Light Measurement Report

Print date: 15-10-2024
Measurement date and time: 15-10-2024 09:01:07 – Measurement no. VFR-241015-1266-MS
Measurement tracking No. and Link: VT241015-001744
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

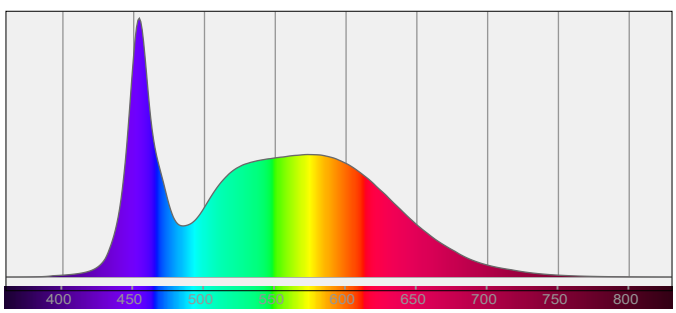
Number of C-planes and Resolution	16 planes – 22,5°
γ (gamma)-Resolution	5°
Test Distance	12,13 m
Input Power, Power and Displ. Factors	56,3 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,253 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

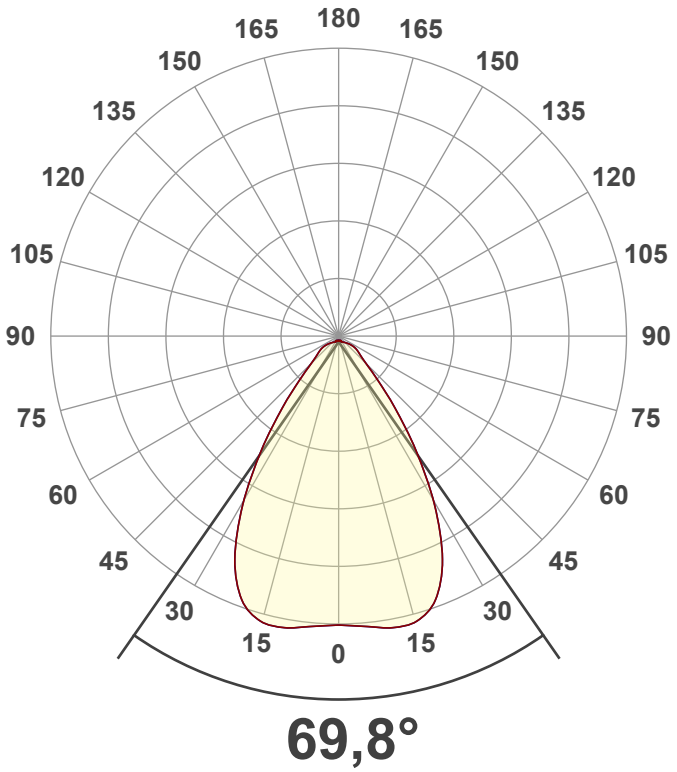
Tested Light Source

Product Name	274464-5700K
Item No. and Manufacturer	274464-5700K – Dutchfulfillment
Product Description (line 1)	RETROFIT TITAN | LED MODULE | 32W/40W/48W/56W | 60°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	9324 lm – 3,34% / 96,66%
Efficiency	166 lm/W
Peak Intensity and Beam Angle	6089 cd – 69,8°
Correlated Color Temperature, Target/Measured	CCT = 5700 K / 5682 K
Color Rendering Index	CRI 82,7
Color Rendering TM30-18	R_f 81,9 – R_g 93,9
Color Shift, CIE duv and MacAdam Steps	Duv 0,0008 – SDCM 3,2
Flicker	SVM 0,01 – PstLM 0





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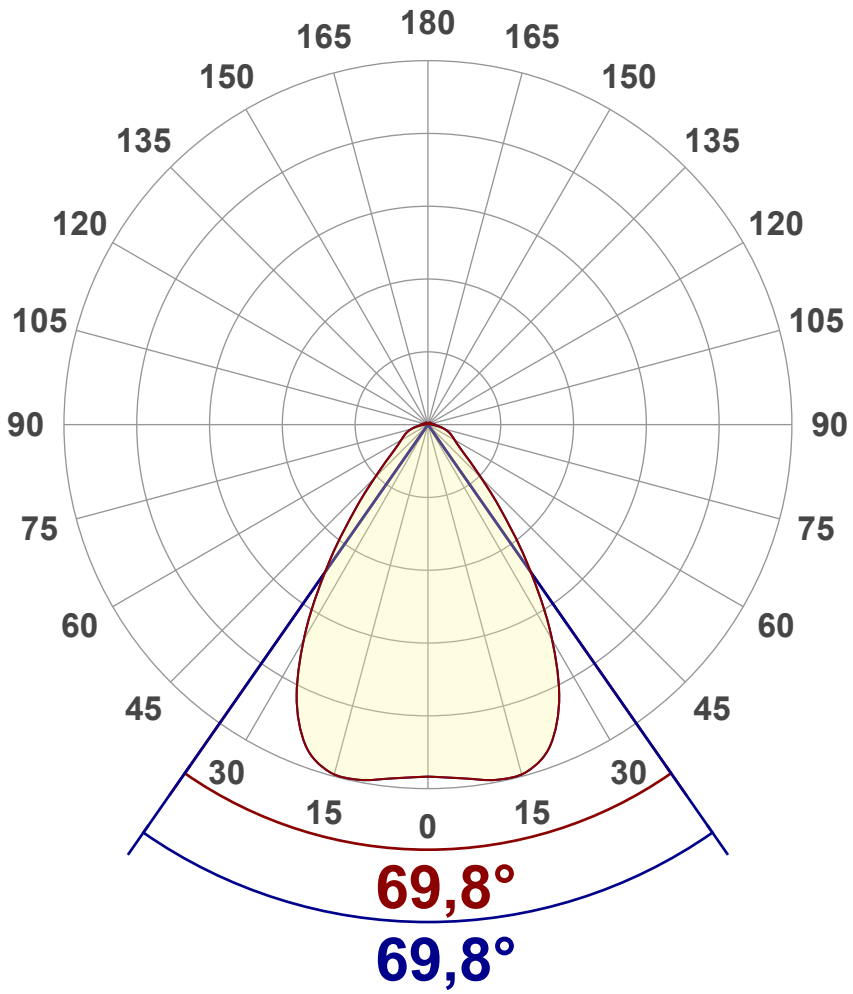
Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	9324 lm
Lumen Up% / Down%	3,34% / 96,66%
Peak Intensity	6089 cd
Beam Angle (50%)	69,8°
Beam Angle (90%)	69,8°
Beam Angle (10%)	69,8°

Cut-off Angle

Average 2,5%	166,6°

Field Angle

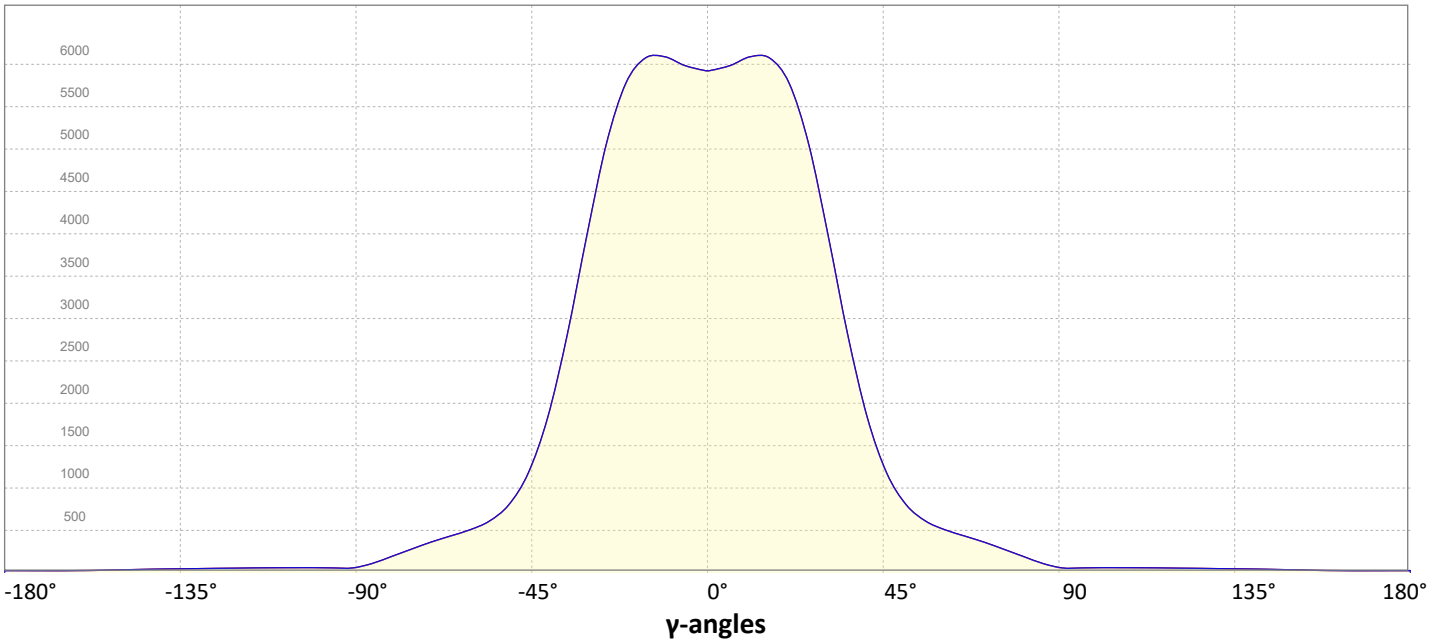
Average 10%	111,8°

Intensity Ratio

In 120° cone	87,1%
In 90° cone	76,3%

C000-C180
C090-C270

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



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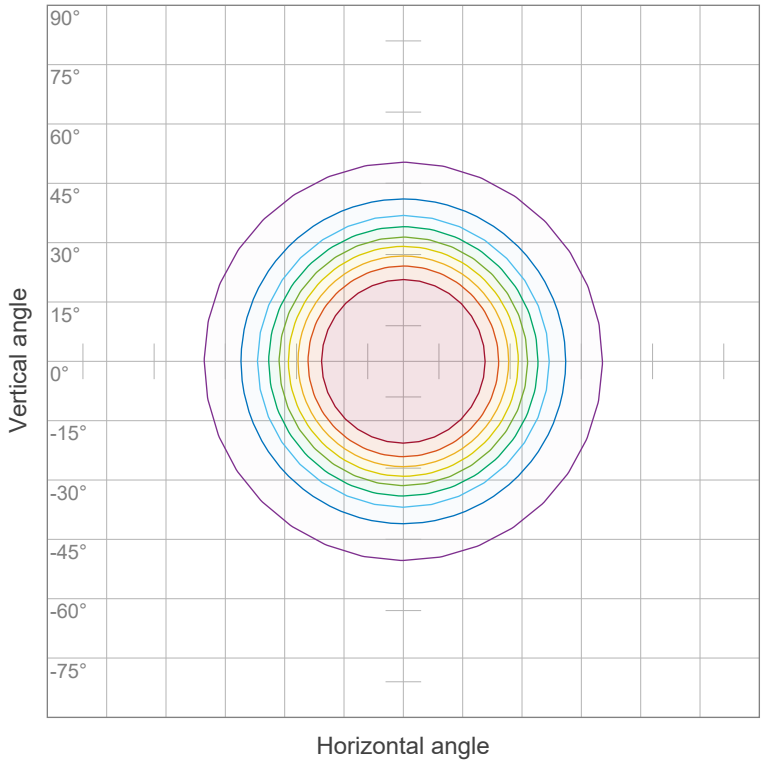
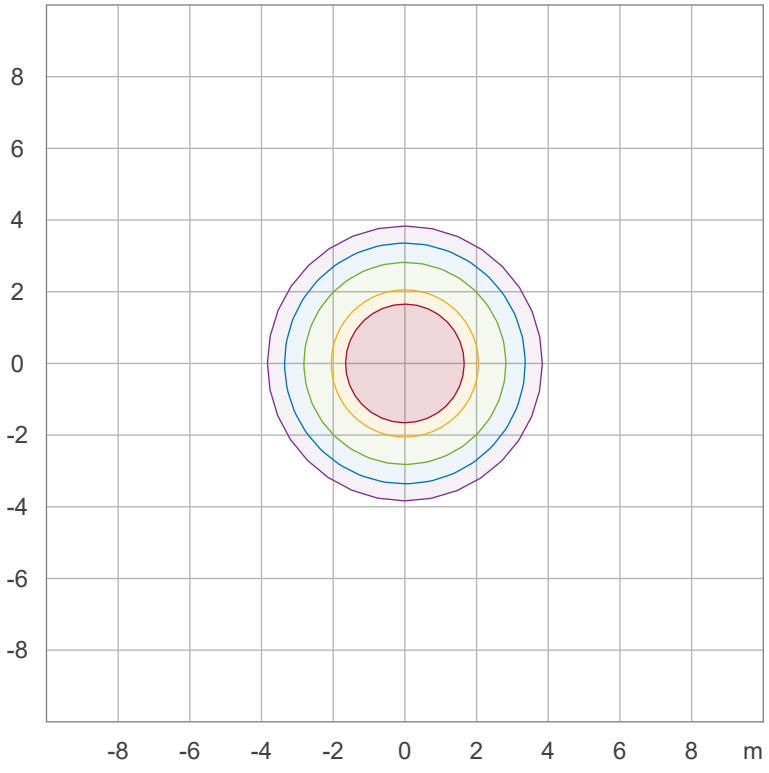
Iso-intensity Diagram (Iso-candela)



90 %	5479,5 cd
80 %	4870,7 cd
70 %	4261,8 cd
60 %	3653,0 cd
50 %	3044,2 cd
40 %	2435,3 cd
30 %	1826,5 cd
20 %	1217,7 cd
10 %	608,8 cd

Peak intensity: 6088,3 cd
Number of c-planes: 16

Iso-illuminance Diagram (Iso-lux)



50,0 %	329,5 lx
30,0 %	197,7 lx
10,0 %	65,9 lx
5,0 %	32,9 lx
3,0 %	19,8 lx

Peak illuminance: 658,9 lx
Mounting height: 3,0 m
Number of c-planes: 16

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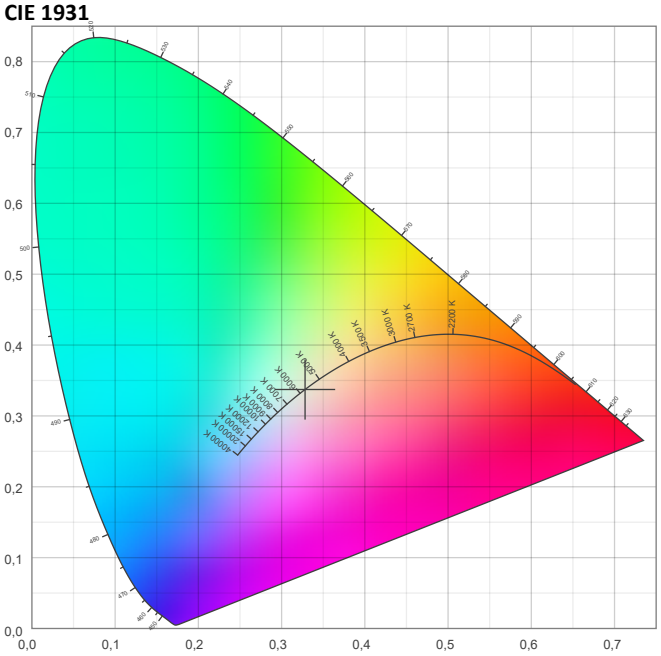
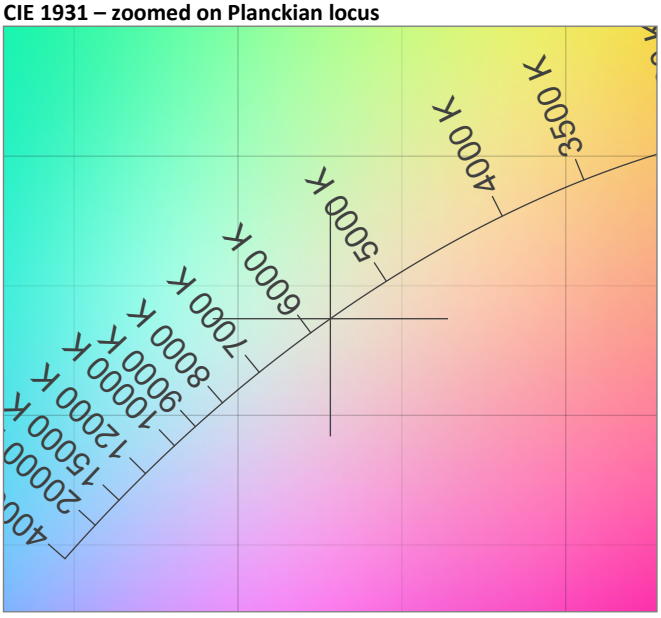
Color details

Correlated Color Temperature, Target	CCT = 5700 K
Correlated Color Temperature, Measured	CCT = 5682 K
Color Rendering Index	CRI 82,7
Color Rendering Index, R9 (red component)	R9 = 8,5
Color Rendering TM30-18	R_f 81,9 – R_g 93,9
Color Quality Scale	CQS = 79,3
MacAdam Steps	SDCM = 3,2
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 = 0,0008
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,205;0,475)

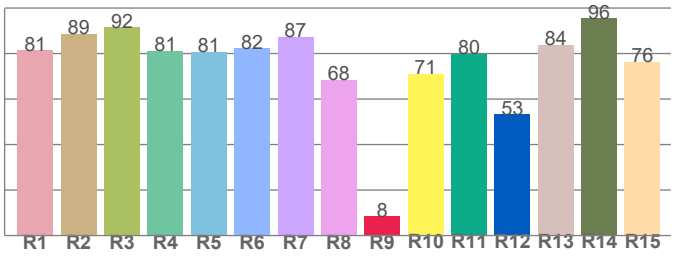
CIE 1931



CIE 1931 – zoomed on Planckian locus



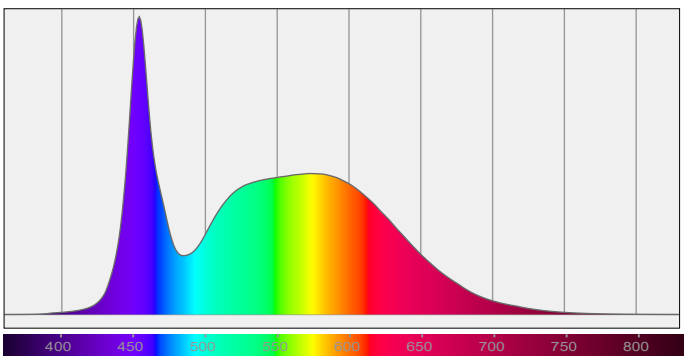
Color Rendering Index per reference color (CIE 1995)



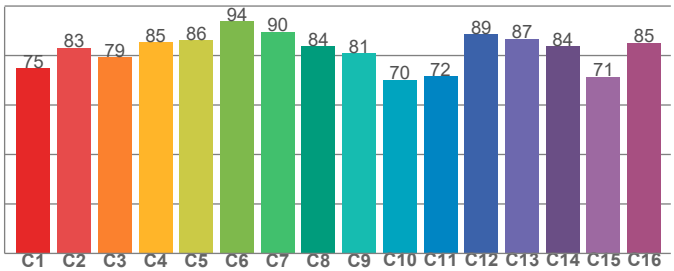
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,4	88,7	91,6	81,3	80,8	82,2	87,4	68,5	8,5	71,2	79,9	53,2	83,9	95,6	76,4

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



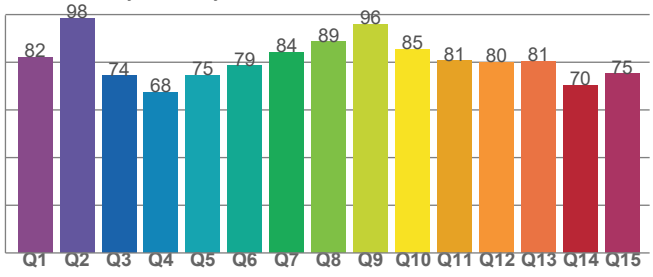
TM30-18 Rf-values per hue bin



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
75,0	83,2	79,3	85,4	86,1	93,9	89,6	83,8	80,8	70,2	71,6	88,7	86,8	83,8	71,4	85,1

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
82,2	98,5	74,3	67,5	74,6	78,6	84,2	88,6	95,9	85,4	80,6	80,0	80,5	70,3	75,1

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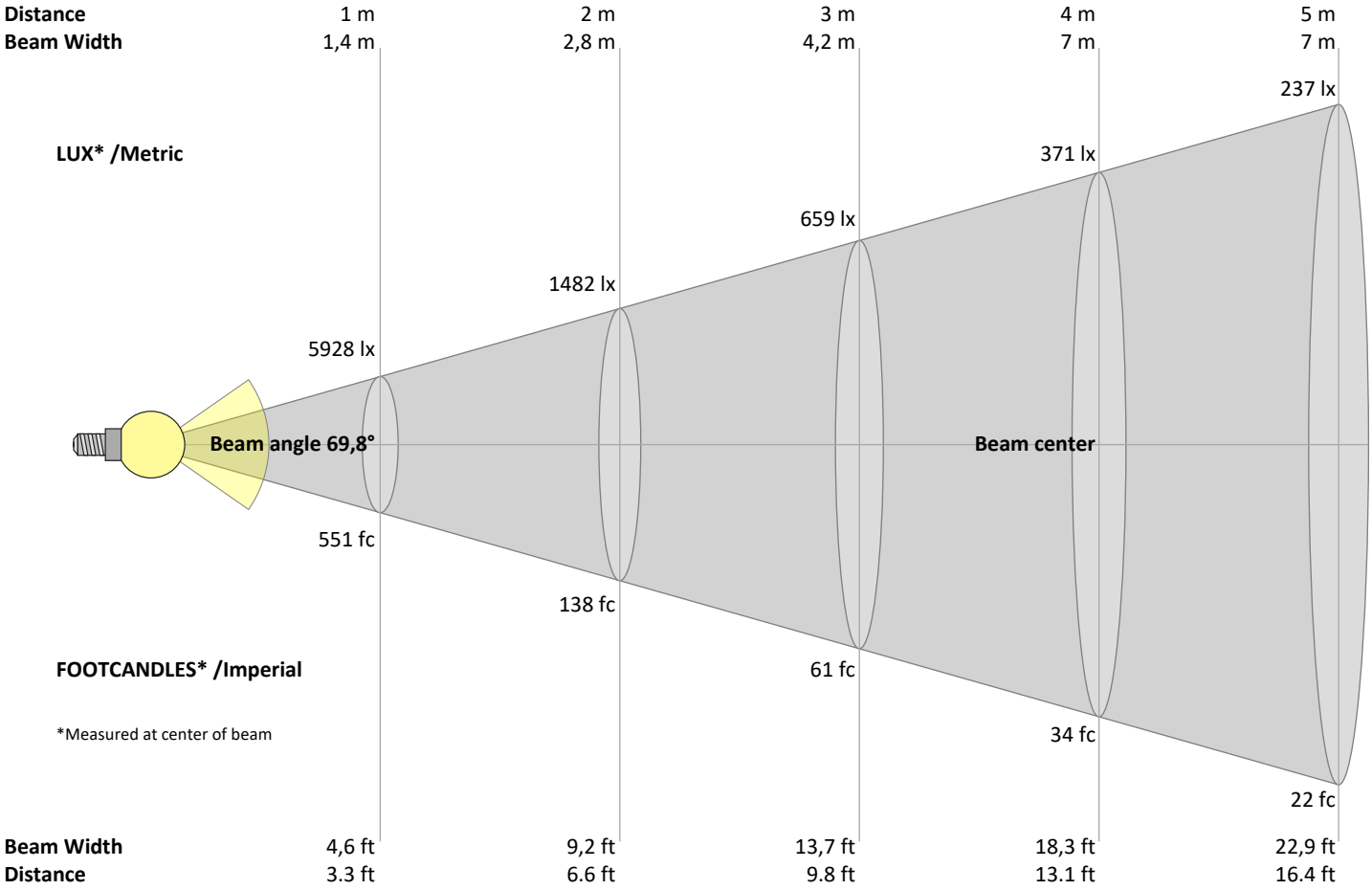
Beam Details



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
5928	1482	659	371	237	165	121	93	73	59	49	41	35	30	26	23	21	18	16	15	lux
550,8	137,7	61,2	34,4	22	15,3	11,2	8,6	6,8	5,5	4,6	3,8	3,3	2,8	2,4	2,2	1,9	1,7	1,5	1,4	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
5928	5976	6070	6076	5830	5188	4171	3020	2010	1294	868	643	524	445	373	292	207	124	66	56	cd
100%	101%	102%	102%	98%	88%	70%	51%	34%	22%	15%	11%	9%	8%	6%	5%	3%	2%	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
5928	5976	6070	6076	5830	5188	4171	3020	2010	1294	868	643	524	445	373	292	207	124	66	56	cd
100%	101%	102%	102%	98%	88%	70%	51%	34%	22%	15%	11%	9%	8%	6%	5%	3%	2%	1%	1%	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
5928	5976	6070	6076	5830	5188	4171	3020	2010	1294	868	643	524	445	373	292	207	124	66	56	cd
100%	101%	102%	102%	98%	88%	70%	51%	34%	22%	15%	11%	9%	8%	6%	5%	3%	2%	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
5928	5976	6070	6076	5830	5188	4171	3020	2010	1294	868	643	524	445	373	292	207	124	66	56	cd
100%	101%	102%	102%	98%	88%	70%	51%	34%	22%	15%	11%	9%	8%	6%	5%	3%	2%	1%	1%	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	21,8	22,7	22,1	23,0	23,3	21,2	22,1	21,4	22,4	22,7
	3H	22,8	23,7	23,2	24,0	24,3	21,9	22,8	22,3	23,1	23,4
	4H	23,4	24,3	23,8	24,6	24,9	22,3	23,2	22,7	23,5	23,8
	6H	24,0	24,8	24,3	25,1	25,5	22,7	23,5	23,0	23,8	24,2
	8H	24,2	25,0	24,6	25,4	25,8	22,8	23,6	23,2	23,9	24,4
	12H	24,4	25,2	24,8	25,6	26,1	22,8	23,6	23,3	24,0	24,5
4H	2H	21,9	22,9	22,4	23,2	23,5	21,4	22,3	21,8	22,6	22,9
	3H	23,3	24,0	23,7	24,4	24,9	22,5	23,2	22,9	23,6	24,1
	4H	23,9	24,7	24,4	25,1	25,7	23,0	23,7	23,4	24,1	24,7
	6H	24,6	25,3	25,2	25,7	26,2	23,4	24,1	24,0	24,5	24,9
	8H	25,0	25,6	25,5	26,0	26,4	23,6	24,2	24,1	24,6	25,1
	12H	25,2	25,8	25,8	26,2	26,7	23,7	24,2	24,2	24,7	25,2
8H	4H	24,1	24,7	24,6	25,1	25,6	23,2	23,8	23,8	24,2	24,7
	6H	25,0	25,4	25,5	25,9	26,5	23,8	24,3	24,4	24,8	25,4
	8H	25,4	25,8	26,0	26,3	27,0	24,1	24,5	24,7	25,1	25,7
	12H	25,8	26,1	26,4	26,6	27,3	24,3	24,6	24,9	25,2	25,8
12H	4H	24,1	24,6	24,6	25,1	25,6	23,2	23,7	23,8	24,2	24,7
	6H	25,0	25,4	25,6	26,0	26,6	23,9	24,3	24,5	24,9	25,6
	8H	25,4	25,8	26,1	26,3	27,0	24,2	24,5	24,8	25,1	25,7

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,6 / -0,4	0,7 / -0,5
S = 1.5H	1,4 / -0,6	1,7 / -0,8
S = 2.0H	2,3 / -0,8	2,8 / -1,0

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	118	118	118	118	115	115	115	115	109	109	109	104	104	104	99	99	99	97
1	110	107	103	100	107	104	101	98	99	97	94	95	93	91	91	89	88	86
2	103	96	91	86	100	94	89	85	90	86	83	87	83	80	83	81	78	76
3	96	88	81	76	93	86	80	75	83	78	73	80	75	72	77	73	70	68
4	90	80	73	68	87	79	72	67	76	70	66	73	69	65	71	67	64	62
5	84	74	66	61	82	72	66	60	70	64	60	68	63	59	66	61	58	56
6	79	68	61	55	77	67	60	55	65	59	54	63	58	54	61	57	53	51
7	74	63	56	50	72	62	55	50	60	54	50	59	53	49	57	52	49	47
8	70	58	51	46	68	58	51	46	56	50	46	55	49	45	53	49	45	43
9	66	55	48	43	64	54	47	43	53	47	42	51	46	42	50	45	42	40
10	62	51	44	40	61	50	44	40	49	43	39	48	43	39	47	42	39	37

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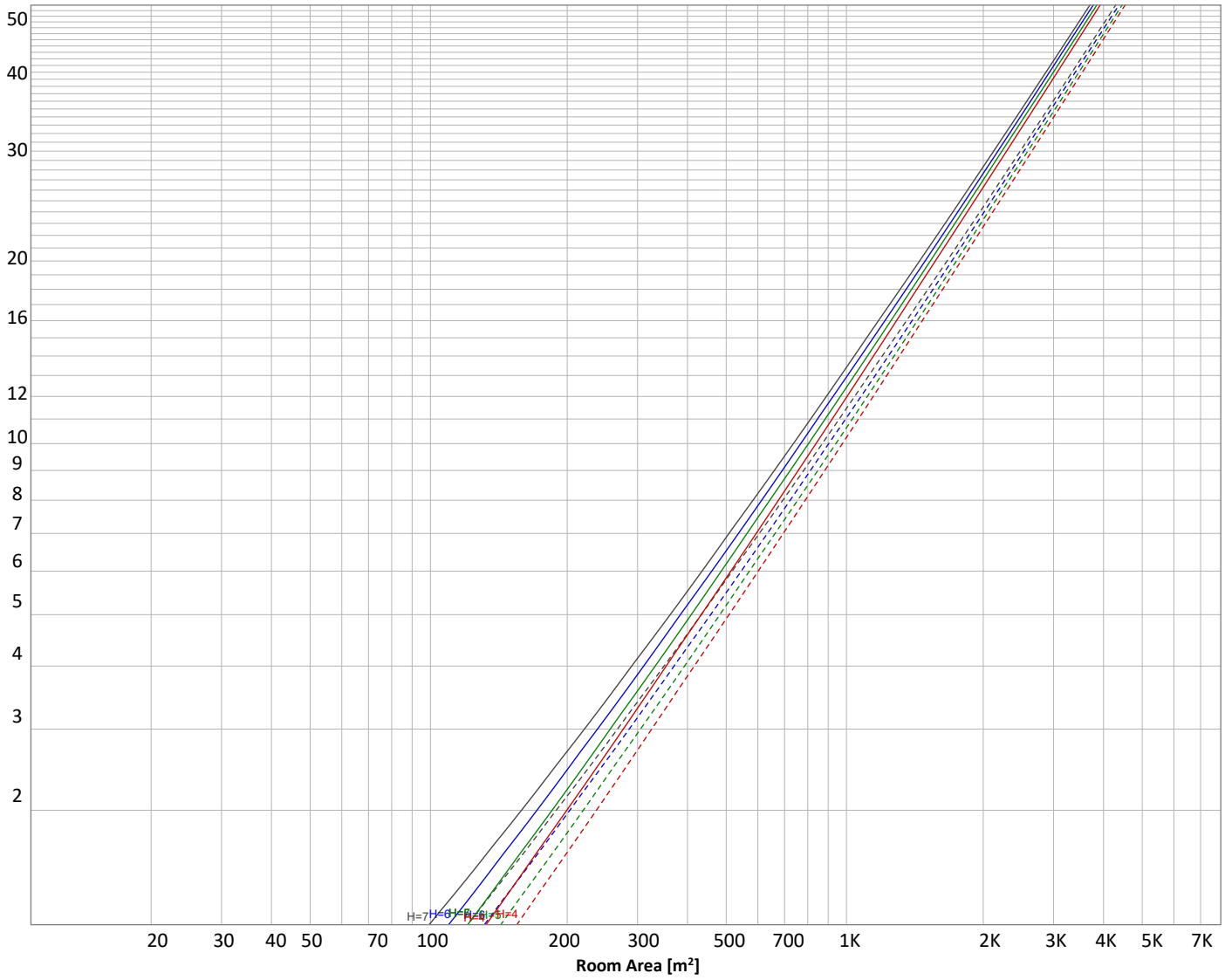
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 9324 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°
574 lm	1706 lm	2348 lm	1885 lm	1024 lm	587 lm	441 lm	308 lm	140 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
62,0 lm	62,6 lm	56,4 lm	46,8 lm	35,8 lm	25,3 lm	13,5 lm	6,93 lm	2,30 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	574 lm	6,2%
10-20°	1706 lm	18,3%
20-30°	2348 lm	25,2%
30-40°	1885 lm	20,2%
40-50°	1024 lm	11,0%
50-60°	587 lm	6,3%
60-70°	441 lm	4,7%
70-80°	308 lm	3,3%
80-90°	140 lm	1,5%
90-100°	62 lm	0,7%
100-110°	63 lm	0,7%
110-120°	56 lm	0,6%
120-130°	47 lm	0,5%
130-140°	36 lm	0,4%
140-150°	25 lm	0,3%
150-160°	14 lm	0,1%
160-170°	7 lm	0,1%
170-180°	2 lm	0,0%
Total	9324 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	4627 lm	49,6%
0-40°	6513 lm	69,9%
0-60°	8123 lm	87,1%
60-90°	889 lm	9,5%
70-100°	510 lm	5,5%
90-120°	181 lm	1,9%
0-90°	9012 lm	96,7%
90-180°	311 lm	3,3%
0-180°	9324 lm	100,0%

Intensity peaks

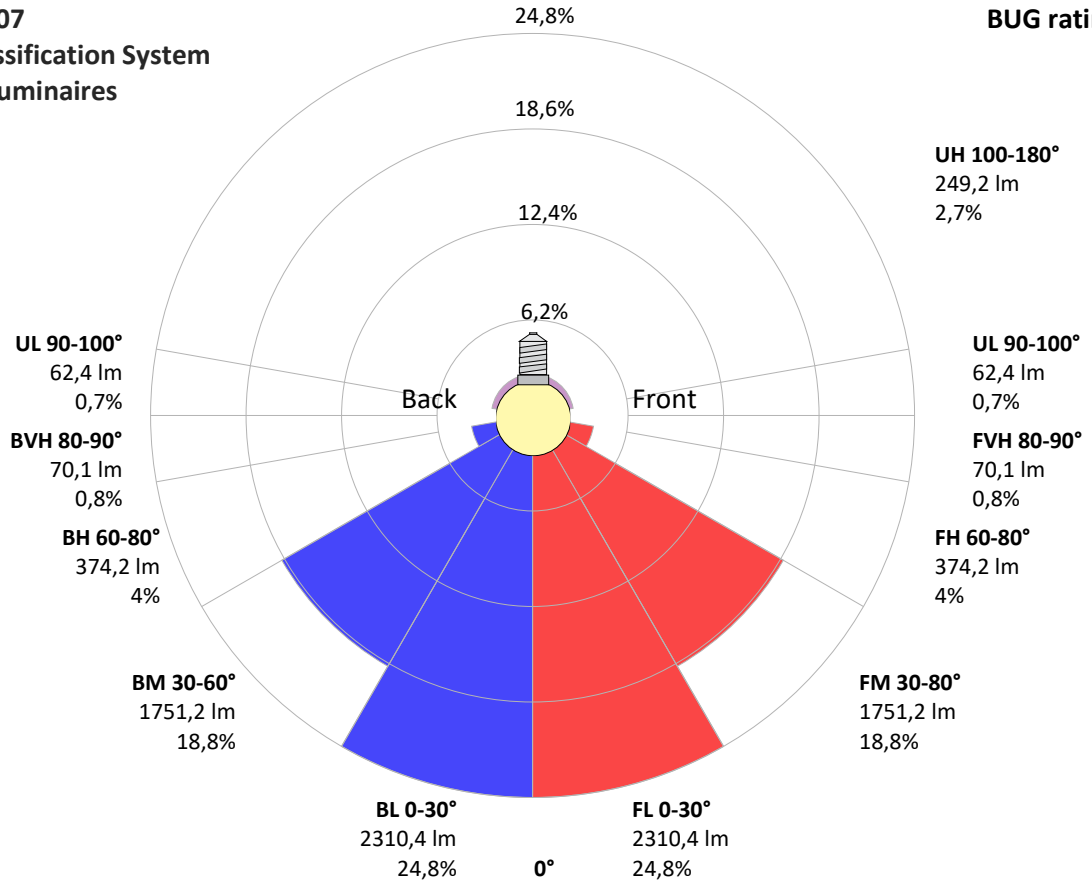
Max intensity	6089 cd
Intensity, 90°	66 cd
Intensity, 0°	5928 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	2310 lm	24,8%
Medium(30-60°)	1751 lm	18,8%
High(60-80°)	374 lm	4,0%
Very high(80-90°)	70 lm	0,8%
Back light		
Low(0-30°)	2310 lm	24,8%
Medium(30-60°)	1751 lm	18,8%
High(60-80°)	374 lm	4,0%
Very high(80-90°)	70 lm	0,8%
Uplight		
Low(90-100°)	62 lm	0,7%
High(100-180°)	249 lm	2,7%

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

BUG rating B3 U3 G1



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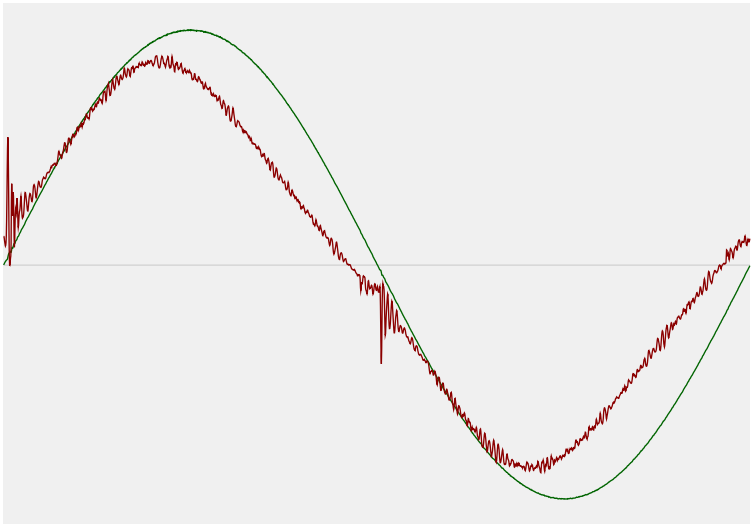
Power Details

Input Power

Power feed to light source	56,3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,253 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	58,27 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	8,59%
Total harmonic distortion of the voltage	0,07%

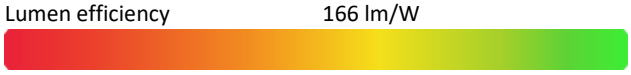
Input Power Curve



Efficiency

Radiated power efficiency 51,9%

Lumen efficiency 166 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5669 K
CCT shift	+31 K
CCT end	5700 K

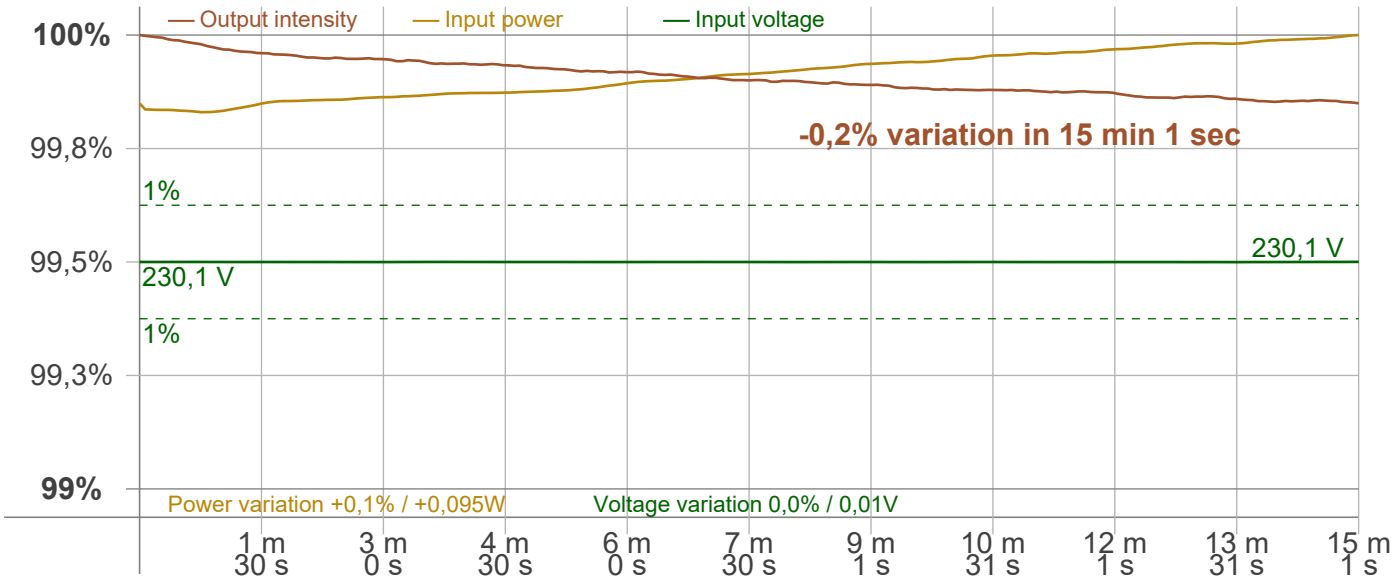
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,2%

Output Change

Output start	9338 lm
Output change	-14 lm
Output end	9324 lm

Stabilization Curve



Light Measurement Report

Print date: 15-10-2024
Measurement date and time: 15-10-2024 09:01:07 – Measurement no. VFR-241015-1266-MS
Measurement tracking No. and Link: VT241015-001744
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	85,47 Hz
Percent Flicker	0,29 %
Flicker index	0

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

JA8/10 40 Hz	0,01 %
JA8/10 90 Hz	0,04 %
JA8/10 200 Hz	0,16 %
JA8/10 400 Hz	0,17 %
JA8/10 1000 Hz	0,18 %

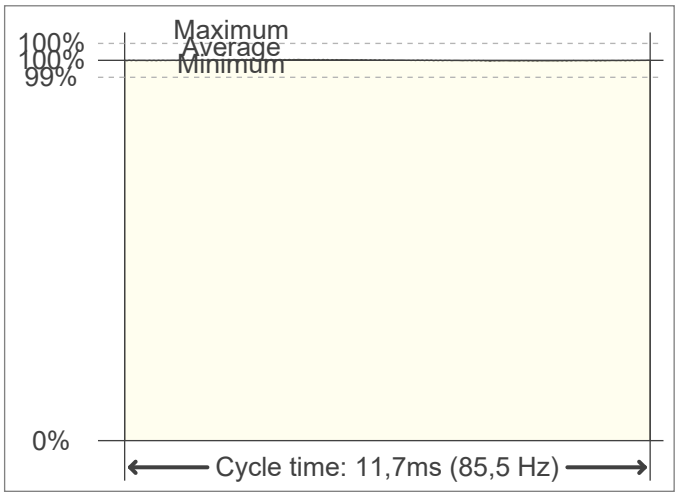
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

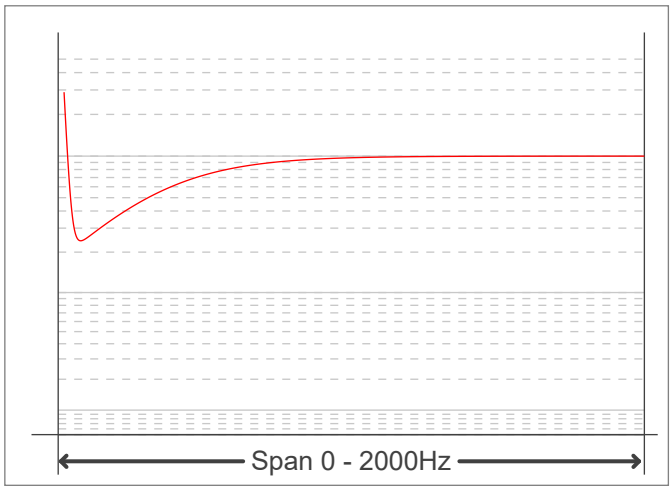
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot