Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 10:53:33 – Measurement no. VFR-250424-0899-MS
Measurement tracking No. and Link: VT250424-003900
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

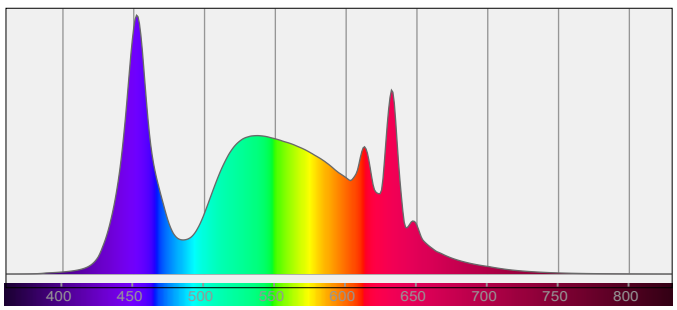
Number of C-planes and Resolution	16 planes – 22,5°
γ (gamma)-Resolution	5°
Test Distance	12,10 m
Input Power, Power and Displ. Factors	75,1 W – PF 0,98 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,334 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

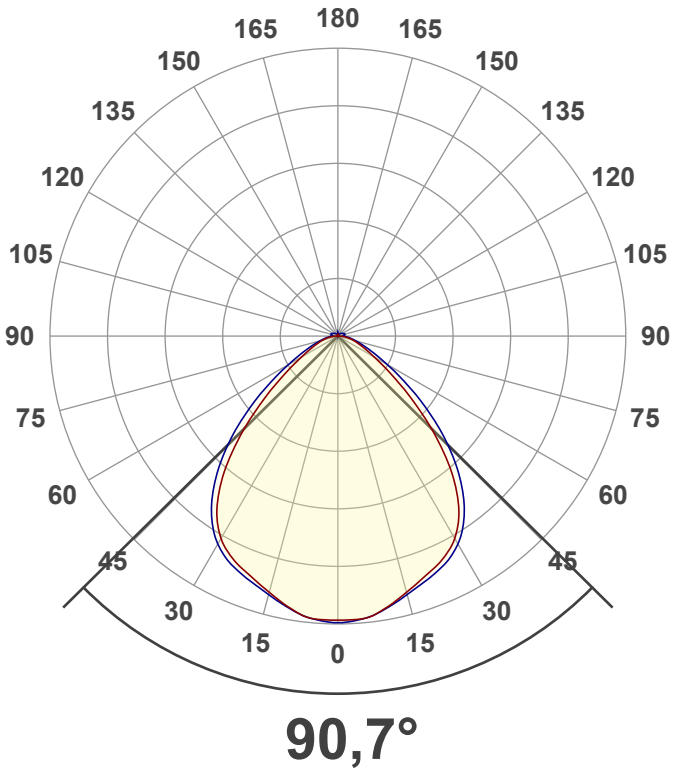
Tested Light Source

Product Name	274471-5700K BATCH 2505
Item No. and Manufacturer	274471-5700K 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%)	11745 lm – 3,34% / 96,66%
Efficiency	156 lm/W
Peak Intensity and Beam Angle	5480 cd – 90,7°
Correlated Color Temperature, Target/Measured	CCT = 5700 K / 5628 K
Color Rendering Index	CRI 82,8
Color Rendering TM30-18	R_f 82,3 – R_g 98,5
Color Shift, CIE duv and MacAdam Steps	Duv 0,0053 – SDCM 7,3
Flicker	SVM 0,03 – PstLM 0,02





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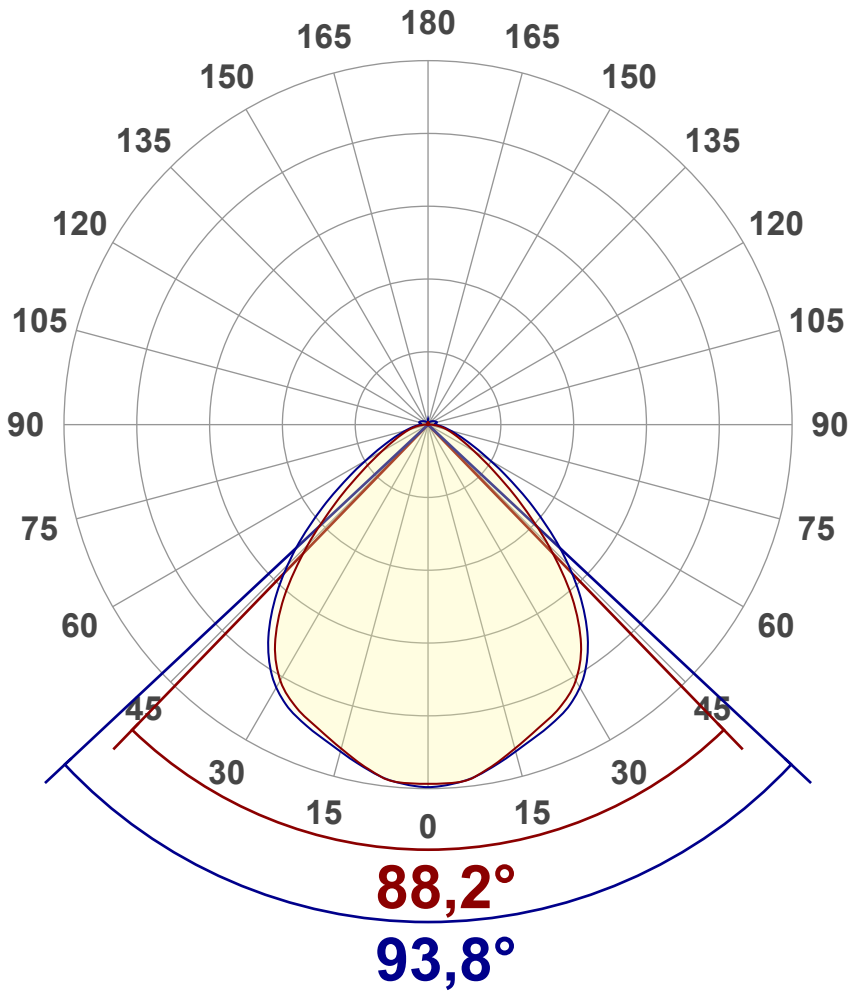
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	11745 lm
Lumen Up% / Down%	3,34% / 96,66%
Peak Intensity	5480 cd
Beam Angle (50%)	90,7°
Beam Angle (90%)	93,8°
Beam Angle (10%)	88,2°

Cut-off Angle

Average 2,5%	178,7°

Field Angle

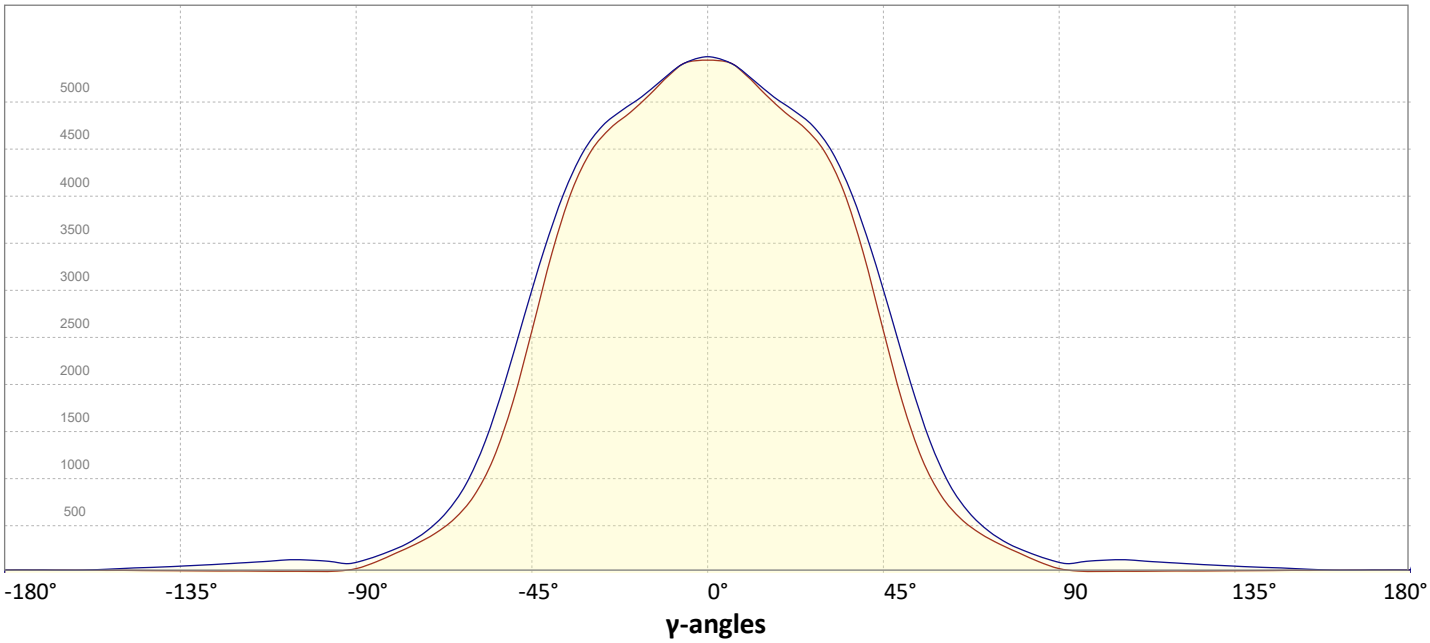
Average 10%	135,7°

Intensity Ratio

In 120° cone	86,2%
In 90° cone	67,1%

C000-C180
C090-C270

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



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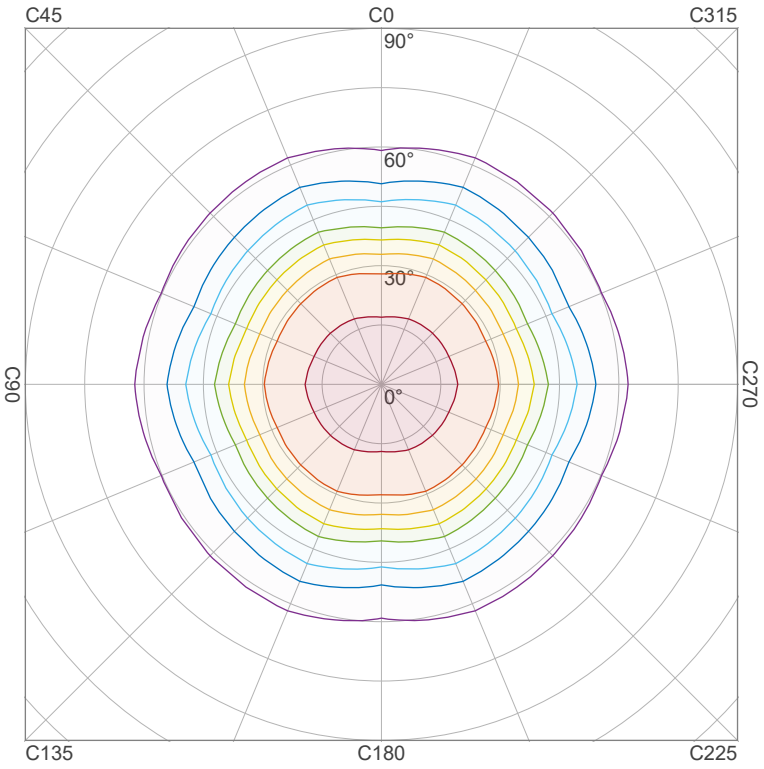
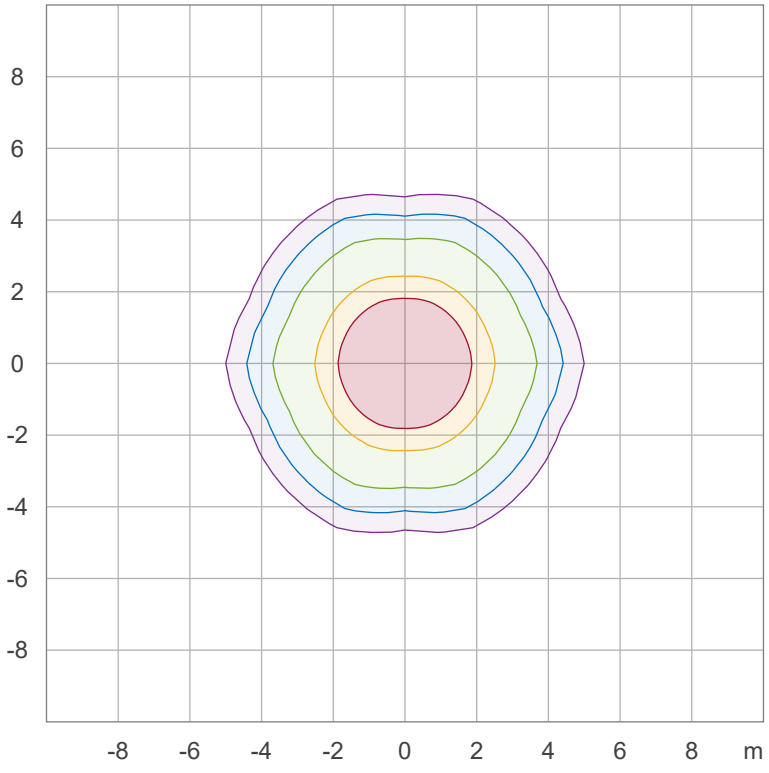
Iso-intensity Diagram (Iso-candela)



90 %	4925,9 cd
80 %	4378,6 cd
70 %	3831,2 cd
60 %	3283,9 cd
50 %	2736,6 cd
40 %	2189,3 cd
30 %	1642,0 cd
20 %	1094,6 cd
10 %	547,3 cd

Peak intensity: 5473,2 cd
Number of c-planes: 16

Iso-illuminance Diagram (Iso-lux)



50,0 %	303,9 lx
30,0 %	182,4 lx
10,0 %	60,8 lx
5,0 %	30,4 lx
3,0 %	18,2 lx

Peak illuminance: 607,9 lx
Mounting height: 3,0 m
Number of c-planes: 16

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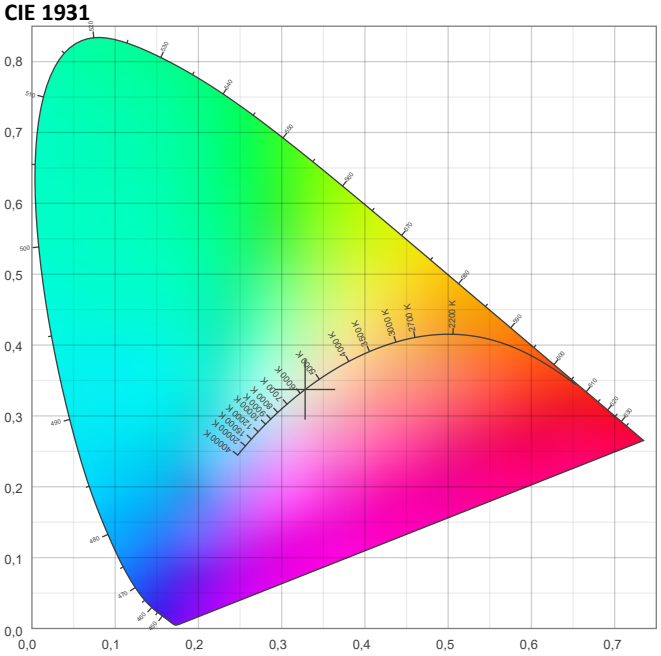
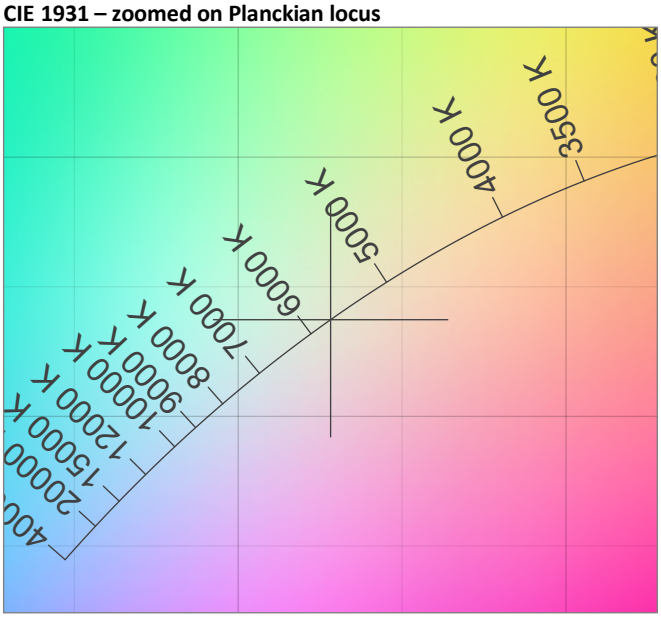
Color details

Correlated Color Temperature, Target	CCT = 5700 K
Correlated Color Temperature, Measured	CCT = 5628 K
Color Rendering Index	CRI 82,8
Color Rendering Index, R9 (red component)	R9 = 38,7
Color Rendering TM30-18	R_f 82,3 – R_g 98,5
Color Quality Scale	CQS = 81,7
MacAdam Steps	SDCM = 7,3
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 = 0,0053
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,205;0,475)

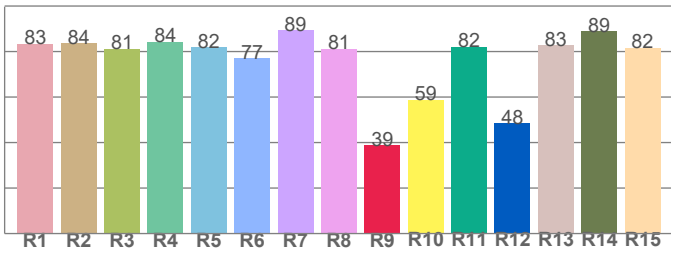
CIE 1931



CIE 1931 – zoomed on Planckian locus



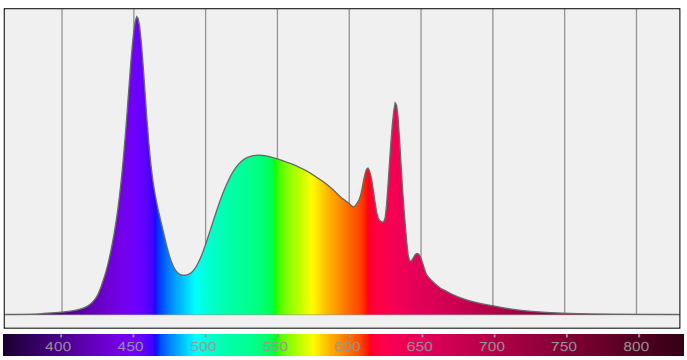
Color Rendering Index per reference color (CIE 1995)



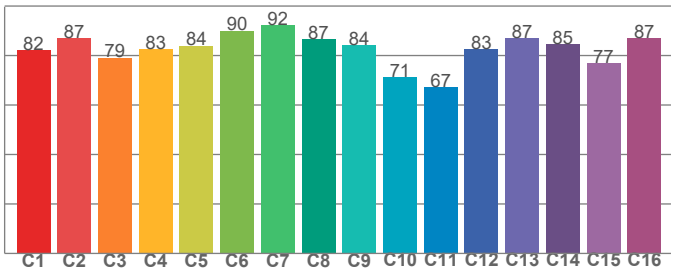
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
83,5	83,7	81,2	84,4	81,9	77,0	89,4	81,2	38,7	58,8	82,2	48,4	82,8	89,0	81,7

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



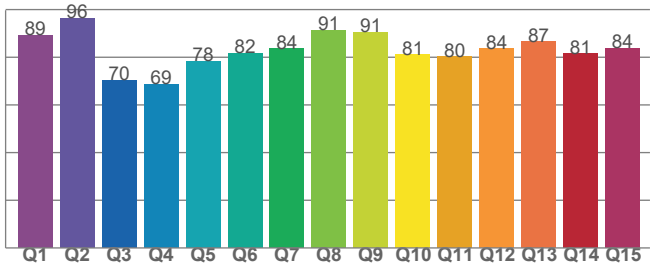
TM30-18 Rf-values per hue bin



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
82,1	87,1	79,0	82,6	83,9	90,1	92,2	86,5	84,2	71,2	67,2	82,5	86,9	84,5	76,9	86,9

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89,3	96,4	70,3	68,7	78,3	81,6	83,5	91,3	90,6	81,1	80,3	83,5	86,6	81,4	83,9

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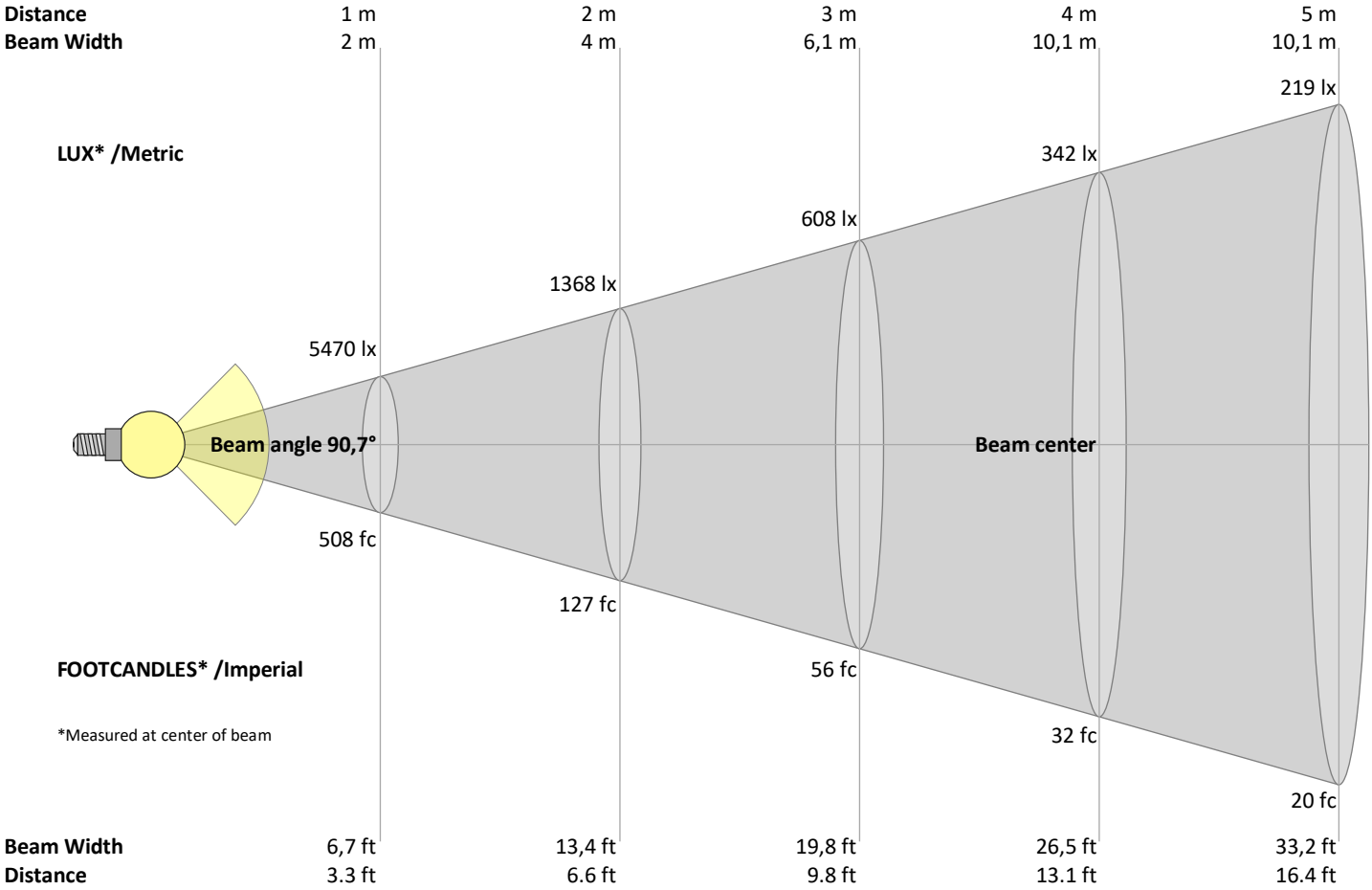
Beam Details



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
5470	1368	608	342	219	152	112	85	68	55	45	38	32	28	24	21	19	17	15	14	lux
508,2	127,1	56,5	31,8	20,3	14,1	10,4	7,9	6,3	5,1	4,2	3,5	3	2,6	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
5470	5423	5278	5073	4883	4716	4465	4029	3372	2570	1797	1200	809	568	412	299	205	114	44	18	cd
100%	99%	96%	93%	89%	86%	82%	74%	62%	47%	33%	22%	15%	10%	8%	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
5470	5421	5289	5120	4967	4810	4574	4190	3651	2997	2294	1637	1114	754	519	362	255	175	116	112	cd
100%	99%	97%	94%	91%	88%	84%	77%	67%	55%	42%	30%	20%	14%	9%	7%	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
5470	5423	5278	5073	4883	4716	4465	4029	3372	2570	1797	1200	809	568	412	299	205	114	44	18	cd
100%	99%	96%	93%	89%	86%	82%	74%	62%	47%	33%	22%	15%	10%	8%	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
5470	5421	5289	5120	4967	4810	4574	4190	3651	2997	2294	1637	1114	754	519	362	255	175	116	112	cd
100%	99%	97%	94%	91%	88%	84%	77%	67%	55%	42%	30%	20%	14%	9%	7%	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	23,6	24,6	24,9	23,4	24,4	23,6	24,7	25,0
	3H	23,6	24,7	24,1	25,0	25,3	23,9	24,9	24,3	25,2	25,5
	4H	23,8	24,8	24,3	25,2	25,5	24,2	25,2	24,6	25,5	25,8
	6H	24,1	24,9	24,4	25,3	25,7	24,5	25,4	24,9	25,7	26,2
	8H	24,1	24,9	24,5	25,3	25,8	24,7	25,5	25,1	25,9	26,3
	12H	24,1	25,0	24,5	25,3	25,8	24,8	25,7	25,2	26,0	26,5
4H	2H	23,4	24,4	23,9	24,7	25,1	23,5	24,5	23,9	24,8	25,1
	3H	24,1	24,9	24,5	25,3	25,8	24,3	25,1	24,7	25,5	26,0
	4H	24,3	25,1	24,8	25,6	26,1	24,6	25,4	25,1	25,8	26,4
	6H	24,6	25,4	25,2	25,7	26,2	25,0	25,8	25,6	26,2	26,6
	8H	24,7	25,4	25,3	25,8	26,2	25,3	26,0	25,8	26,4	26,8
	12H	24,8	25,3	25,3	25,8	26,3	25,5	26,1	26,1	26,6	27,1
8H	4H	24,5	25,1	25,0	25,6	26,0	24,7	25,4	25,3	25,8	26,2
	6H	24,9	25,4	25,4	25,9	26,5	25,3	25,8	25,9	26,3	26,9
	8H	25,1	25,5	25,7	26,1	26,8	25,7	26,1	26,3	26,7	27,4
	12H	25,3	25,6	25,9	26,2	26,8	26,1	26,4	26,7	27,0	27,7
12H	4H	24,5	25,0	25,0	25,5	26,0	24,7	25,3	25,3	25,7	26,3
	6H	25,0	25,4	25,5	26,0	26,7	25,4	25,8	26,0	26,4	27,1
	8H	25,2	25,6	25,8	26,1	26,8	25,8	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	0,9 / -1,3	0,9 / -0,9
S = 2.0H	1,9 / -1,9	1,7 / -1,4

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	86	84
2	101	94	88	83	98	92	87	82	88	84	80	84	81	78	81	78	75	73
3	94	84	77	72	91	83	76	71	79	74	69	76	72	68	73	69	66	64
4	87	76	68	62	84	74	67	62	72	65	61	69	64	59	67	62	58	56
5	80	69	61	55	78	67	60	54	65	59	54	63	57	53	61	56	52	50
6	75	63	54	49	73	61	54	48	59	53	48	58	52	47	56	51	46	44
7	69	57	49	44	68	56	49	43	54	48	43	53	47	42	51	46	42	40
8	65	53	45	39	63	52	44	39	50	43	39	49	43	38	47	42	38	36
9	61	48	41	36	59	48	40	36	46	40	35	45	39	35	44	39	35	33
10	57	45	37	33	56	44	37	32	43	37	32	42	36	32	41	36	32	30

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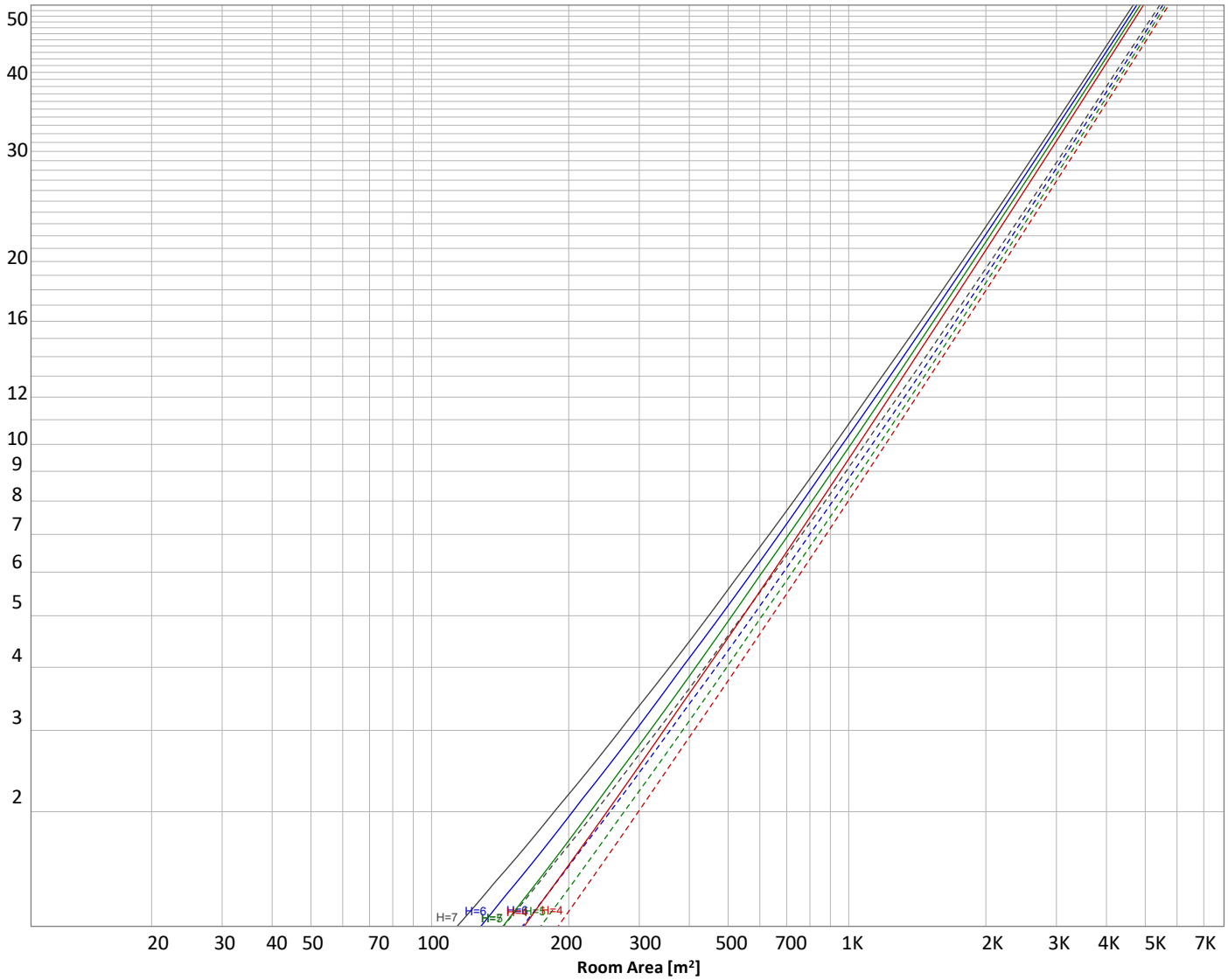
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 11745 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°
514 lm	1442 lm	2195 lm	2560 lm	2132 lm	1283 lm	677 lm	368 lm	180 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
88,1 lm	92,6 lm	74,8 lm	53,8 lm	35,7 lm	22,9 lm	13,5 lm	7,93 lm	2,79 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	514 lm	4,4%
10-20°	1442 lm	12,3%
20-30°	2195 lm	18,7%
30-40°	2560 lm	21,8%
40-50°	2132 lm	18,2%
50-60°	1283 lm	10,9%
60-70°	677 lm	5,8%
70-80°	368 lm	3,1%
80-90°	180 lm	1,5%
90-100°	88 lm	0,7%
100-110°	93 lm	0,8%
110-120°	75 lm	0,6%
120-130°	54 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	11745 lm	100,0%

Intensity peaks

Max intensity	5480 cd
Intensity, 90°	44 cd
Intensity, 0°	5470 cd

Zonal Lumen summary

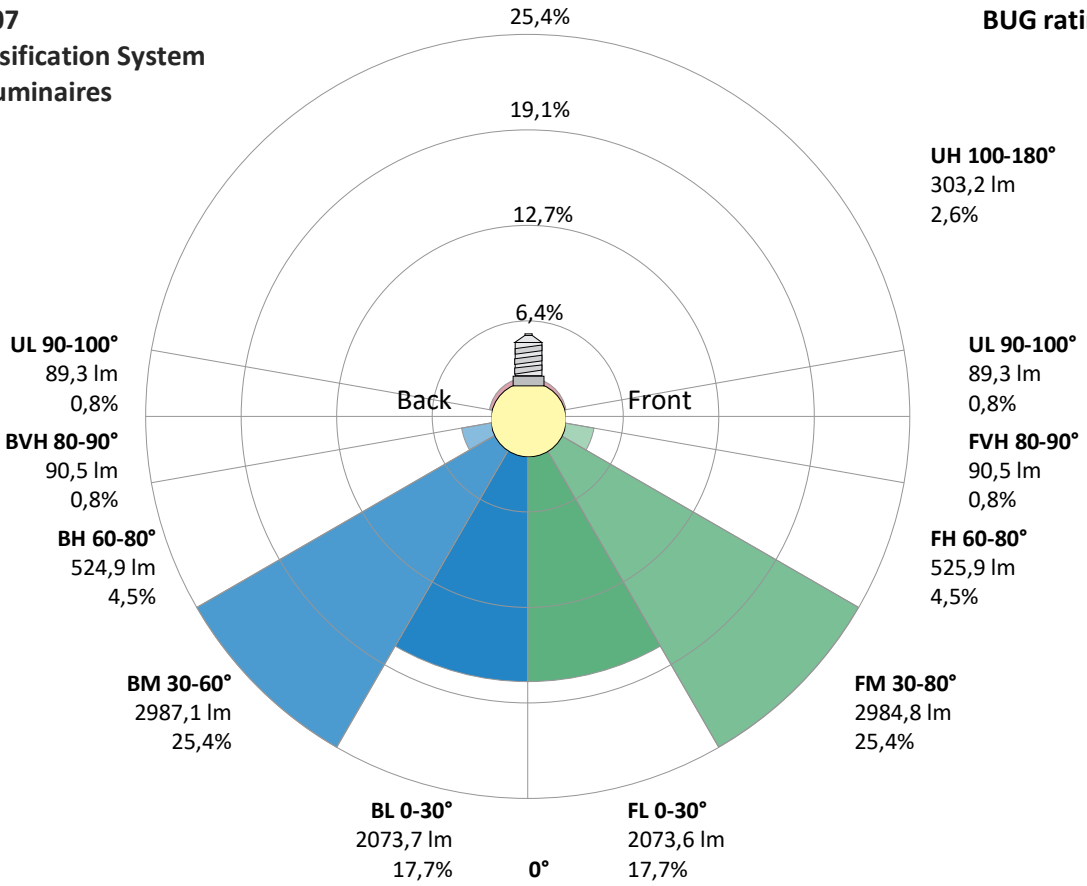
Zone (γ)	Lumen	% Total
0-30°	4152 lm	35,3%
0-40°	6712 lm	57,2%
0-60°	10127 lm	86,2%
60-90°	1225 lm	10,4%
70-100°	636 lm	5,4%
90-120°	255 lm	2,2%
0-90°	11352 lm	96,7%
90-180°	392 lm	3,3%
0-180°	11745 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	2074 lm	17,7%
Medium(30-60°)	2985 lm	25,4%
High(60-80°)	526 lm	4,5%
Very high(80-90°)	91 lm	0,8%
Back light		
Low(0-30°)	2074 lm	17,7%
Medium(30-60°)	2987 lm	25,4%
High(60-80°)	525 lm	4,5%
Very high(80-90°)	91 lm	0,8%
Uplight		
Low(90-100°)	89 lm	0,8%
High(100-180°)	303 lm	2,6%

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

BUG rating B3 U3 G1



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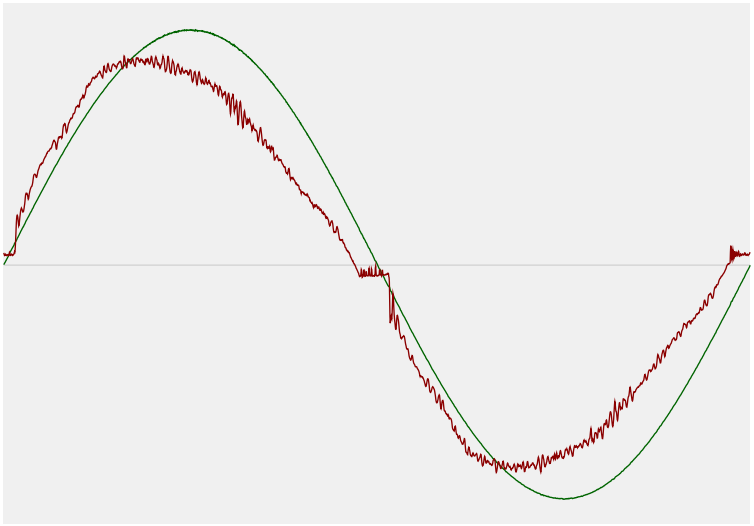
Power Details

Input Power

Power feed to light source	75,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,334 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	76,8 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	8,93%
Total harmonic distortion of the voltage	0,08%

Input Power Curve



Efficiency

Radiated power efficiency 47,4%

Lumen efficiency 156 lm/W

Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5694 K
CCT shift	+6 K
CCT end	5700 K

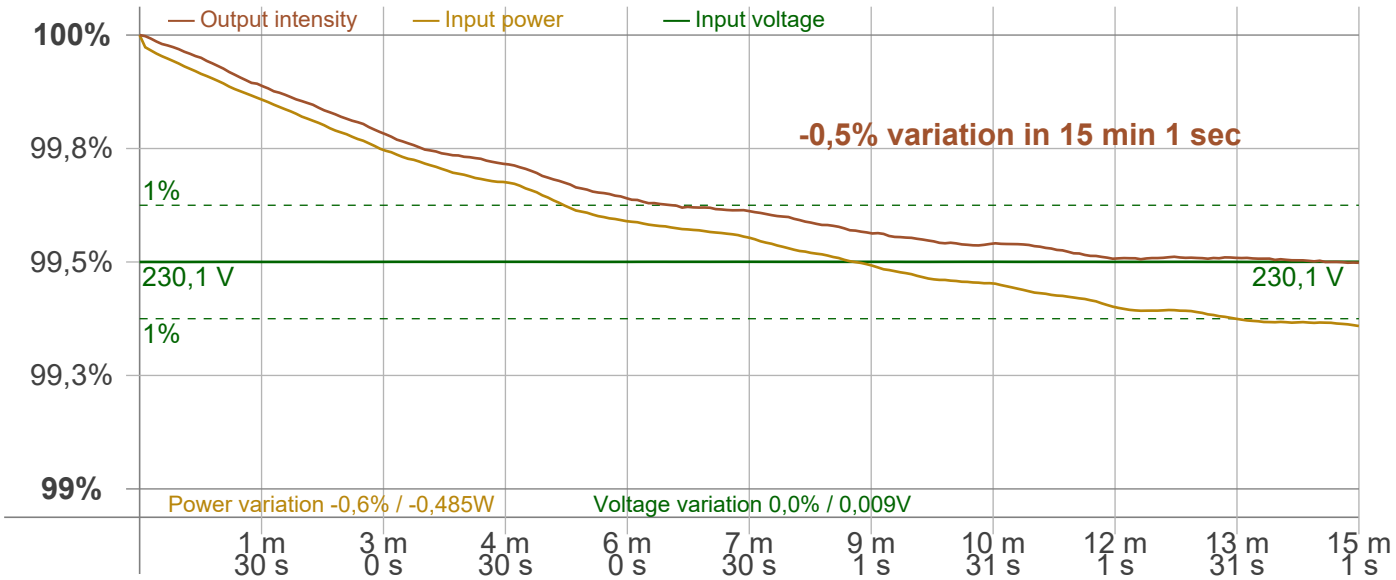
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,5%

Output Change

Output start	11804 lm
Output change	-59 lm
Output end	11745 lm

Stabilization Curve



Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 10:53:33 – Measurement no. VFR-250424-0899-MS
Measurement tracking No. and Link: VT250424-003900
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	0,8 %
Flicker index	0

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	0,79 %
JA8/10 400 Hz	0,79 %
JA8/10 1000 Hz	0,79 %

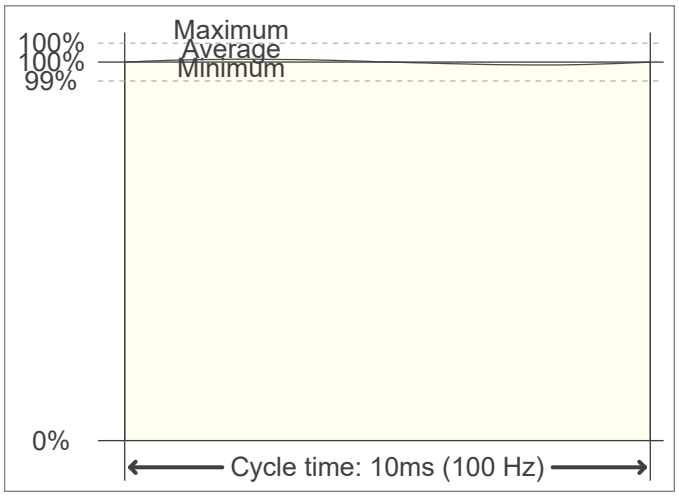
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

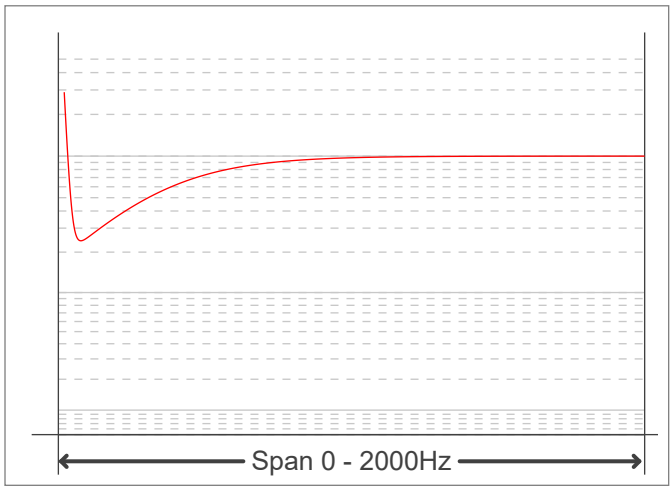
Flicker indices according to Lighting Research Center (2015)

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