933 lm	0,246 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	93 lm	3,8%
10-20°	272 lm	11,0%
20-30°	407 lm	16,4%
30-40°	441 lm	17,8%
40-50°	421 lm	17,0%
50-60°	334 lm	13,5%
60-70°	223 lm	9,0%
70-80°	129 lm	5,2%
80-90°	62 lm	2,5%
90-100°	27 lm	1,1%
100-110°	22 lm	0,9%
110-120°	18 lm	0,7%
120-130°	13 lm	0,5%
130-140°	9 lm	0,4%
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	2480 lm	100,0%

Intensity peaks

Max intensity	981 cd
Intensity, 90°	17 cd
Intensity, 0°	977 cd

Zonal Lumen summary

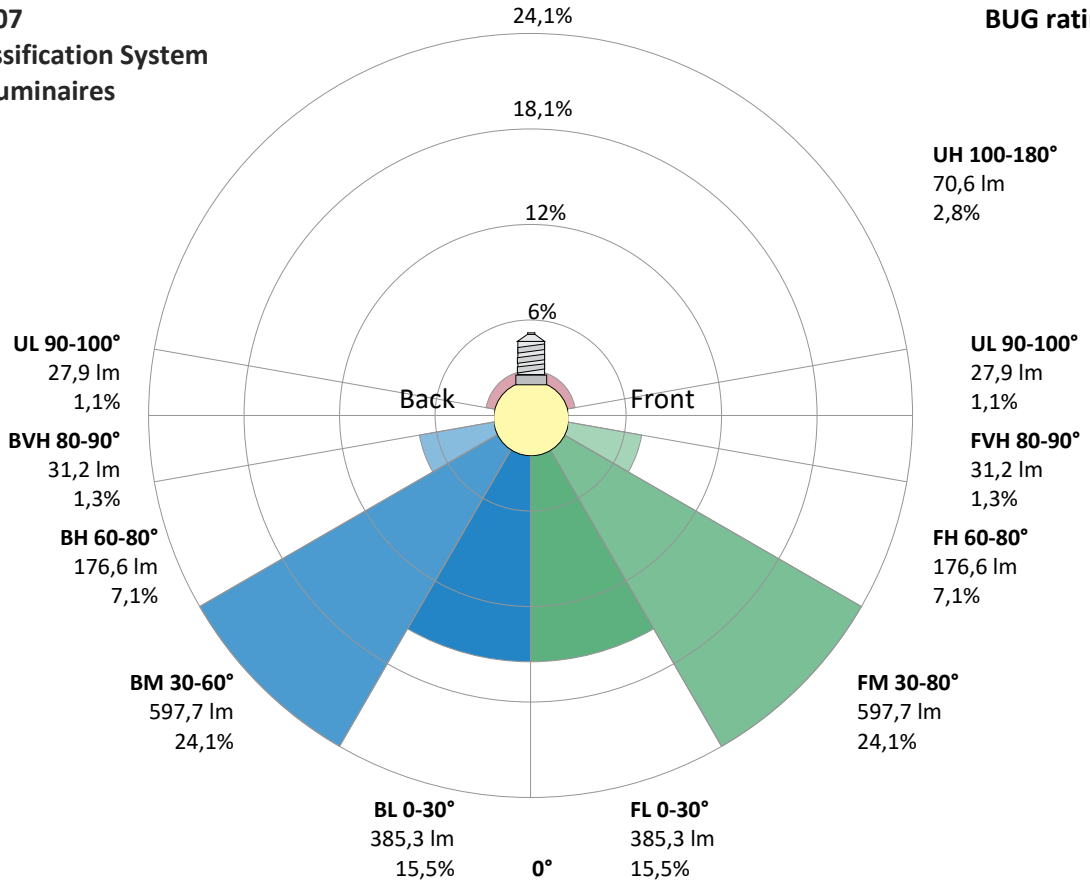
Zone (γ)	Lumen	% Total
0-30°	772 lm	31,1%
0-40°	1214 lm	48,9%
0-60°	1968 lm	79,4%
60-90°	414 lm	16,7%
70-100°	218 lm	8,8%
90-120°	67 lm	2,7%
0-90°	2382 lm	96,1%
90-180°	98 lm	3,9%
0-180°	2480 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	385 lm	15,5%
Medium(30-60°)	598 lm	24,1%
High(60-80°)	177 lm	7,1%
Very high(80-90°)	31 lm	1,3%
Back light		
Low(0-30°)	385 lm	15,5%
Medium(30-60°)	598 lm	24,1%
High(60-80°)	177 lm	7,1%
Very high(80-90°)	31 lm	1,3%
Uplight		
Low(90-100°)	28 lm	1,1%
High(100-180°)	71 lm	2,8%

