

Light Measurement Report

Print date: 15-10-2024

Measurement date and time: 15-10-2024 10:24:35 – Measurement no. VFR-241015-1272-MS

Measurement tracking No. and Link: [VT241015-009218](#)

Operator:



Laboratory and Equipment

Laboratory Owner and Location
Goniospectrometer System and Type
Sensor Name, Calibr. Date and Serial No.
Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark
LabSpion – Type C, horizontal
LabSensor Model2 – 11-1-2024 – 3130191315
Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution
 γ (gamma)-Resolution
Test Distance
Input Power, Power and Displ. Factors
Input RMS Voltage and Current
Frequency of Input Power
Warm-up Time and Variation

48 planes – 7,5°
5°
12,13 m
64,7 W – PF 0,97 – DPF 0,98
230 V – 0,290 A
50 Hz
Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

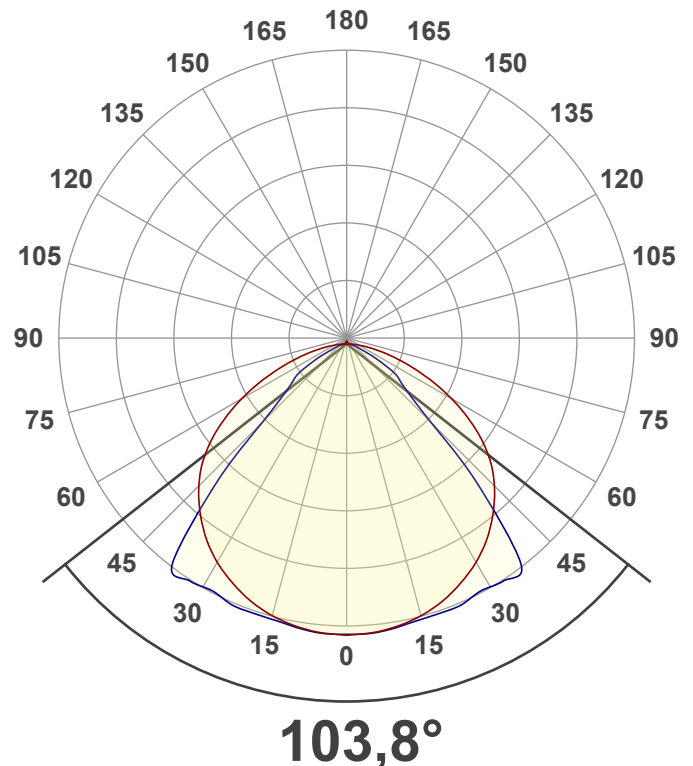
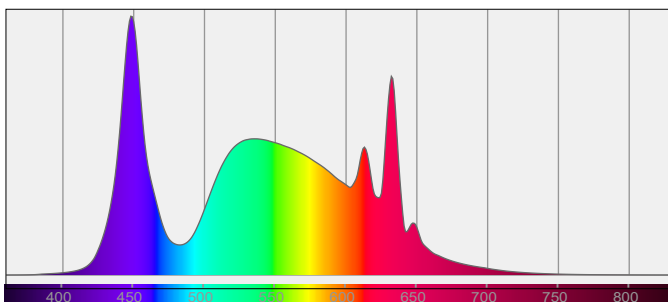
Product Name
Item No. and Manufacturer
Product Description (line 1)

276284-5700K
276284-5700K – Dutchfulfillment
LICHTLIJN JUPITER | LED MODULE | 33W/42W/58W/66W | 90°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)
Efficiency
Peak Intensity and Beam Angle
Correlated Color Temperature, Target/Measured
Color Rendering Index
Color Rendering TM30-18
Color Shift, CIE duv and MacAdam Steps
Flicker

11158 lm – 1,06% / 98,94%
172 lm/W
4313 cd – 103,8°
CCT = 5700 K / 5658 K
CRI 82,3
 R_f 81,8 – R_g 101,1
Duv 0,0016 – SDCM 6,6
SVM 0 – PstLM 0,01



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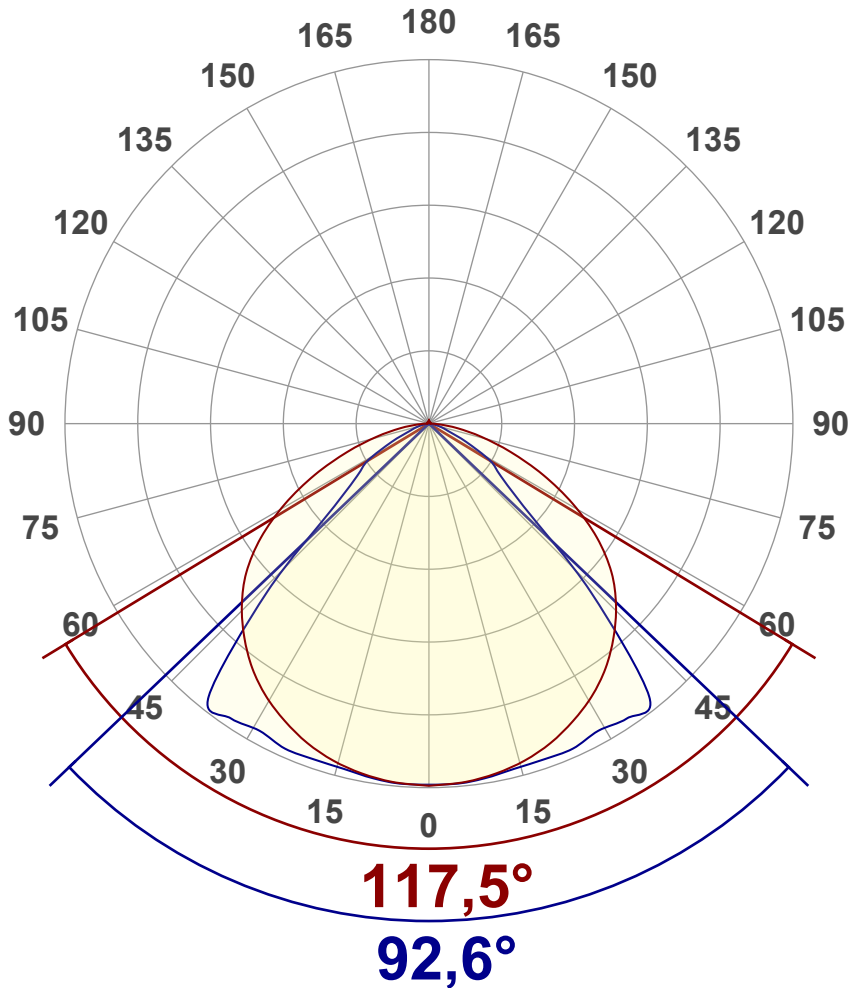
Measurement tracking No. and Link: [VT241015-009218](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	11158 lm
Lumen Up% / Down%	1,06% / 98,94%
Peak Intensity	4313 cd
Beam Angle (50%)	103,8°
Beam Angle (90%)	92,6°
Beam Angle (10%)	116,4°

Cut-off Angle

Average 2,5%	162,5°
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Field Angle

Average 10%	142,2°
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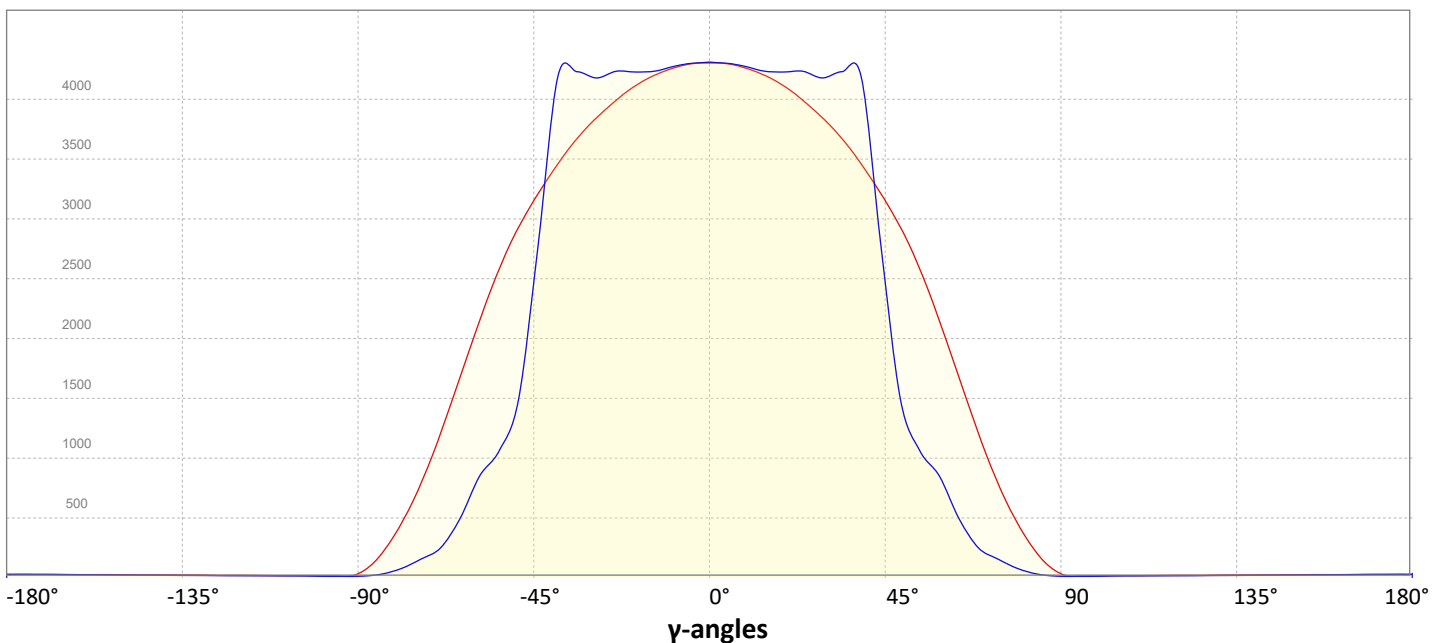
Intensity Ratio

In 120° cone	87,8%
In 90° cone	64,7%

C000-C180

C090-C270

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



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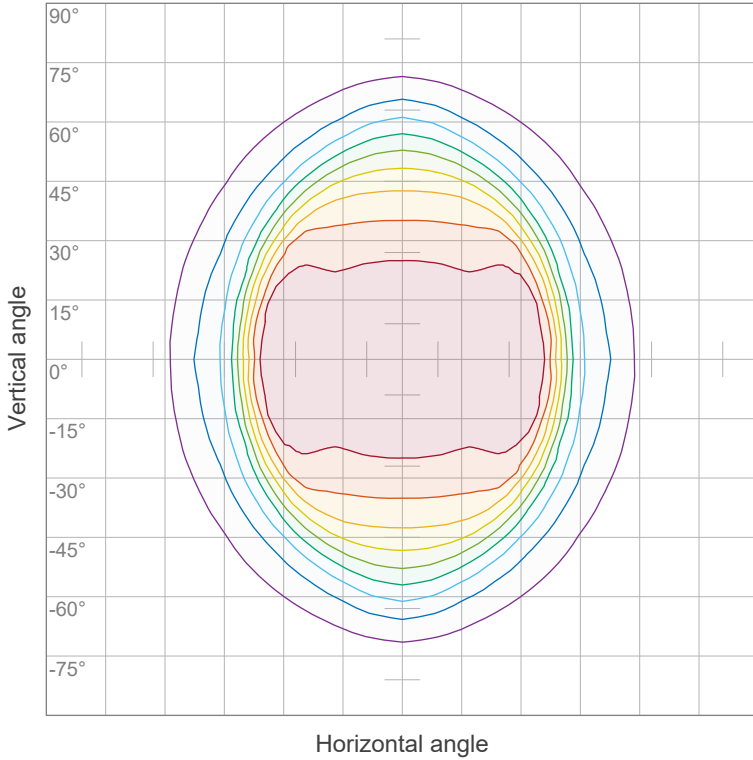
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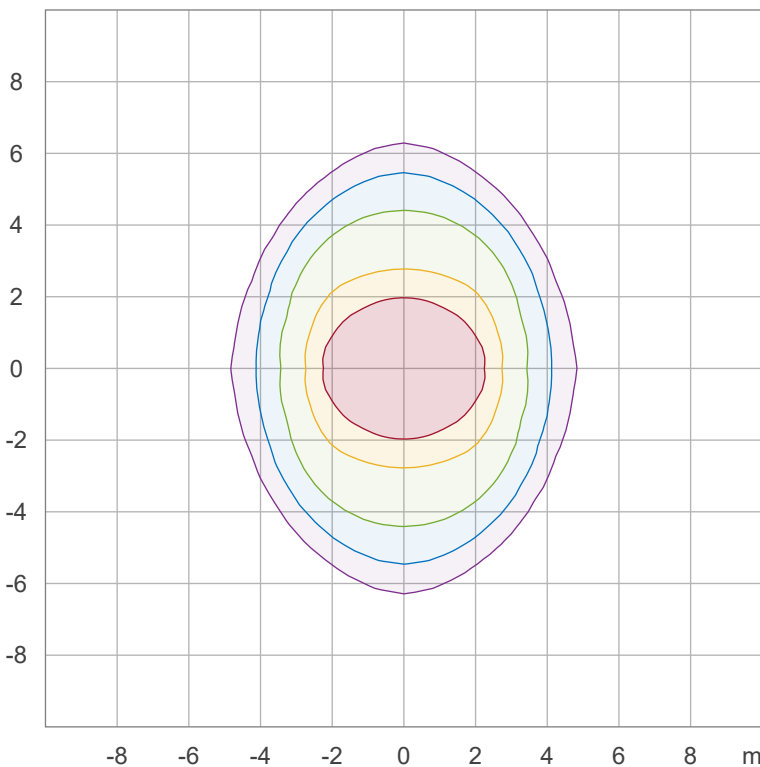
Iso-intensity Diagram (Iso-candela)



90 %	3879,1 cd
80 %	3448,1 cd
70 %	3017,1 cd
60 %	2586,1 cd
50 %	2155,1 cd
40 %	1724,1 cd
30 %	1293,0 cd
20 %	862,0 cd
10 %	431,0 cd

Peak intensity: 4310,2 cd
Number of c-planes: 48

Iso-illuminance Diagram (Iso-lux)



50,0 %	239,4 lx
30,0 %	143,7 lx
10,0 %	47,9 lx
5,0 %	23,9 lx
3,0 %	14,4 lx

Peak illuminance: 478,9 lx
Mounting height: 3,0 m
Number of c-planes: 48

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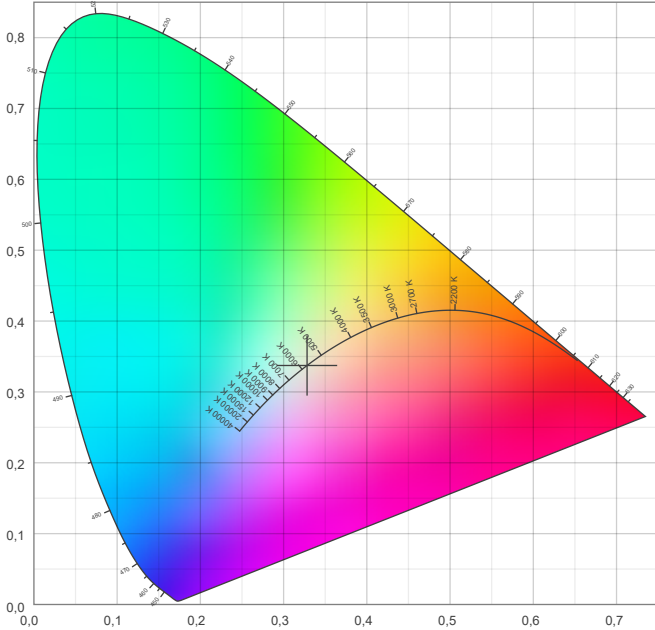


Color details

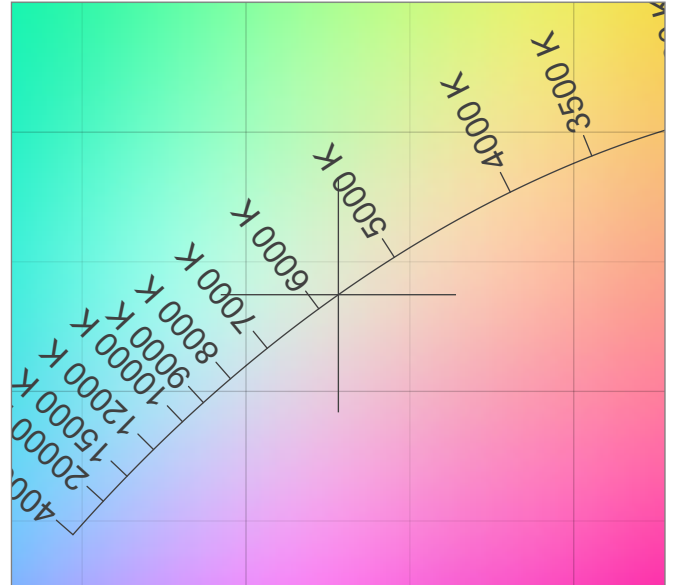
Correlated Color Temperature, Target CCT = 5700 K
 Correlated Color Temperature, Measured CCT = 5658 K
 Color Rendering Index CRI 82,3
 Color Rendering Index, R9 (red component) R9 = 47,7
 Color Rendering TM30-18 R_f 81,8 – R_g 101,1
 Color Quality Scale CQS = 82,5

MacAdam Steps SDCM = 6,6
 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 = 0,0016
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,205;0,475)

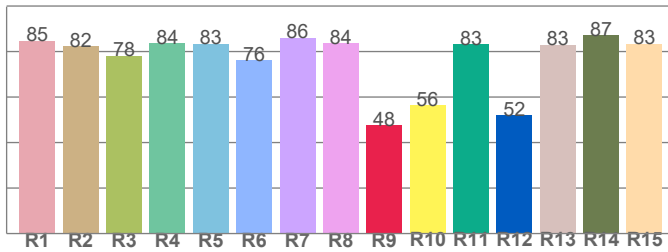
CIE 1931



CIE 1931 – zoomed on Planckian locus



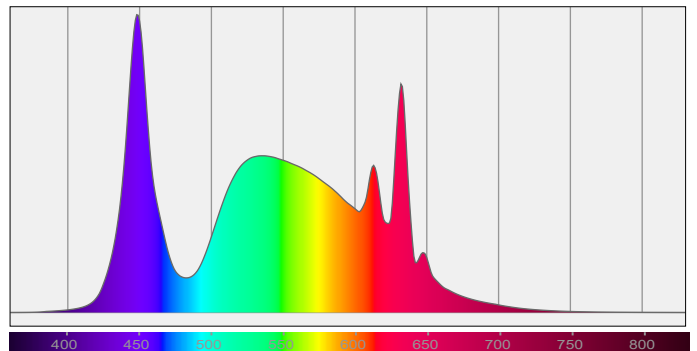
Color Rendering Index per reference color (CIE 1995)



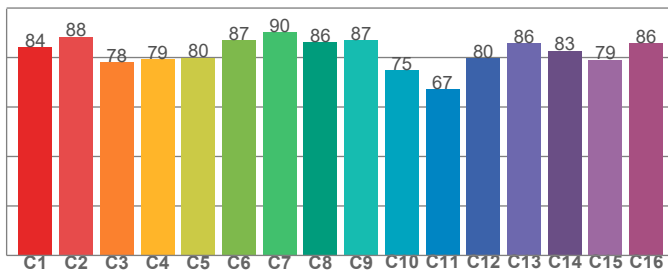
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84,8	82,3	78,1	83,6	83,4	76,2	86,1	83,6	47,7	56,4	83,2	51,9	83,0	87,3	83,5

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



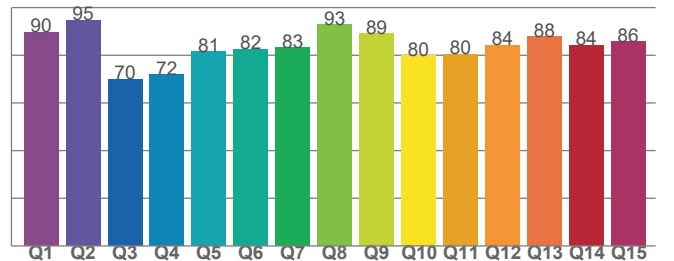
TM30-18 Rf-values per hue bin



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
84,2	88,4	78,1	79,3	79,9	87,0	90,1	86,2	87,0	74,9	67,1	79,6	85,8	82,7	79,1	85,9

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89,6	94,6	70,0	71,8	81,4	82,5	83,2	92,9	89,1	79,8	80,3	84,2	87,8	84,1	85,7

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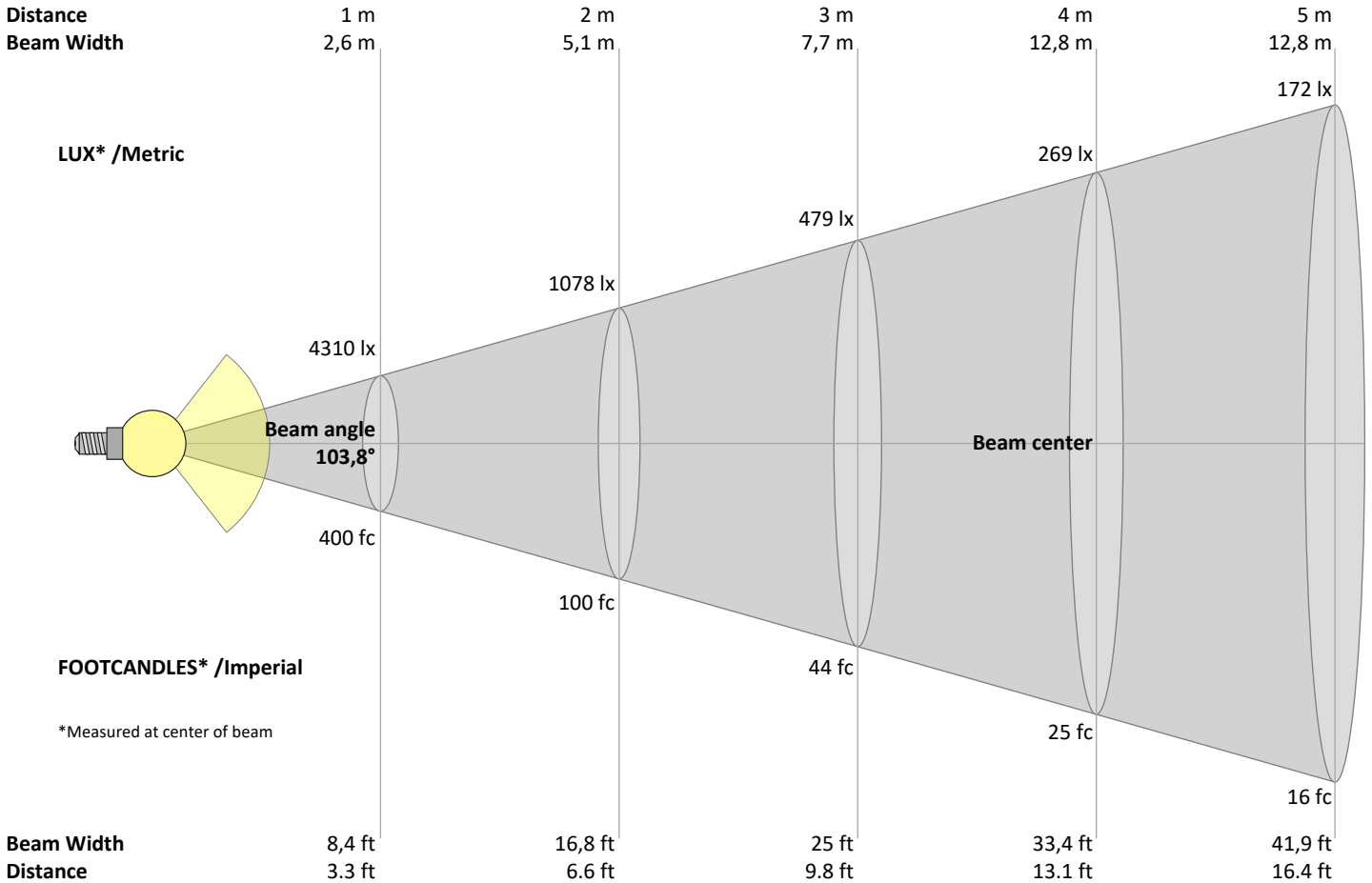
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Operator:



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
4310	1078	479	269	172	120	88	67	53	43	36	30	26	22	19	17	15	13	12	11	lux
400,4	100,1	44,5	25	16	11,1	8,2	6,3	4,9	4	3,3	2,8	2,4	2	1,8	1,6	1,4	1,2	1,1	1	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
4310	4293	4251	4184	4088	3959	3809	3625	3402	3149	2855	2483	2041	1569	1109	711	397	167	40	17	cd
100%	100%	99%	97%	95%	92%	88%	84%	79%	73%	66%	58%	47%	36%	26%	17%	9%	4%	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
4310	4296	4267	4233	4229	4221	4189	4219	3868	2491	1396	1013	770	440	228	138	67	27	13	12	cd
100%	100%	99%	98%	98%	98%	97%	98%	90%	58%	32%	23%	18%	10%	5%	3%	2%	1%	0%	0%	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
4310	4293	4251	4184	4088	3959	3809	3625	3402	3149	2855	2483	2041	1569	1109	711	397	167	40	17	cd
100%	100%	99%	97%	95%	92%	88%	84%	79%	73%	66%	58%	47%	36%	26%	17%	9%	4%	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
4310	4296	4267	4233	4229	4221	4189	4219	3868	2491	1396	1013	770	440	228	138	67	27	13	12	cd
100%	100%	99%	98%	98%	98%	97%	98%	90%	58%	32%	23%	18%	10%	5%	3%	2%	1%	0%	0%	of 0°val

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Operator:



Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	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		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	26,0	27,1	26,2	27,4	27,6	22,6	23,7	22,8	24,0	24,2
	3H	27,0	28,1	27,4	28,4	28,6	22,6	23,7	23,0	24,0	24,2
	4H	27,4	28,5	27,8	28,8	29,0	22,6	23,7	23,0	24,0	24,2
	6H	27,8	28,7	28,1	29,0	29,4	22,6	23,6	23,0	23,9	24,3
	8H	27,9	28,8	28,2	29,1	29,5	22,6	23,5	22,9	23,8	24,2
	12H	27,9	28,8	28,3	29,1	29,6	22,5	23,4	22,9	23,8	24,2
4H	2H	25,9	27,0	26,3	27,2	27,5	22,9	24,0	23,3	24,3	24,6
	3H	27,1	28,0	27,5	28,4	28,8	23,2	24,0	23,5	24,4	24,9
	4H	27,6	28,4	28,0	28,8	29,3	23,1	23,9	23,6	24,3	24,9
	6H	27,9	28,7	28,5	29,1	29,5	23,1	23,9	23,6	24,2	24,6
	8H	28,1	28,8	28,6	29,2	29,6	23,1	23,8	23,6	24,1	24,5
	12H	28,2	28,7	28,7	29,2	29,7	23,0	23,6	23,5	24,0	24,5
8H	4H	27,5	28,2	28,0	28,6	29,0	23,2	23,9	23,7	24,3	24,7
	6H	27,9	28,5	28,5	28,9	29,5	23,2	23,8	23,8	24,2	24,8
	8H	28,1	28,6	28,7	29,1	29,8	23,3	23,7	23,8	24,2	24,9
	12H	28,3	28,6	28,9	29,2	29,8	23,2	23,6	23,8	24,1	24,7
12H	4H	27,5	28,0	28,0	28,5	29,0	23,2	23,8	23,7	24,2	24,7
	6H	27,9	28,4	28,5	28,9	29,6	23,3	23,7	23,8	24,3	24,9
	8H	28,1	28,5	28,7	29,0	29,6	23,3	23,6	23,9	24,1	24,8

Variations with the observer position for the luminaire spacings, S:

S = 1.0H	0,1 / -0,1	1,2 / -1,7
S = 1.5H	0,6 / -1,0	2,2 / -2,7
S = 2.0H	1,5 / -2,1	3,6 / -4,5

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	101	101	101	99
1	110	106	102	99	107	104	100	97	99	97	94	95	93	91	92	90	88	86
2	101	94	88	83	99	92	87	82	89	84	80	85	81	78	82	79	76	74
3	93	84	76	71	91	82	75	70	79	73	69	76	71	67	74	70	66	64
4	86	75	67	61	84	74	66	60	71	65	59	69	63	59	66	62	58	56
5	79	67	59	53	77	66	58	53	64	57	52	62	56	51	60	55	51	49
6	73	61	53	47	71	60	52	46	58	51	46	56	50	45	55	49	45	43
7	68	55	47	41	66	55	47	41	53	46	41	51	45	40	50	44	40	38
8	63	51	43	37	62	50	42	37	49	42	37	47	41	36	46	40	36	34
9	59	46	39	33	58	46	38	33	45	38	33	44	37	33	42	37	33	31
10	56	43	35	30	54	42	35	30	41	35	30	40	34	30	39	34	30	28

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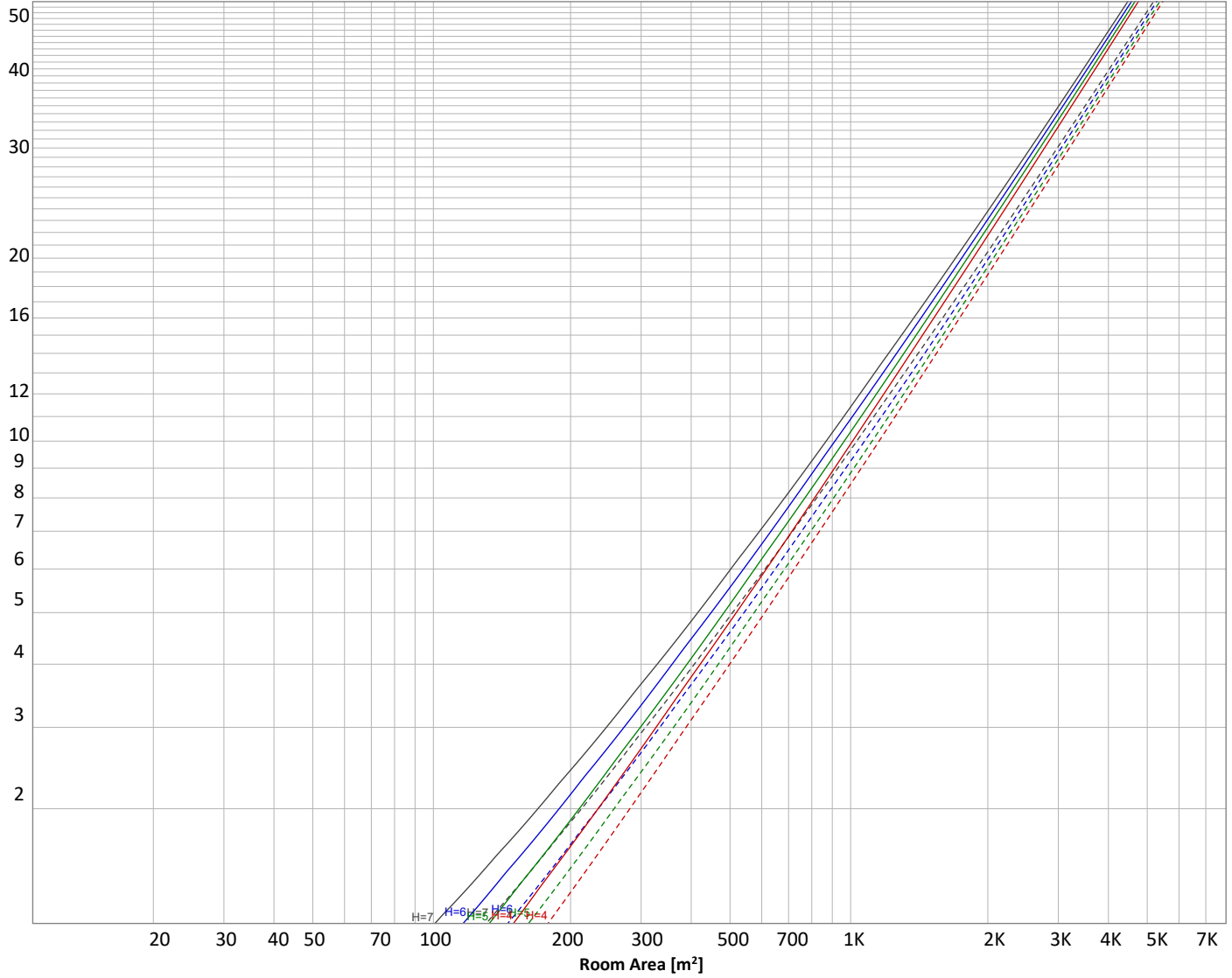
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 11158 lm				
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) 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°
409 lm	1189 lm	1883 lm	2454 lm	2358 lm	1508 lm	818 lm	338 lm	81,3 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
15,3 lm	16,5 lm	17,4 lm	17,4 lm	16,2 lm	14,3 lm	11,4 lm	7,53 lm	2,66 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	409 lm	3,7%
10-20°	1189 lm	10,7%
20-30°	1883 lm	16,9%
30-40°	2454 lm	22,0%
40-50°	2358 lm	21,1%
50-60°	1508 lm	13,5%
60-70°	818 lm	7,3%
70-80°	338 lm	3,0%
80-90°	81 lm	0,7%
90-100°	15 lm	0,1%
100-110°	17 lm	0,1%
110-120°	17 lm	0,2%
120-130°	17 lm	0,2%
130-140°	16 lm	0,1%
140-150°	14 lm	0,1%
150-160°	11 lm	0,1%
160-170°	8 lm	0,1%
170-180°	3 lm	0,0%
Total	11158 lm	100,0%

Intensity peaks

Max intensity	4313 cd
Intensity, 90°	40 cd
Intensity, 0°	4310 cd

Zonal Lumen summary

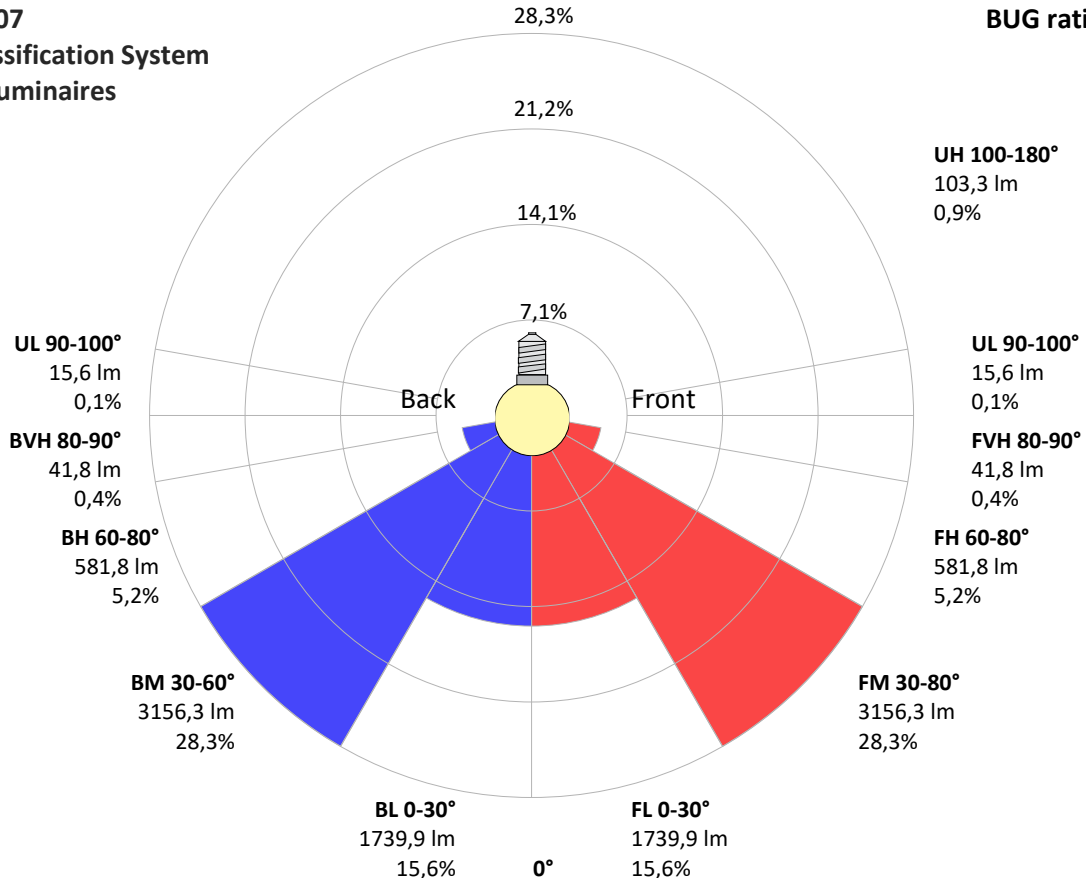
Zone (γ)	Lumen	% Total
0-30°	3481 lm	31,2%
0-40°	5936 lm	53,2%
0-60°	9802 lm	87,8%
60-90°	1237 lm	11,1%
70-100°	435 lm	3,9%
90-120°	49 lm	0,4%
0-90°	11039 lm	98,9%
90-180°	119 lm	1,1%
0-180°	11158 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1740 lm	15,6%
Medium(30-60°)	3156 lm	28,3%
High(60-80°)	582 lm	5,2%
Very high(80-90°)	42 lm	0,4%
Back light		
Low(0-30°)	1740 lm	15,6%
Medium(30-60°)	3156 lm	28,3%
High(60-80°)	582 lm	5,2%
Very high(80-90°)	42 lm	0,4%
Uplight		
Low(90-100°)	16 lm	0,1%
High(100-180°)	103 lm	0,9%

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

BUG rating B3 U3 G1



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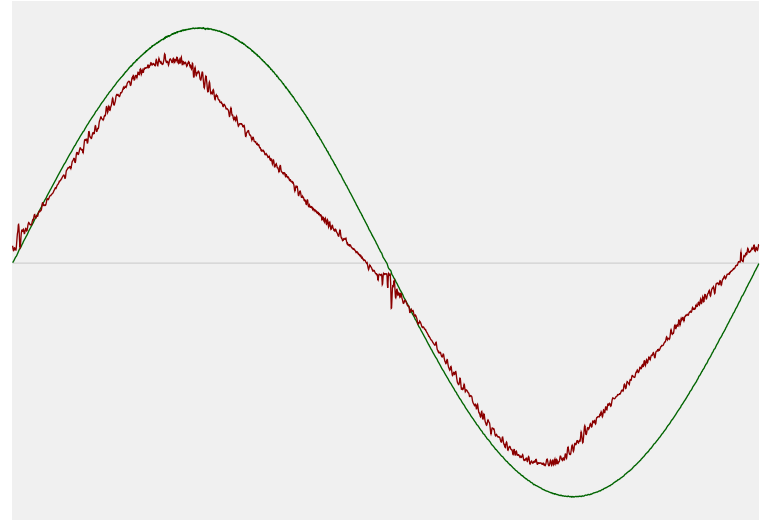


Power Details

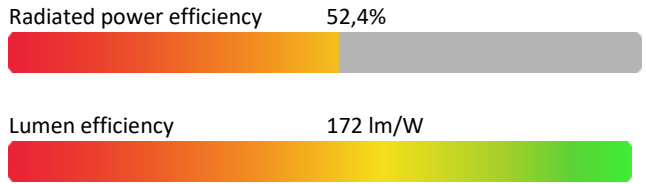
Input Power

Power feed to light source	64,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,290 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	66,68 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	13,1%
Total harmonic distortion of the voltage	0,08%

Input Power Curve



Efficiency



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5708 K
CCT shift	-8 K
CCT end	5700 K

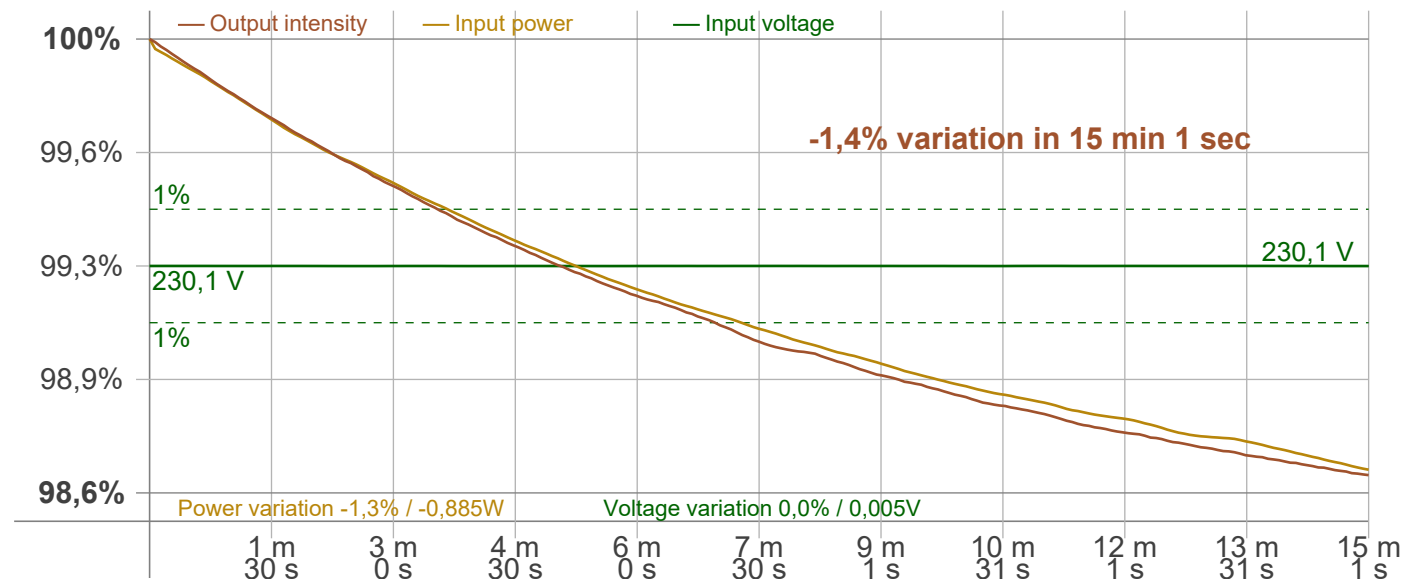
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-1,4%

Output Change

Output start	11315 lm
Output change	-157 lm
Output end	11158 lm

Stabilization Curve



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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: 98,52 Hz
 Percent Flicker: 0,08 %
 Flicker index: 0

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

JA8/10 40 Hz: 0,03 %
 JA8/10 90 Hz: 0,03 %
 JA8/10 200 Hz: 0,06 %
 JA8/10 400 Hz: 0,06 %
 JA8/10 1000 Hz: 0,07 %

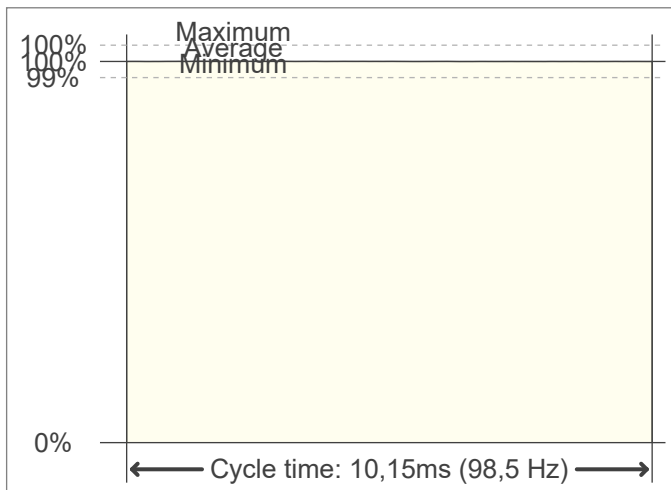
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

