Light Measurement Report

Print date: 18-11-2024
Measurement date and time: 18-11-2024 13:01:55 – Measurement no. VFR-241118-2053-MS
Measurement tracking No. and Link: VT241118-002523
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

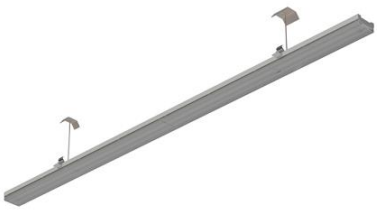
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,13 m
Input Power, Power and Displ. Factors	57,2 W – PF 0,98 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,255 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

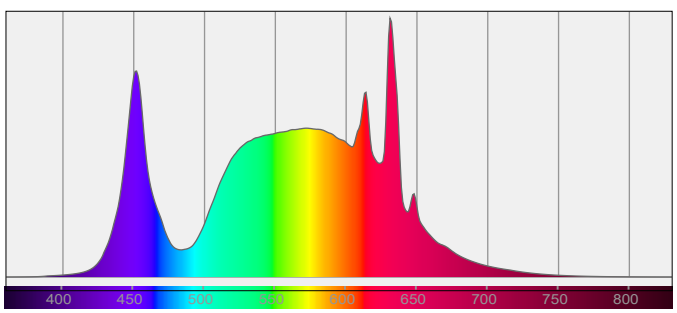
Tested Light Source

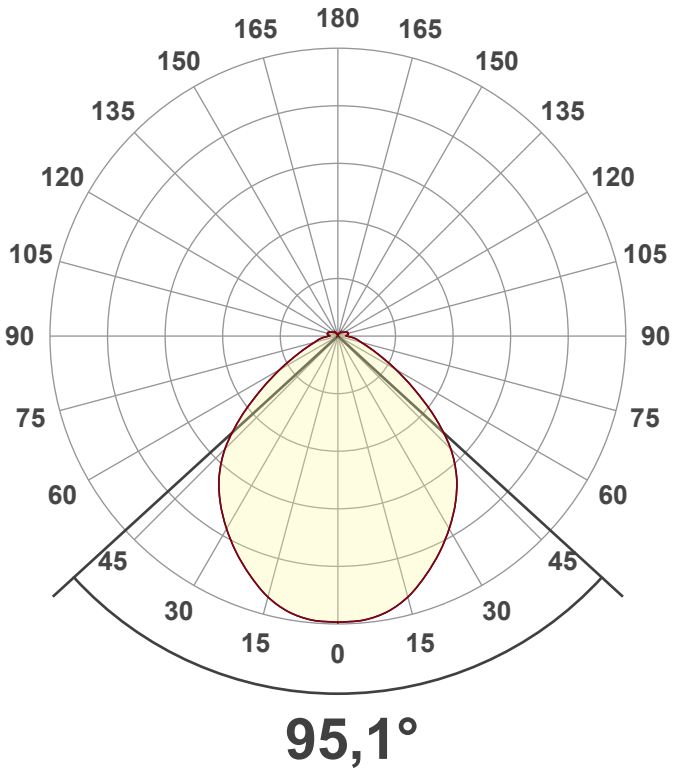
Product Name	805838-4000K
Item No. and Manufacturer	805838-4000K – Dutchfulfillment
Product Description (line 1)	RETROFIT PLUTO | LED MODULE | 32W/40W/48W/55W | 90°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	9588 lm – 6,62% / 93,38%
Efficiency	167 lm/W
Peak Intensity and Beam Angle	4024 cd – 95,1°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4099 K
Color Rendering Index	CRI 82,2
Color Rendering TM30-18	R_f 82,1 – R_g 98,2
Color Shift, CIE duv and MacAdam Steps	Duv 0,0031 – SDCM 3,0
Flicker	SVM 0 – PstLM 0,01







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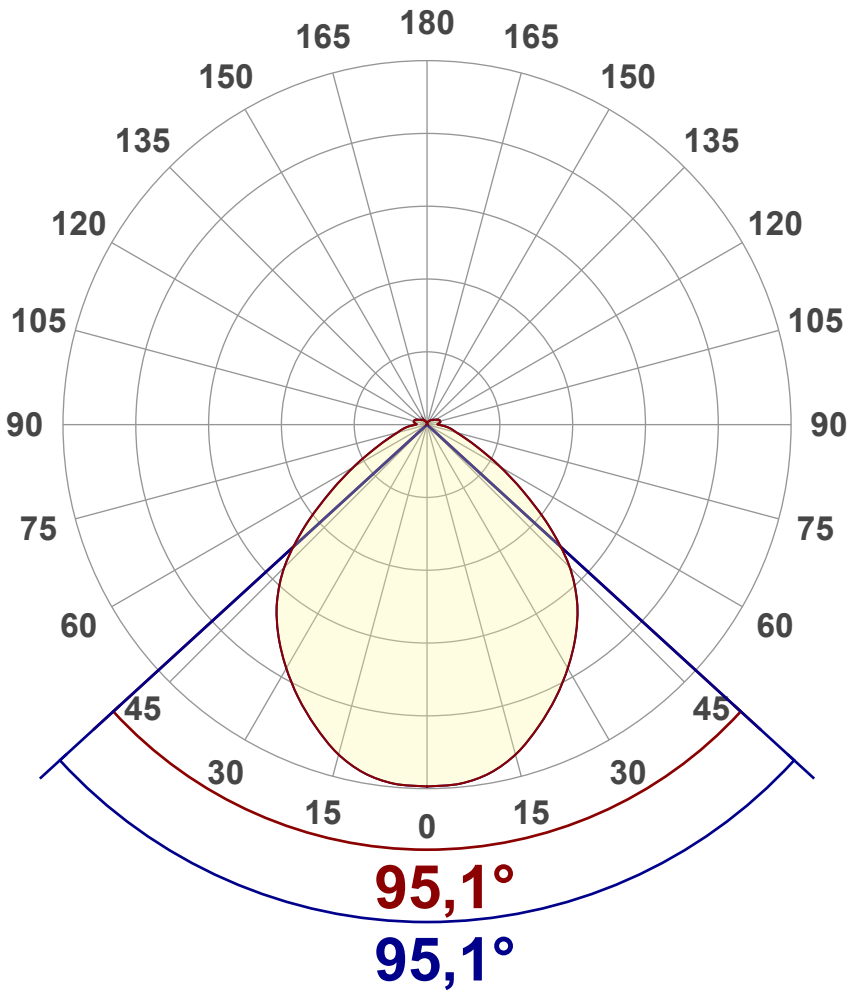
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	9588 lm
Lumen Up% / Down%	6,62% / 93,38%
Peak Intensity	4024 cd
Beam Angle (50%)	95,1°
Beam Angle (90%)	95,1°
Beam Angle (10%)	95,1°

Cut-off Angle

Average 2,5%	245,4°

Field Angle

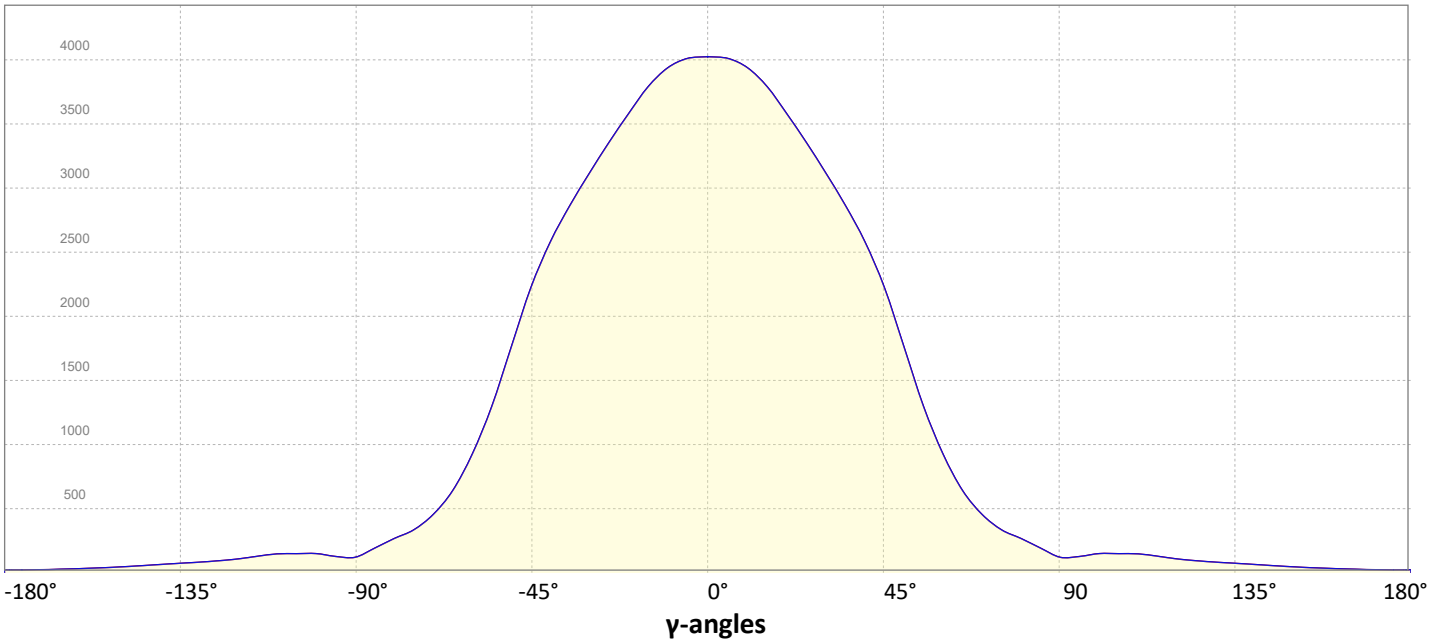
Average 10%	144,9°

Intensity Ratio

In 120° cone	80,3%
In 90° cone	59,3%

C000-C180
C090-C270

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



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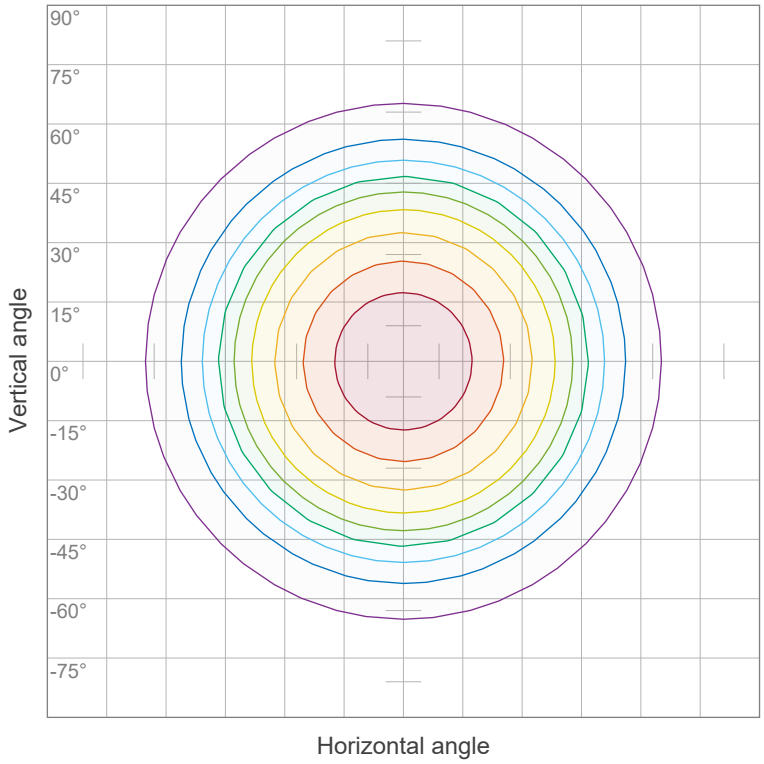
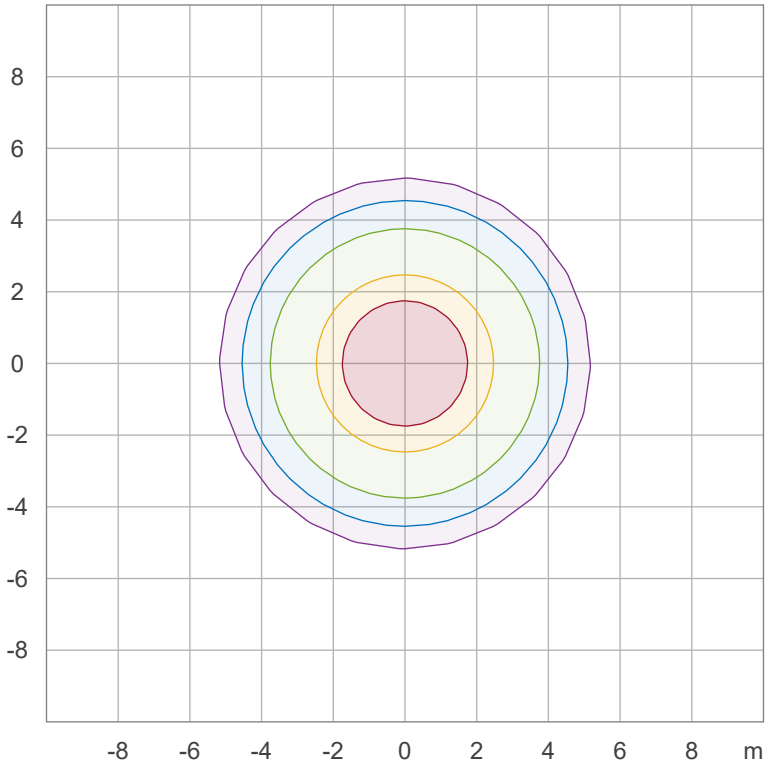
Iso-intensity Diagram (Iso-candela)



90 %	3621,3 cd
80 %	3218,9 cd
70 %	2816,5 cd
60 %	2414,2 cd
50 %	2011,8 cd
40 %	1609,5 cd
30 %	1207,1 cd
20 %	804,7 cd
10 %	402,4 cd

Peak intensity: 4023,6 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	223,5 lx
30,0 %	134,1 lx
10,0 %	44,7 lx
5,0 %	22,4 lx
3,0 %	13,4 lx

Peak illuminance: 447,1 lx
Mounting height: 3,0 m
Number of c-planes: 12

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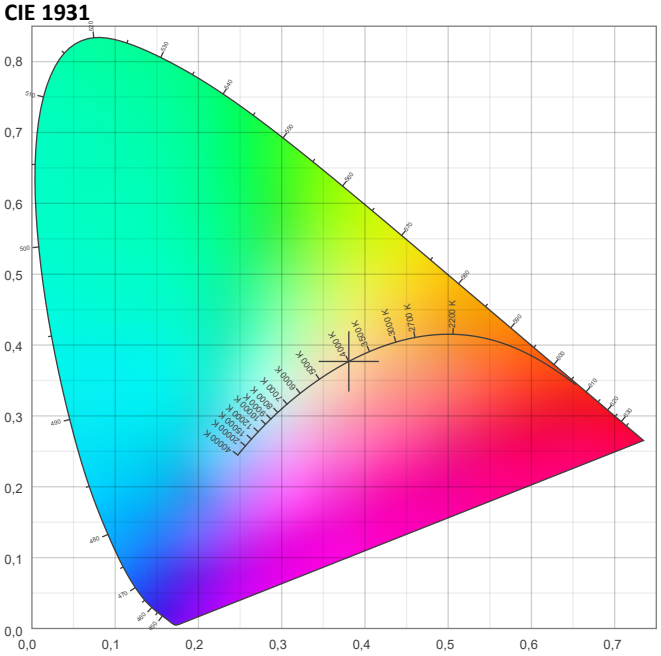
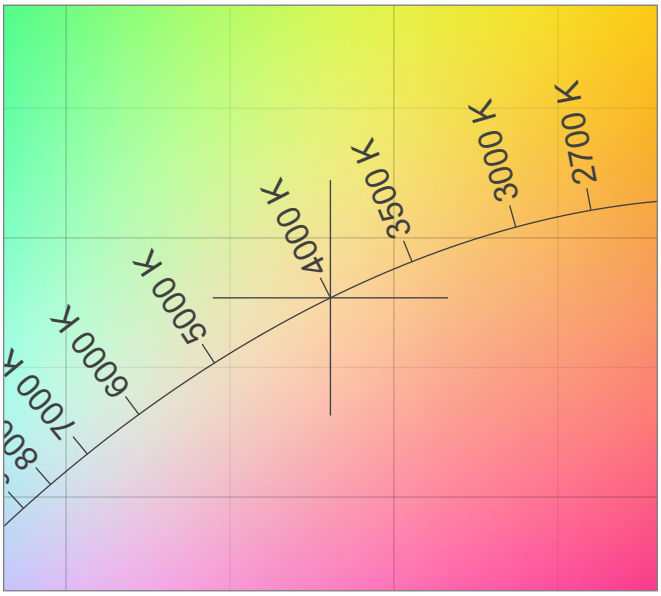
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4099 K
Color Rendering Index	CRI 82,2
Color Rendering Index, R9 (red component)	R9 = 29,4
Color Rendering TM30-18	R_f 82,1 – R_g 98,2
Color Quality Scale	CQS = 81,9
MacAdam Steps	SDCM = 3,0
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 = 0,0031
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

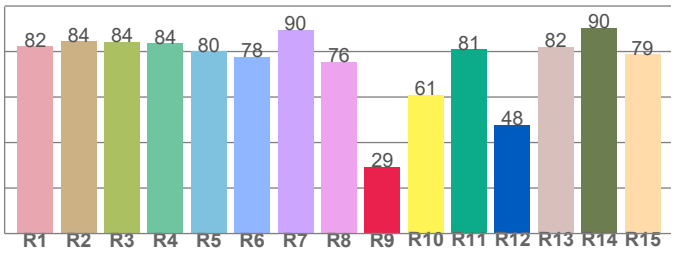
CIE 1931



CIE 1931 – zoomed on Planckian locus



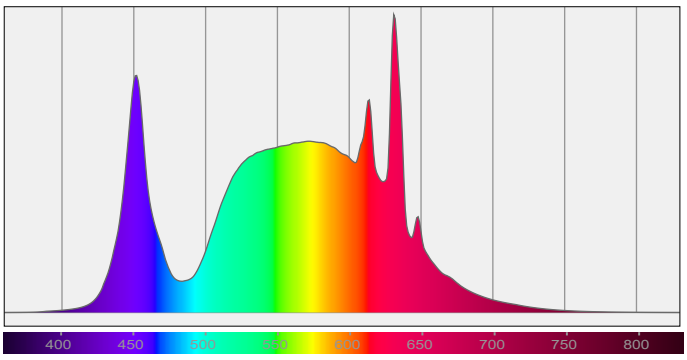
Color Rendering Index per reference color (CIE 1995)



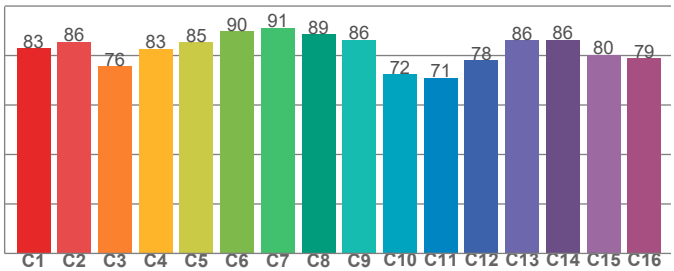
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,3	84,5	84,3	83,7	80,1	77,7	89,6	75,5	29,4	60,9	81,0	47,8	82,0	90,4	78,7

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



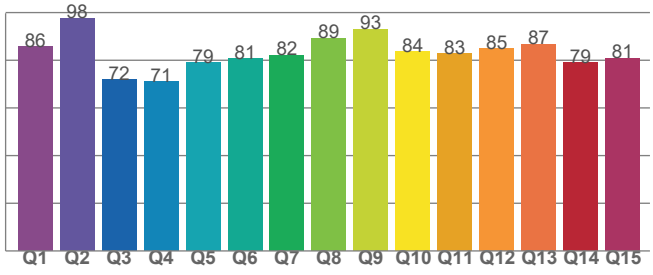
TM30-18 Rf-values per hue bin



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
83,1	85,6	75,7	82,7	85,4	89,9	91,2	88,5	86,4	72,4	71,0	78,0	86,2	86,3	80,3	78,9

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
85,6	97,6	71,9	71,0	79,0	80,6	82,1	89,3	92,9	83,6	82,7	84,8	86,7	78,9	80,8

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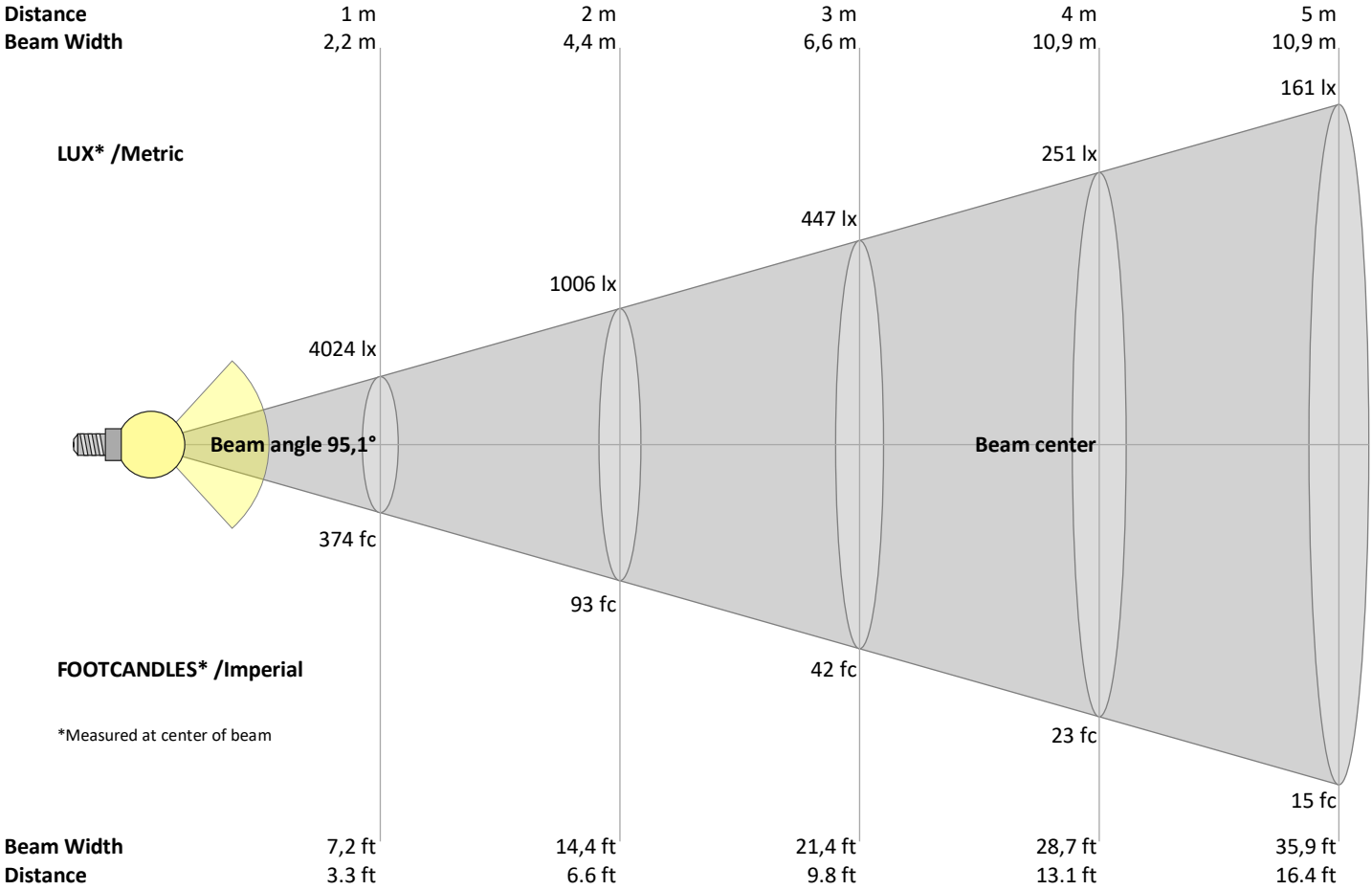
Beam Details



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
4024	1006	447	251	161	112	82	63	50	40	33	28	24	21	18	16	14	12	11	10	lux
373,8	93,5	41,5	23,4	15	10,4	7,6	5,8	4,6	3,7	3,1	2,6	2,2	1,9	1,7	1,5	1,3	1,2	1	0,9	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
4024	4011	3941	3797	3591	3368	3129	2878	2596	2242	1787	1323	945	657	465	341	271	196	124	127	cd
100%	100%	98%	94%	89%	84%	78%	72%	65%	56%	44%	33%	23%	16%	12%	8%	7%	5%	3%	3%	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
4024	4011	3941	3797	3591	3368	3129	2878	2596	2242	1787	1323	945	657	465	341	271	196	124	127	cd
100%	100%	98%	94%	89%	84%	78%	72%	65%	56%	44%	33%	23%	16%	12%	8%	7%	5%	3%	3%	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
4024	4011	3941	3797	3591	3368	3129	2878	2596	2242	1787	1323	945	657	465	341	271	196	124	127	cd
100%	100%	98%	94%	89%	84%	78%	72%	65%	56%	44%	33%	23%	16%	12%	8%	7%	5%	3%	3%	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
4024	4011	3941	3797	3591	3368	3129	2878	2596	2242	1787	1323	945	657	465	341	271	196	124	127	cd
100%	100%	98%	94%	89%	84%	78%	72%	65%	56%	44%	33%	23%	16%	12%	8%	7%	5%	3%	3%	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	22,6	23,6	22,9	24,0	24,3	22,2	23,3	22,5	23,6	24,0
	3H	23,2	24,3	23,7	24,6	25,0	22,7	23,8	23,2	24,2	24,5
	4H	23,5	24,5	24,0	24,9	25,3	23,0	24,0	23,5	24,4	24,8
	6H	24,0	24,9	24,4	25,3	25,7	23,3	24,2	23,7	24,6	25,1
	8H	24,2	25,1	24,6	25,5	26,0	23,4	24,3	23,9	24,7	25,2
	12H	24,4	25,3	24,9	25,7	26,3	23,6	24,4	24,0	24,8	25,4
4H	2H	22,7	23,8	23,2	24,1	24,5	22,4	23,5	22,9	23,8	24,2
	3H	23,6	24,5	24,1	24,9	25,5	23,2	24,1	23,7	24,5	25,1
	4H	24,0	24,9	24,6	25,3	26,0	23,5	24,4	24,1	24,8	25,5
	6H	24,6	25,3	25,2	25,8	26,3	24,0	24,7	24,5	25,2	25,6
	8H	24,9	25,6	25,5	26,0	26,5	24,2	24,8	24,7	25,3	25,8
	12H	25,2	25,8	25,8	26,3	26,9	24,3	24,9	24,9	25,4	26,0
8H	4H	24,1	24,8	24,7	25,3	25,8	23,7	24,4	24,3	24,8	25,3
	6H	24,9	25,4	25,5	25,9	26,6	24,3	24,8	24,9	25,3	26,0
	8H	25,3	25,7	25,9	26,4	27,1	24,6	25,0	25,2	25,7	26,4
	12H	25,8	26,2	26,5	26,8	27,5	24,9	25,3	25,6	25,9	26,6
12H	4H	24,1	24,7	24,7	25,2	25,8	23,7	24,3	24,3	24,8	25,4
	6H	24,9	25,4	25,5	26,0	26,7	24,4	24,8	25,0	25,4	26,1
	8H	25,4	25,8	26,1	26,4	27,1	24,7	25,1	25,4	25,7	26,4

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,2 / -0,2	0,2 / -0,3
S = 1.5H	0,4 / -0,5	0,5 / -0,7
S = 2.0H	1,1 / -1,0	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	117	117	117	117	114	114	114	114	107	107	107	101	101	101	96	96	96	93
1	108	104	100	96	105	101	97	94	95	93	90	90	88	86	86	84	82	80
2	99	92	86	80	96	89	84	79	85	80	76	81	77	74	77	74	71	69
3	91	82	74	68	88	80	73	67	76	70	65	72	68	63	69	65	62	59
4	84	73	65	59	82	71	64	58	68	62	57	65	60	55	62	58	54	52
5	78	66	58	52	75	64	57	51	62	55	50	59	53	49	57	52	48	45
6	72	60	51	45	70	59	51	45	56	49	44	54	48	43	52	47	42	40
7	67	54	46	41	65	53	46	40	51	44	39	49	43	39	47	42	38	36
8	63	50	42	36	61	49	41	36	47	40	36	45	39	35	44	38	34	32
9	59	46	38	33	57	45	38	33	44	37	32	42	36	32	41	35	31	29
10	55	42	35	30	53	42	35	30	40	34	29	39	33	29	38	32	29	27

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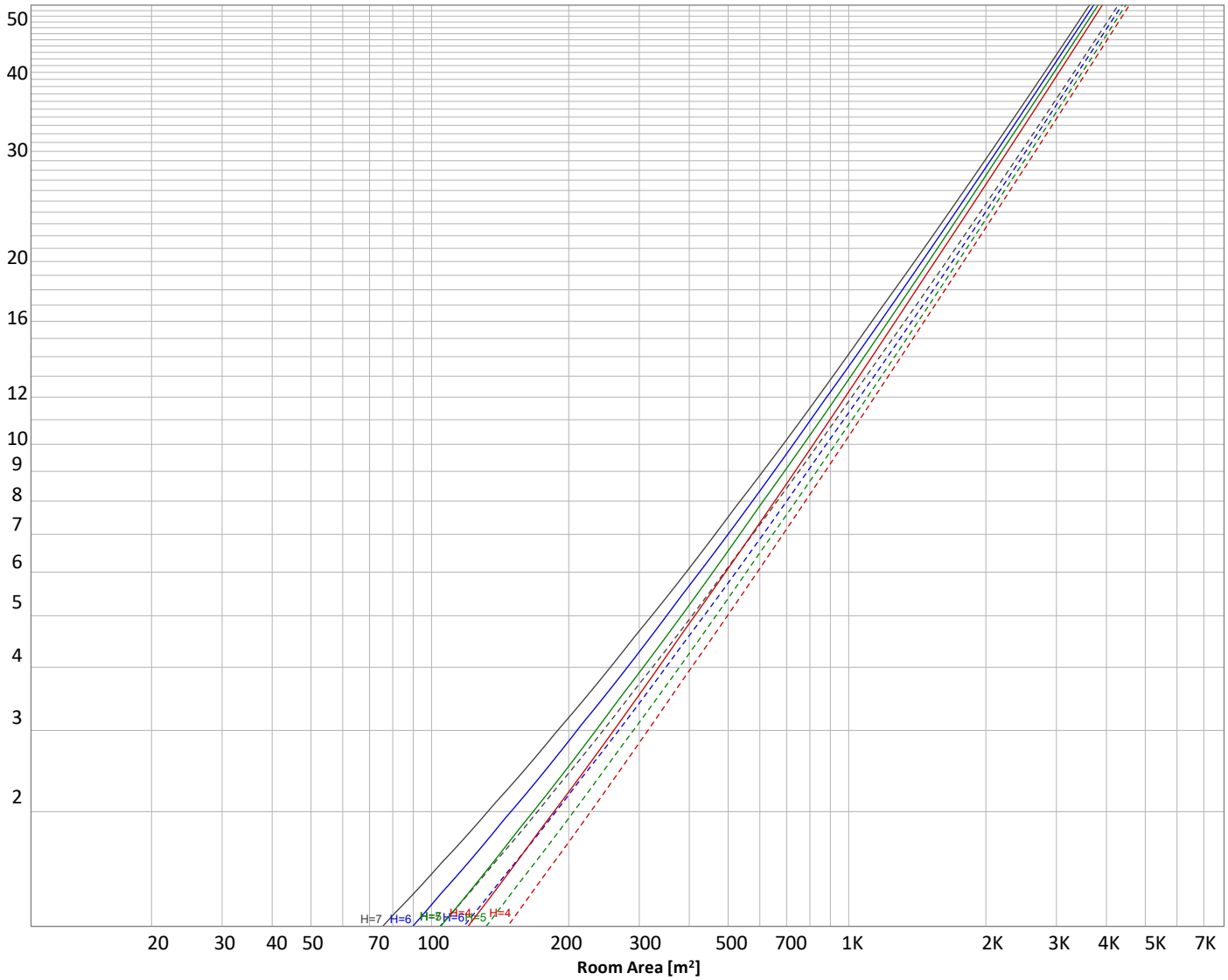
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 9588 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°
380 lm	1066 lm	1550 lm	1796 lm	1709 lm	1196 lm	670 lm	372 lm	214 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
142 lm	157 lm	128 lm	85,3 lm	57,4 lm	34,9 lm	18,4 lm	8,17 lm	2,20 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	380 lm	4,0%
10-20°	1066 lm	11,1%
20-30°	1550 lm	16,2%
30-40°	1796 lm	18,7%
40-50°	1709 lm	17,8%
50-60°	1196 lm	12,5%
60-70°	670 lm	7,0%
70-80°	372 lm	3,9%
80-90°	214 lm	2,2%
90-100°	142 lm	1,5%
100-110°	157 lm	1,6%
110-120°	128 lm	1,3%
120-130°	85 lm	0,9%
130-140°	57 lm	0,6%
140-150°	35 lm	0,4%
150-160°	18 lm	0,2%
160-170°	8 lm	0,1%
170-180°	2 lm	0,0%
Total	9588 lm	100,0%

Intensity peaks

Max intensity	4024 cd
Intensity, 90°	124 cd
Intensity, 0°	4024 cd

Zonal Lumen summary

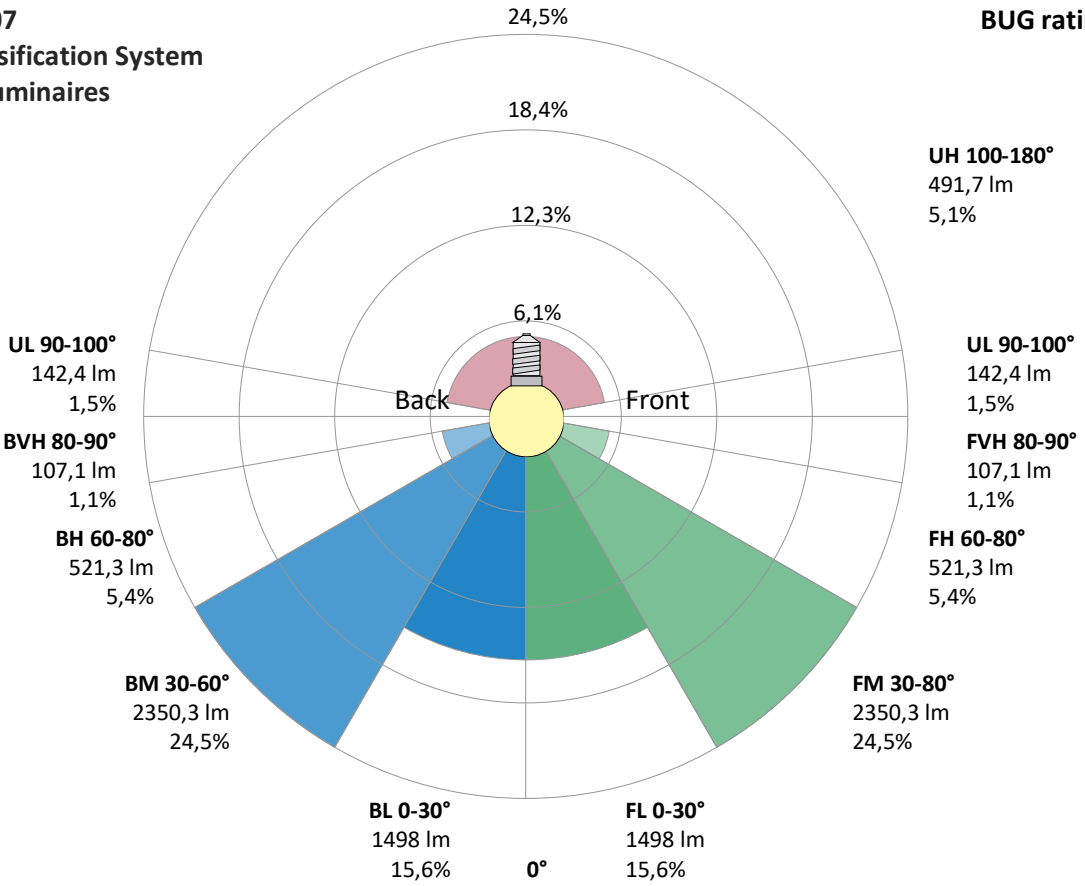
Zone (γ)	Lumen	% Total
0-30°	2996 lm	31,3%
0-40°	4792 lm	50,0%
0-60°	7697 lm	80,3%
60-90°	1256 lm	13,1%
70-100°	729 lm	7,6%
90-120°	428 lm	4,5%
0-90°	8953 lm	93,4%
90-180°	634 lm	6,6%
0-180°	9588 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1498 lm	15,6%
Medium(30-60°)	2350 lm	24,5%
High(60-80°)	521 lm	5,4%
Very high(80-90°)	107 lm	1,1%
Back light		
Low(0-30°)	1498 lm	15,6%
Medium(30-60°)	2350 lm	24,5%
High(60-80°)	521 lm	5,4%
Very high(80-90°)	107 lm	1,1%
Uplight		
Low(90-100°)	142 lm	1,5%
High(100-180°)	492 lm	5,1%

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

BUG rating B3 U3 G2



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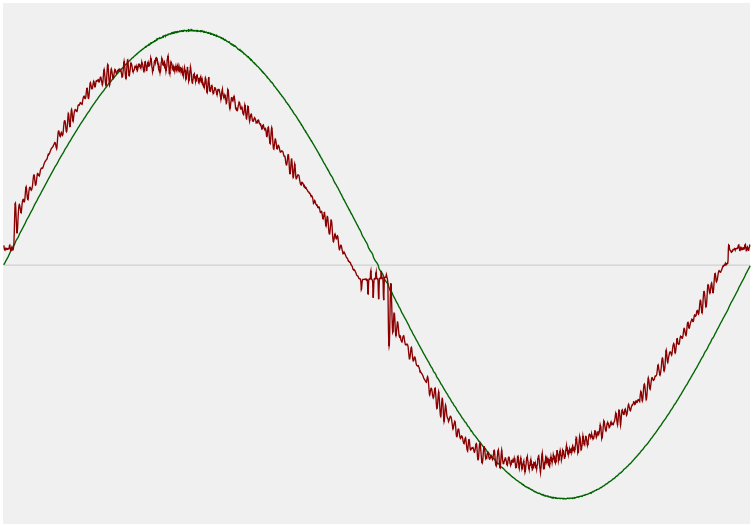
Power Details

Input Power

Power feed to light source	57,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,255 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	58,65 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	6,16%
Total harmonic distortion of the voltage	0,06%

Input Power Curve



Efficiency

Radiated power efficiency 48,3%

Lumen efficiency 167 lm/W

Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	4005 K
CCT shift	-5 K
CCT end	4000 K

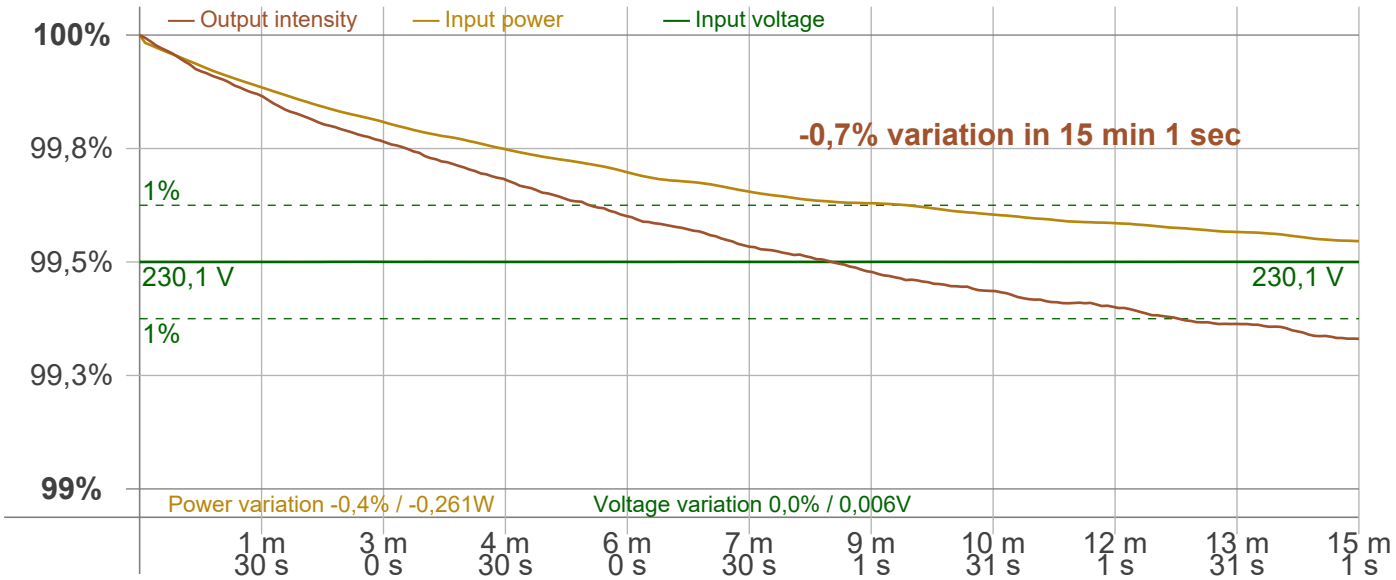
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,7%

Output Change

Output start	9653 lm
Output change	-66 lm
Output end	9588 lm

Stabilization Curve



Light Measurement Report

Print date: 18-11-2024
Measurement date and time: 18-11-2024 13:01:55 – Measurement no. VFR-241118-2053-MS
Measurement tracking No. and Link: VT241118-002523
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	100,5 Hz
Percent Flicker	0,16 %
Flicker index	0

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

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,14 %
JA8/10 400 Hz	0,15 %
JA8/10 1000 Hz	0,15 %

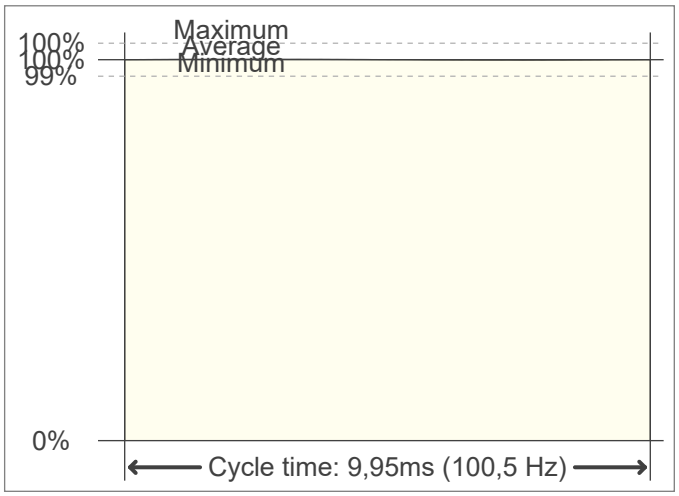
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz)	0,01
SVM value (80 < F < 2000 Hz)	0

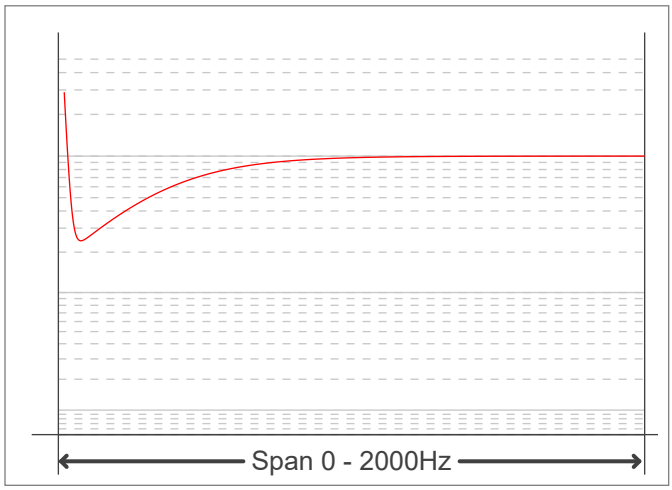
Flicker indices according to Lighting Research Center (2015)

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