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

BUG rating B1 U3 G1



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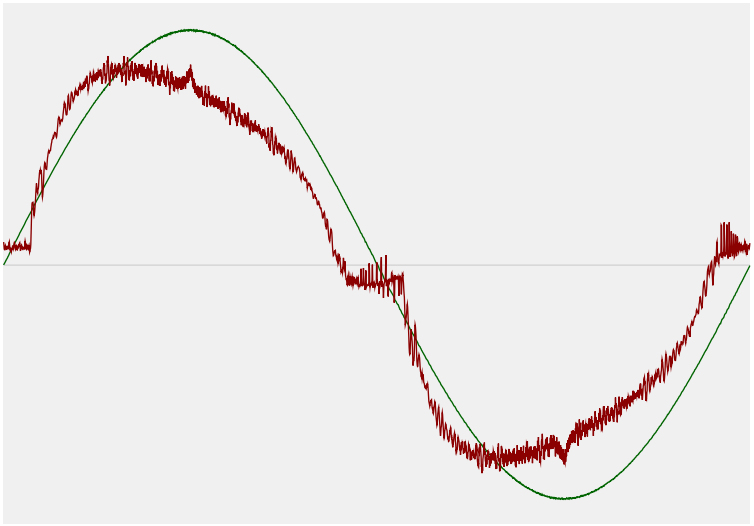
Power Details

Input Power

Power feed to light source	18,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,082 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	18,81 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	13,61%
Total harmonic distortion of the voltage	0,06%

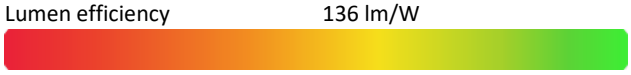
Input Power Curve



Efficiency

Radiated power efficiency 39,1%

Lumen efficiency 136 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3000 K
CCT shift	+0 K
CCT end	3000 K

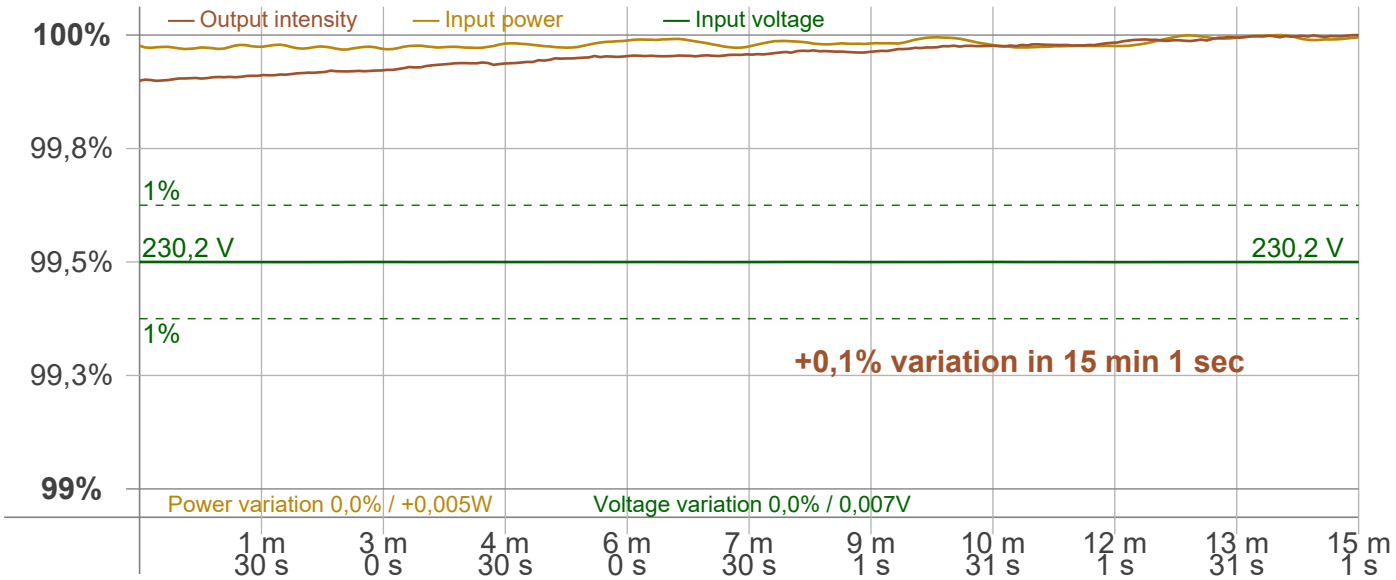
Warmup Result

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

Output Change

Output start	2478 lm
Output change	+2 lm
Output end	2480 lm

Stabilization Curve



Light Measurement Report

Print date: 13-5-2025
Measurement date and time: 13-5-2025 16:25:51 – Measurement no. VFR-250513-1237-MS
Measurement tracking No. and Link: VT250513-000329
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	0,99 %
Flicker index	0

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

JA8/10 40 Hz	0,07 %
JA8/10 90 Hz	0,08 %
JA8/10 200 Hz	1,02 %
JA8/10 400 Hz	0,98 %
JA8/10 1000 Hz	0,98 %

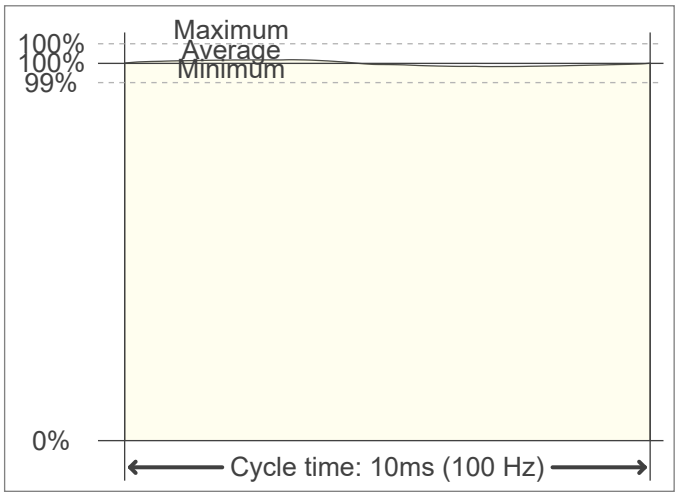
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz)	0,06
SVM value (80 < F < 2000 Hz)	0,04

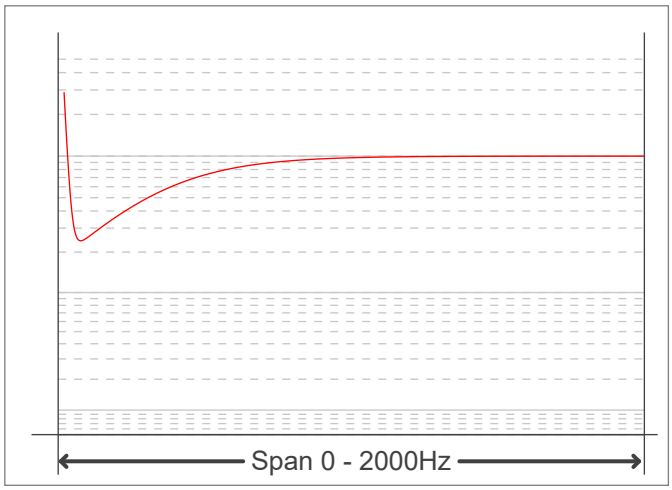
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0,04

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot