

Light Measurement Report

Print date: 19-12-2024

Measurement date and time: 19-12-2024 09:47:52 – Measurement no. VFR-241219-2591-MS

Measurement tracking No. and Link: [VT241219-008939](https://www.viso-systems.com/VT241219-008939)

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

12 planes – 30°
5°
7,71 m
42,3 W – PF 0,96 – DPF 0,97
230 V – 0,191 A
50 Hz
Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

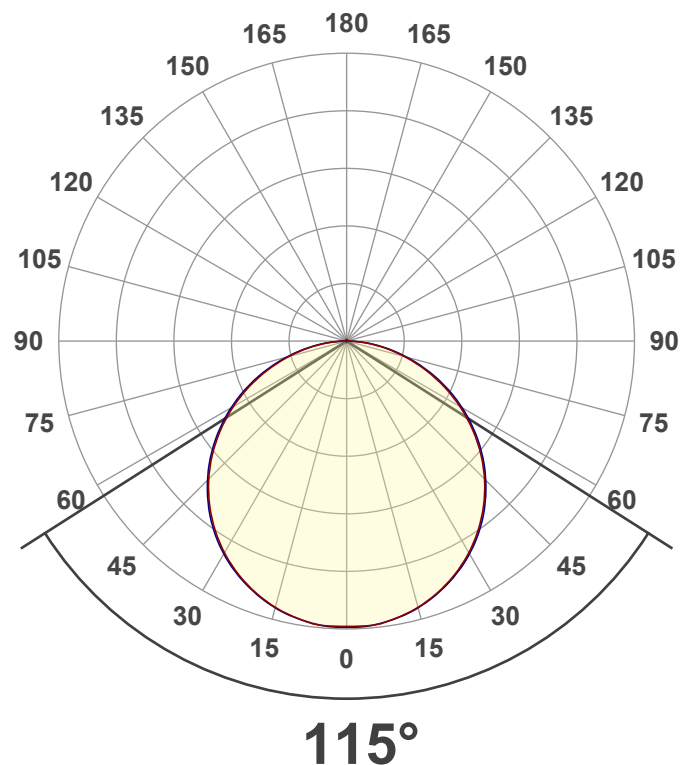
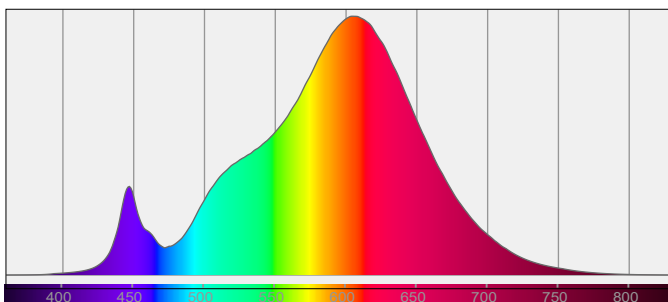
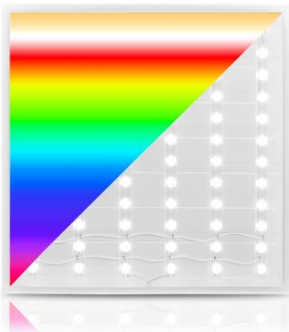
Product Name
Item No. and Manufacturer
Product Description (line 1)

808198-2700K
808198-2700K – Dutchfulfillment
BACK-LIT LED PANEEL | DOVER | 60x60CM | RGB+CCT | 40W

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

3947 lm – 0,56% / 99,44%
93 lm/W
1323 cd – 115°
CCT = 2700 K / 2746 K
CRI 82,2
 R_f 86,0 – R_g 94,9
Duv 0,0039 – SDCM 4,6
SVM 0 – PstLM 0,01



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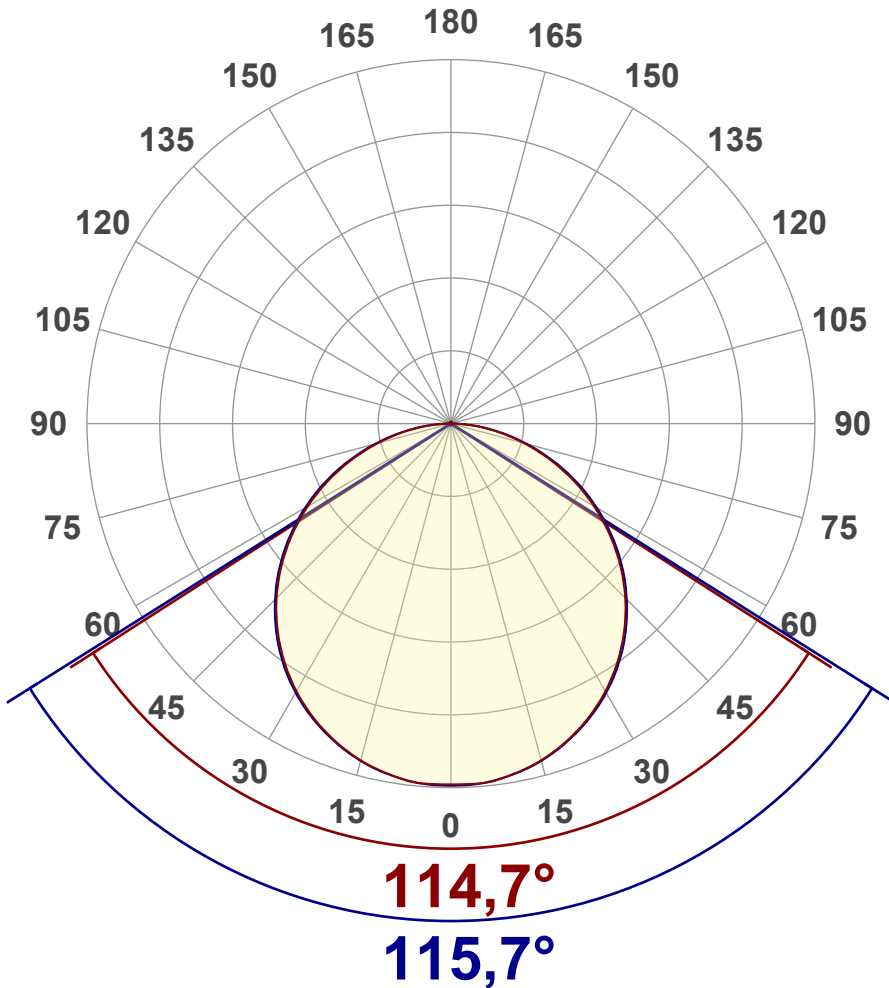
Measurement tracking No. and Link: [VT241219-008939](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3947 lm
Lumen Up% / Down%	0,56% / 99,44%
Peak Intensity	1323 cd
Beam Angle (50%)	115°
Beam Angle (90%)	115,7°
Beam Angle (10%)	114,7°

Cut-off Angle

Average 2,5%	177,4°
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Field Angle

Average 10%	164,9°
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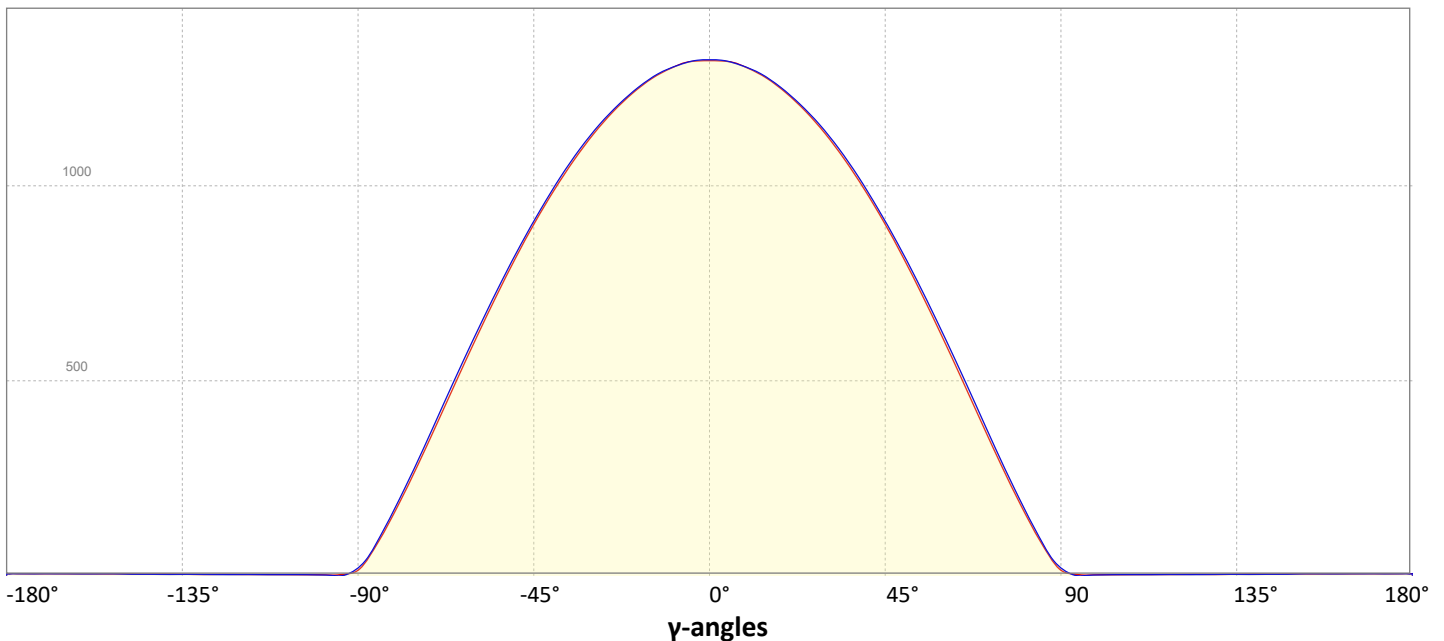
Intensity Ratio

In 120° cone	76,9%
In 90° cone	51,9%

C000-C180

C090-C270

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



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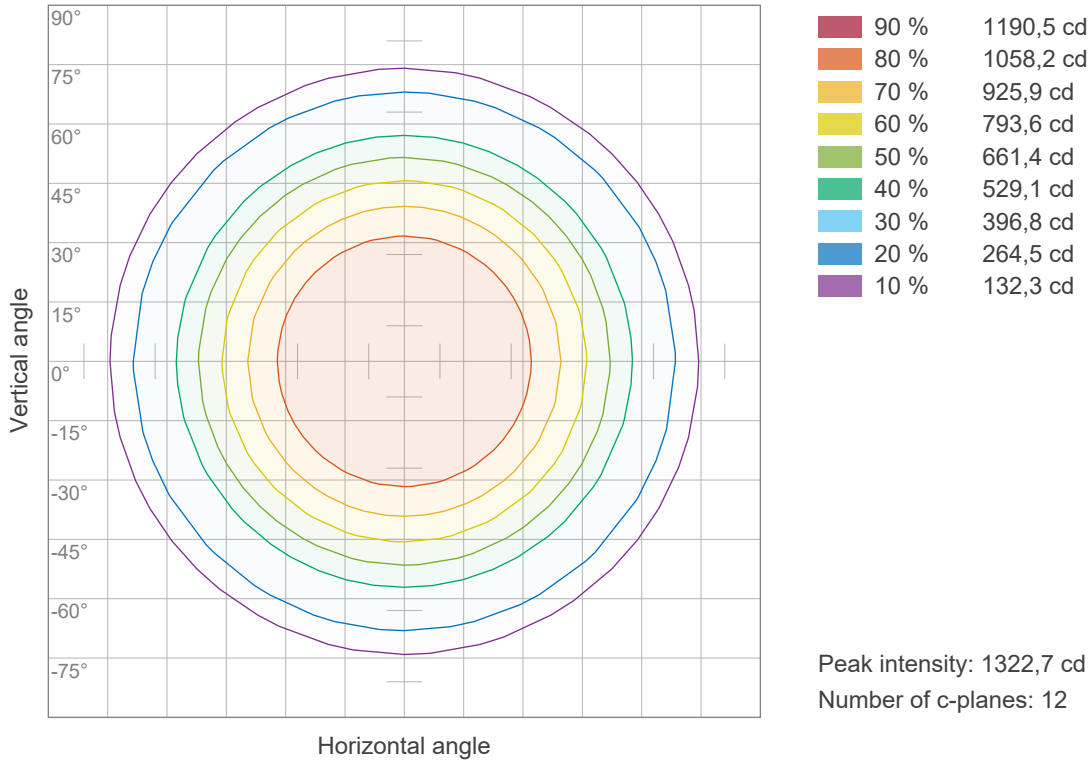
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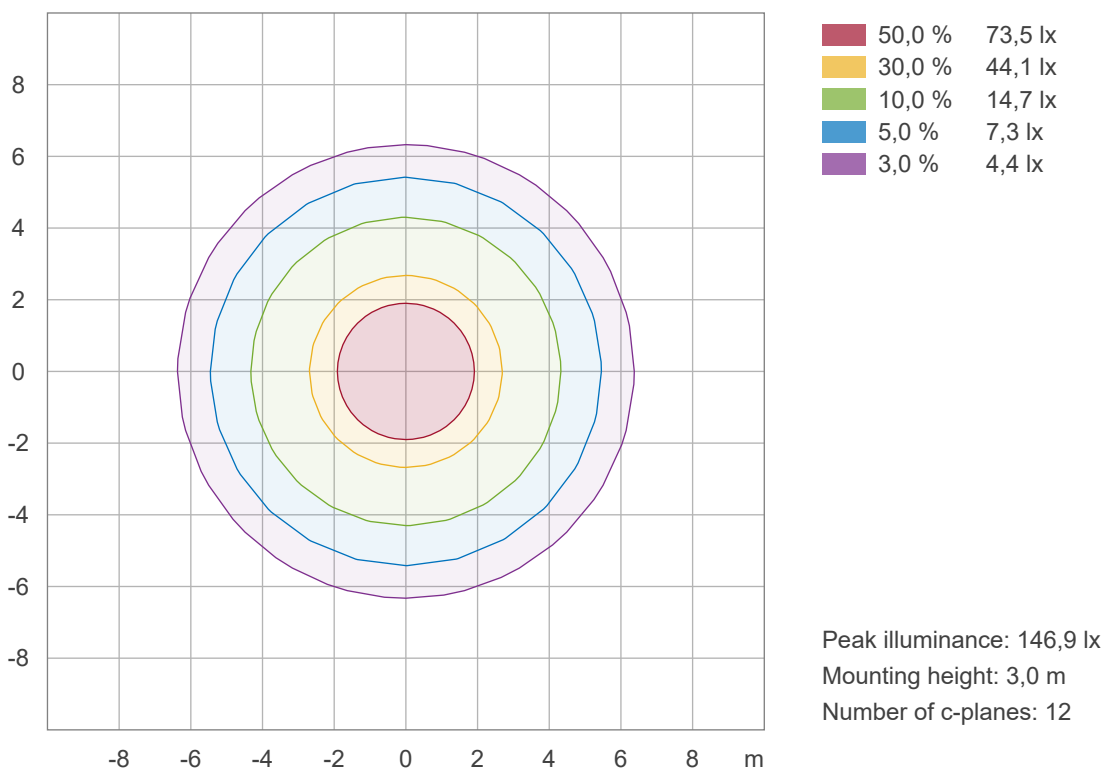
Operator:



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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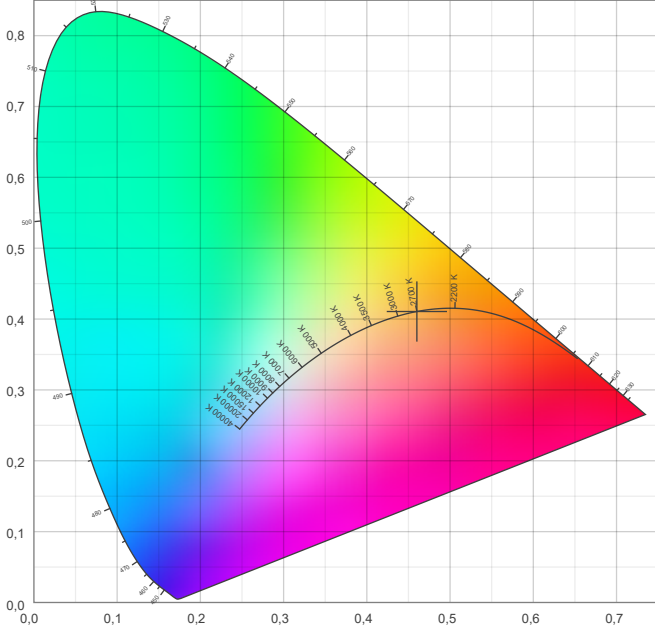


Color details

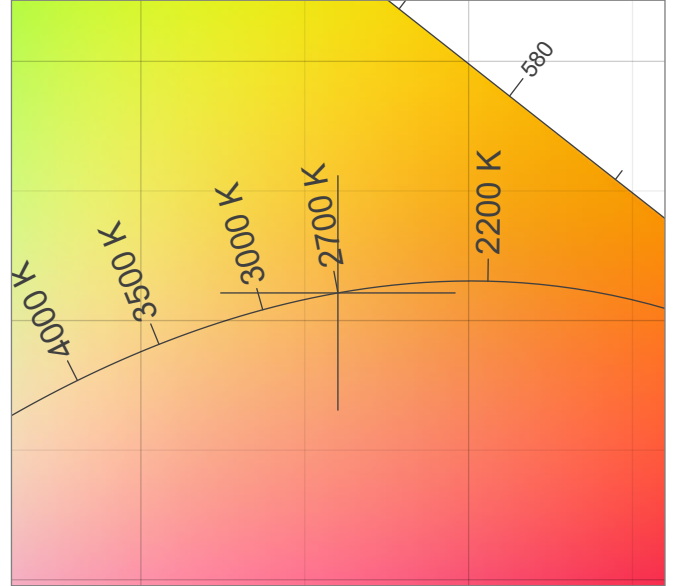
Correlated Color Temperature, Target CCT = 2700 K
 Correlated Color Temperature, Measured CCT = 2746 K
 Color Rendering Index CRI 82,2
 Color Rendering Index, R9 (red component) R9 = 2,9
 Color Rendering TM30-18 R_f 86,0 – R_g 94,9
 Color Quality Scale CQS = 82,4

MacAdam Steps SDCM = 4,6
 Color coordinates CIE 1931 (x;y) = (0,460;0,411)
 Color coordinate CIEs 1960 (u;v) = (0,263;0,352)
 Color deviation from BBL Duv = 0,0039
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,263;0,527)

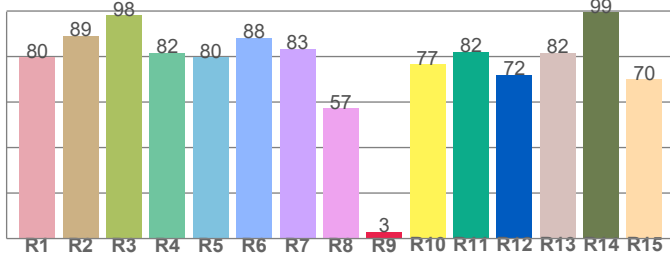
CIE 1931



CIE 1931 – zoomed on Planckian locus



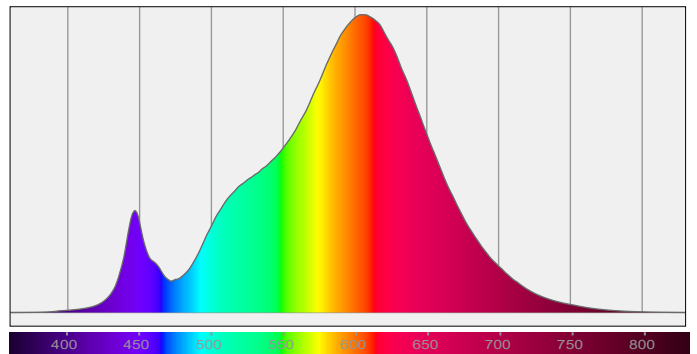
Color Rendering Index per reference color (CIE 1995)



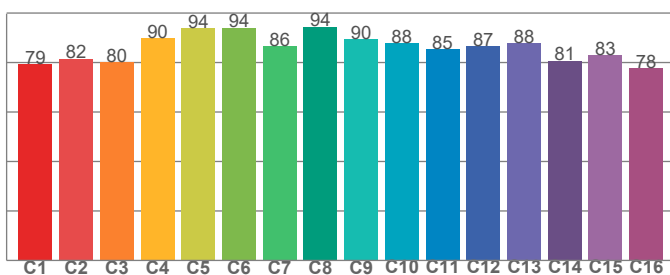
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
79,7	89,2	98,1	81,7	79,8	88,2	83,4	57,2	2,9	76,7	82,1	71,9	81,6	99,3	70,0

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



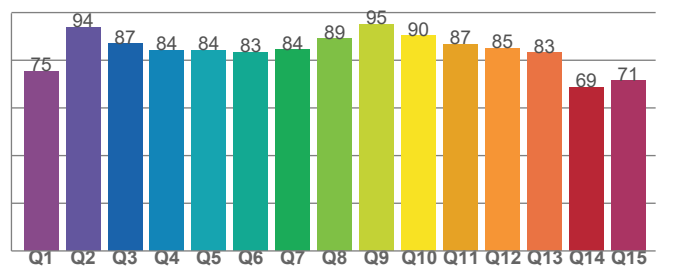
TM30-18 R_f-values per hue bin



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
79,4	81,5	80,1	89,9	93,9	94,1	86,5	94,4	89,5	87,9	85,3	86,6	87,8	80,7	82,9	77,7

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
75,5	93,9	86,9	84,2	84,1	83,5	84,4	89,1	95,1	90,4	86,6	85,0	83,2	68,8	71,5

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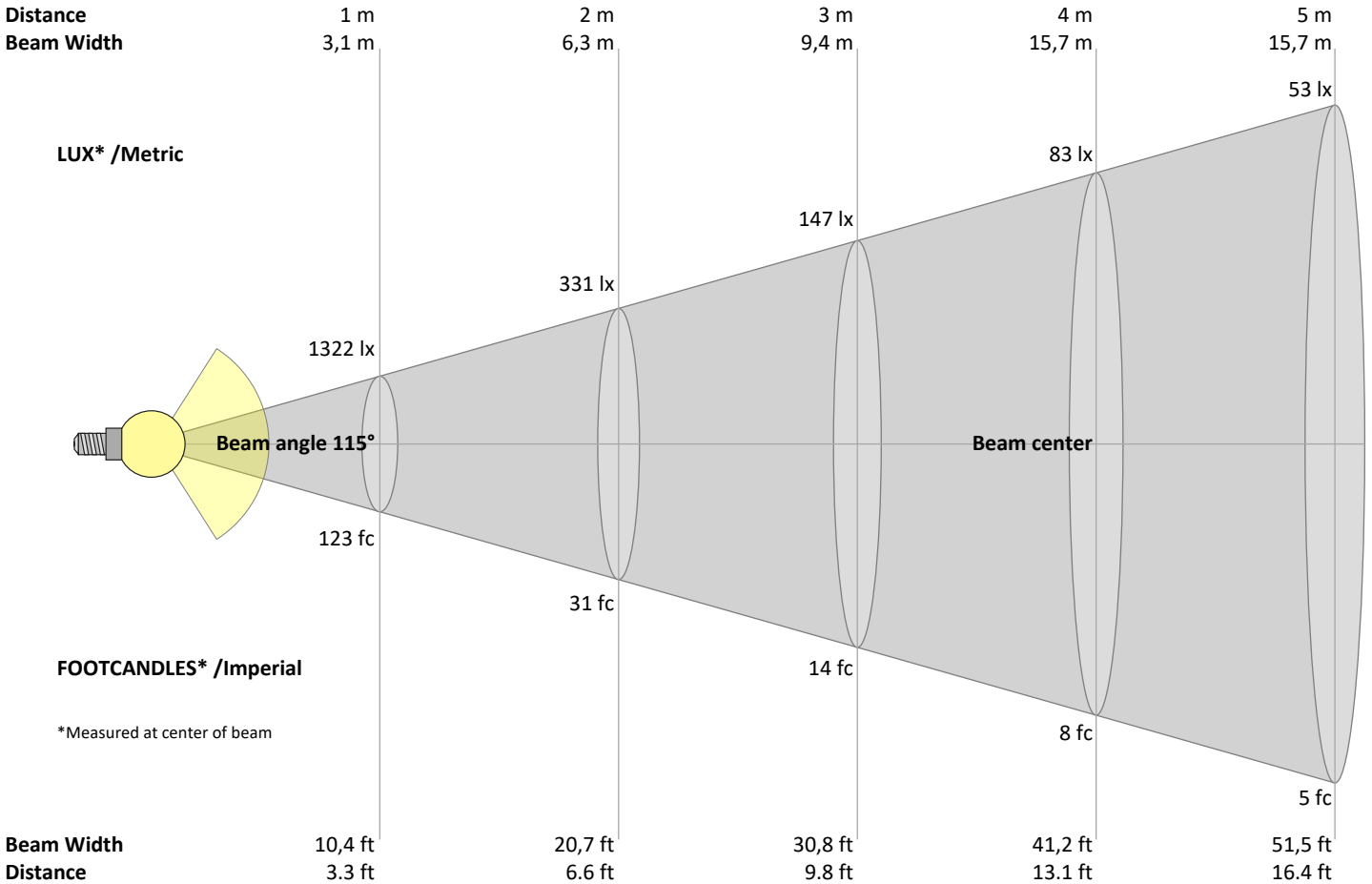
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Beam Details



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
1322	331	147	83	53	37	27	21	16	13	11	9	8	7	6	5	5	4	4	3	lux
122,8	30,7	13,6	7,7	4,9	3,4	2,5	1,9	1,5	1,2	1	0,9	0,7	0,6	0,5	0,5	0,4	0,4	0,3	0,3	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
1322	1318	1300	1273	1234	1186	1129	1061	985	901	808	708	604	496	385	277	176	84	16	3	cd
100%	100%	98%	96%	93%	90%	85%	80%	75%	68%	61%	54%	46%	37%	29%	21%	13%	6%	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
1322	1317	1301	1274	1237	1190	1134	1068	992	908	817	719	616	508	398	289	185	92	25	2	cd
100%	100%	98%	96%	94%	90%	86%	81%	75%	69%	62%	54%	47%	38%	30%	22%	14%	7%	2%	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
1322	1318	1300	1273	1234	1186	1129	1061	985	901	808	708	604	496	385	277	176	84	16	3	cd
100%	100%	98%	96%	93%	90%	85%	80%	75%	68%	61%	54%	46%	37%	29%	21%	13%	6%	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
1322	1317	1301	1274	1237	1190	1134	1068	992	908	817	719	616	508	398	289	185	92	25	2	cd
100%	100%	98%	96%	94%	90%	86%	81%	75%	69%	62%	54%	47%	38%	30%	22%	14%	7%	2%	0%	of 0°val

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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	17,4	18,6	17,6	18,9	19,2	17,4	18,7	17,7	19,0	19,2
	3H	18,9	20,2	19,3	20,5	20,7	19,0	20,3	19,4	20,6	20,8
	4H	19,6	20,8	20,0	21,1	21,3	19,7	20,9	20,1	21,2	21,5
	6H	20,1	21,2	20,5	21,5	21,9	20,3	21,4	20,6	21,7	22,0
	8H	20,3	21,3	20,7	21,7	22,1	20,5	21,5	20,8	21,8	22,3
	12H	20,4	21,4	20,8	21,8	22,2	20,6	21,6	21,0	22,0	22,4
4H	2H	18,0	19,2	18,4	19,5	19,8	18,1	19,3	18,5	19,6	19,8
	3H	19,8	20,8	20,2	21,2	21,7	19,9	20,9	20,3	21,3	21,7
	4H	20,5	21,5	21,0	21,9	22,5	20,7	21,6	21,1	22,0	22,6
	6H	21,2	22,1	21,7	22,4	22,8	21,3	22,2	21,8	22,6	23,0
	8H	21,4	22,2	21,9	22,6	23,0	21,6	22,4	22,1	22,8	23,2
	12H	21,6	22,3	22,1	22,7	23,2	21,8	22,4	22,3	22,9	23,4
8H	4H	20,9	21,7	21,4	22,1	22,5	21,0	21,8	21,5	22,2	22,6
	6H	21,7	22,3	22,2	22,8	23,3	21,8	22,4	22,3	22,9	23,5
	8H	22,0	22,6	22,5	23,1	23,7	22,2	22,7	22,7	23,2	23,9
	12H	22,3	22,7	22,8	23,2	23,9	22,4	22,9	23,0	23,4	24,0
12H	4H	20,9	21,6	21,4	22,0	22,5	21,0	21,7	21,5	22,1	22,6
	6H	21,8	22,3	22,3	22,8	23,5	21,9	22,4	22,4	23,0	23,6
	8H	22,1	22,6	22,7	23,1	23,7	22,3	22,7	22,9	23,2	23,9

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

S = 1.0H	0,1 / -0,1	0,1 / -0,1
S = 1.5H	0,1 / -0,2	0,1 / -0,2
S = 2.0H	0,4 / -0,4	0,4 / -0,4

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	119	119	119	119	116	116	116	116	111	111	106	106	106	102	102	102	99	
1	108	103	99	95	105	101	97	93	97	93	90	92	90	87	89	87	85	82
2	98	90	83	77	95	88	81	76	84	79	74	81	76	72	77	74	70	68
3	89	78	70	63	87	77	69	63	74	67	62	71	65	60	68	63	59	57
4	82	69	60	54	79	68	60	53	65	58	52	63	57	52	61	55	51	49
5	75	62	53	46	73	61	52	46	59	51	45	56	50	45	55	49	44	42
6	69	56	47	40	67	55	46	40	53	45	39	51	44	39	49	43	39	36
7	64	50	42	35	62	50	41	35	48	40	35	46	40	35	45	39	34	32
8	60	46	37	31	58	45	37	31	44	36	31	43	36	31	41	35	31	29
9	56	42	34	28	54	42	34	28	40	33	28	39	33	28	38	32	28	26
10	52	39	31	26	51	38	31	25	37	30	25	36	30	25	35	29	25	23

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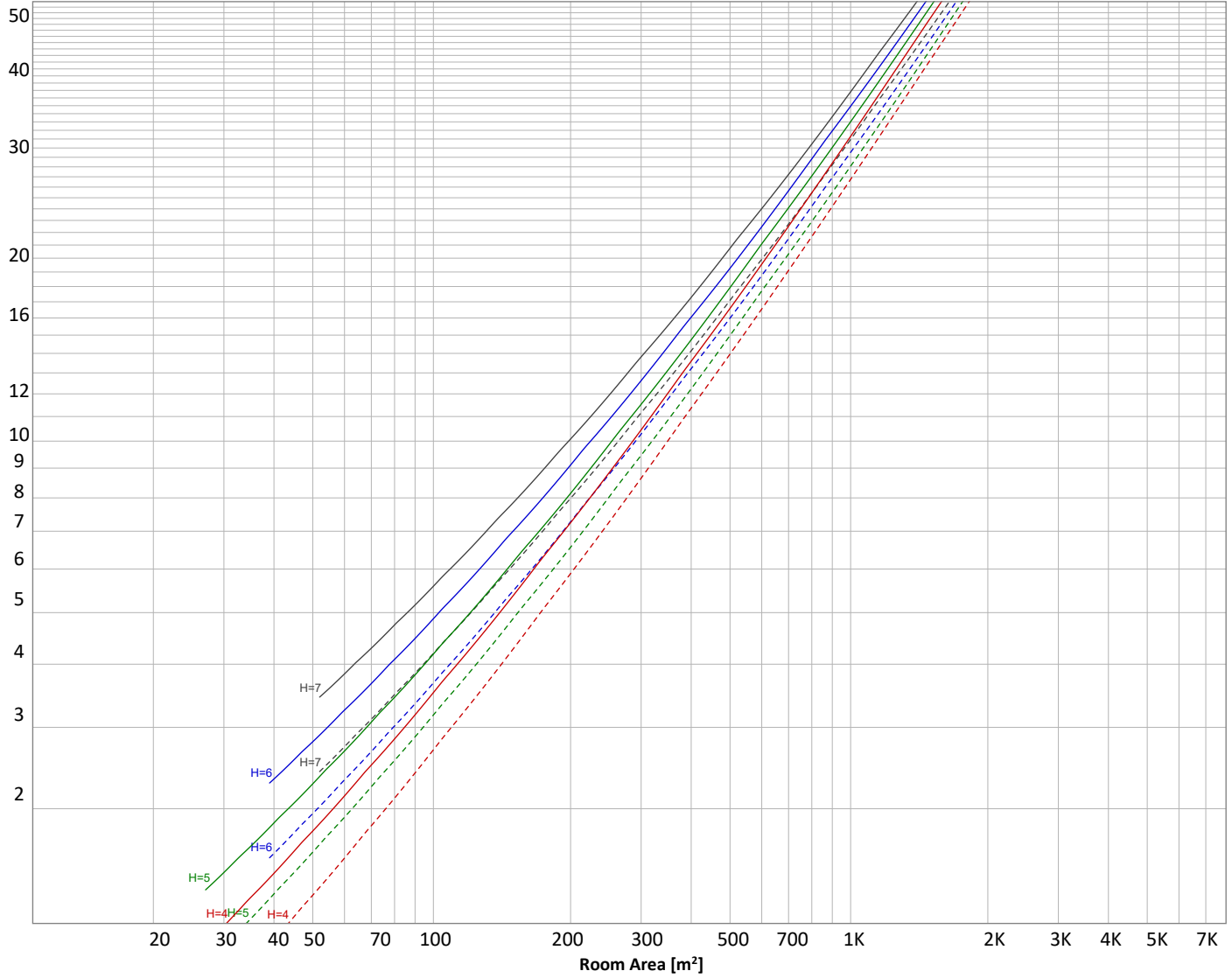
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3947 lm	$\rho(\%)$			
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°
125 lm	360 lm	548 lm	666 lm	697 lm	637 lm	495 lm	299 lm	97,2 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
4,41 lm	2,53 lm	2,89 lm	2,92 lm	2,93 lm	2,56 lm	2,11 lm	1,31 lm	0,462 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	125 lm	3,2%
10-20°	360 lm	9,1%
20-30°	548 lm	13,9%
30-40°	666 lm	16,9%
40-50°	697 lm	17,7%
50-60°	637 lm	16,1%
60-70°	495 lm	12,6%
70-80°	299 lm	7,6%
80-90°	97 lm	2,5%
90-100°	4 lm	0,1%
100-110°	3 lm	0,1%
110-120°	3 lm	0,1%
120-130°	3 lm	0,1%
130-140°	3 lm	0,1%
140-150°	3 lm	0,1%
150-160°	2 lm	0,1%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
Total	3947 lm	100,0%

Intensity peaks

Max intensity	1323 cd
Intensity, 90°	16 cd
Intensity, 0°	1322 cd

Zonal Lumen summary

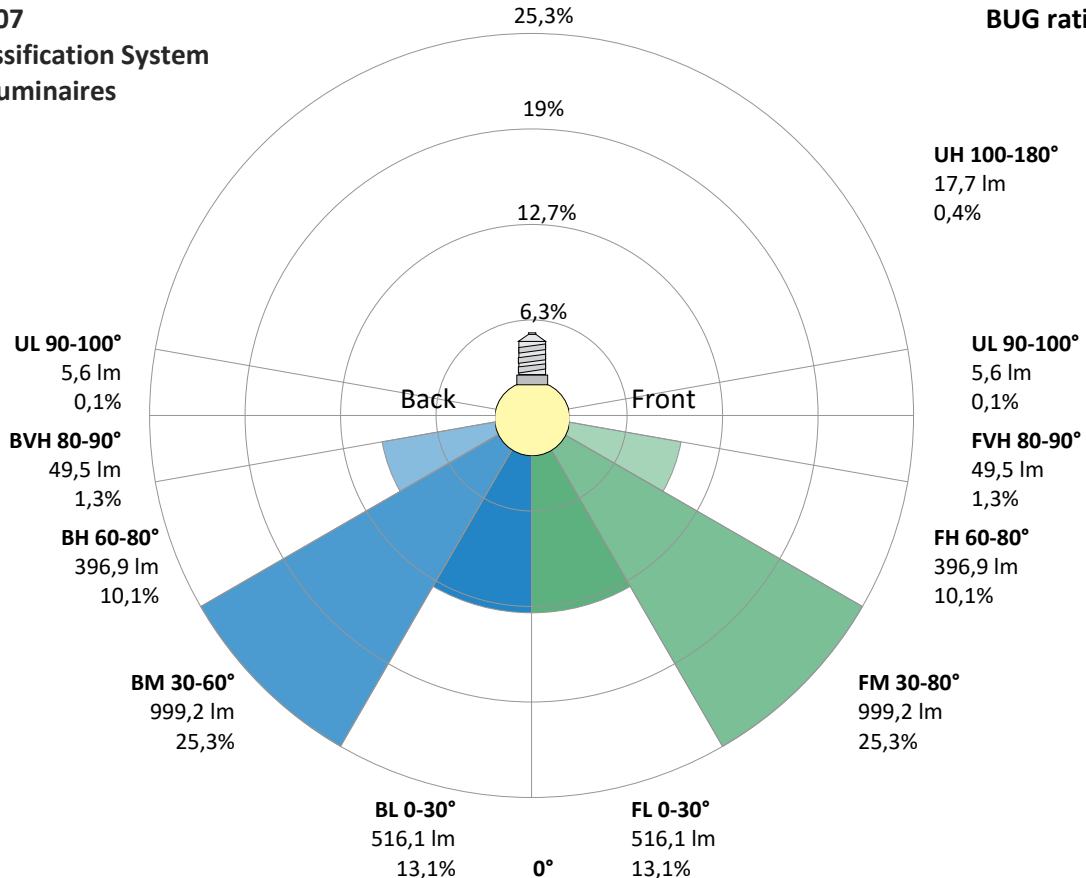
Zone (γ)	Lumen	% Total
0-30°	1033 lm	26,2%
0-40°	1699 lm	43,1%
0-60°	3033 lm	76,9%
60-90°	891 lm	22,6%
70-100°	400 lm	10,1%
90-120°	10 lm	0,2%
0-90°	3924 lm	99,4%
90-180°	22 lm	0,6%
0-180°	3947 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	516 lm	13,1%
Medium(30-60°)	999 lm	25,3%
High(60-80°)	397 lm	10,1%
Very high(80-90°)	49 lm	1,3%
Back light		
Low(0-30°)	516 lm	13,1%
Medium(30-60°)	999 lm	25,3%
High(60-80°)	397 lm	10,1%
Very high(80-90°)	49 lm	1,3%
Uplight		
Low(90-100°)	6 lm	0,1%
High(100-180°)	18 lm	0,4%

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

BUG rating B2 U2 G1



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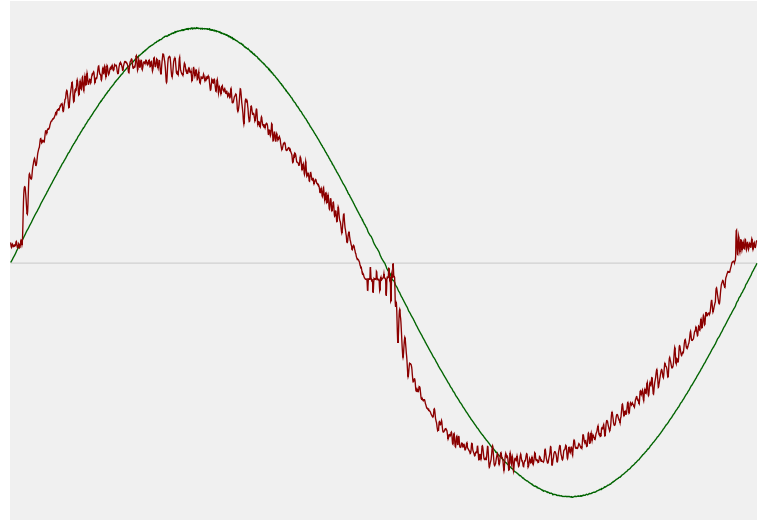


Power Details

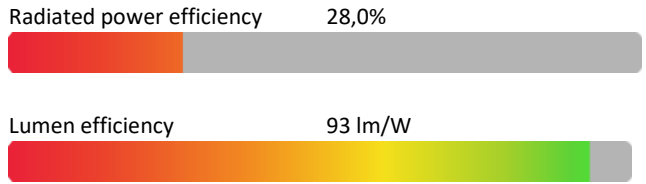
Input Power

Power feed to light source	42,3 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,191 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	43,93 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,96
Total harmonic distortion of the current	10,75%
Total harmonic distortion of the voltage	0,07%

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	2699 K
CCT shift	+1 K
CCT end	2700 K

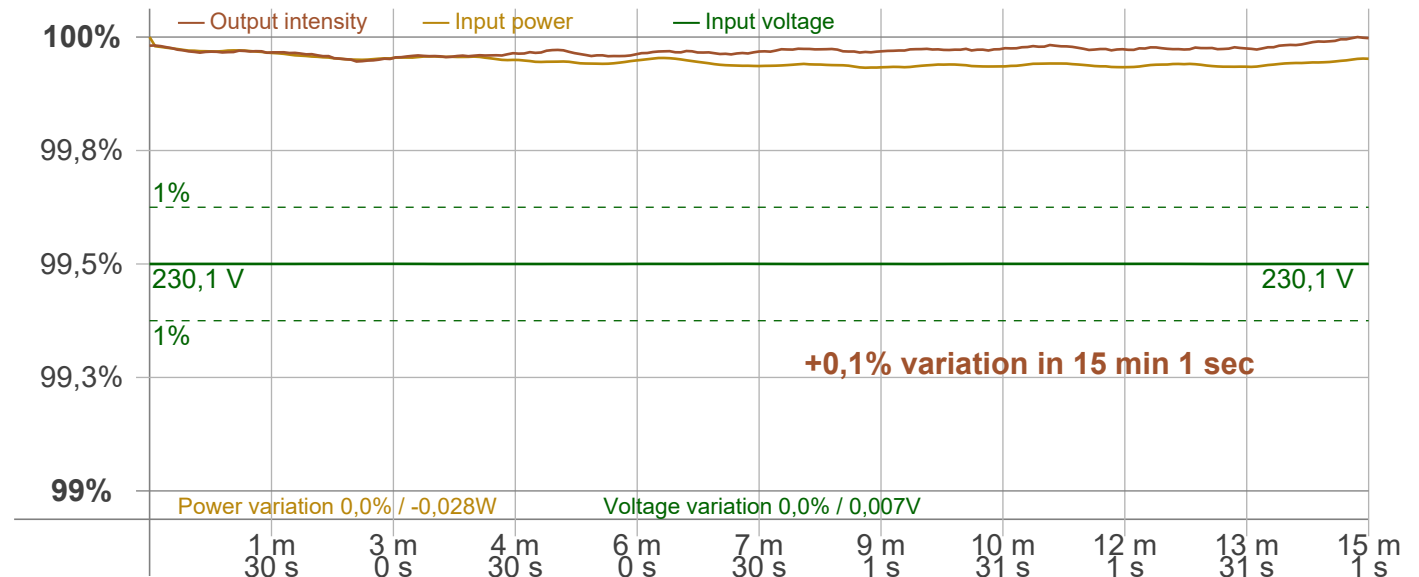
Warmup Result

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

Output Change

Output start	3946 lm
Output change	+1 lm
Output end	3947 lm

Stabilization Curve



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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: 0,07 %
 Flicker index: 0

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

JA8/10 40 Hz: 0,01 %
 JA8/10 90 Hz: 0,01 %
 JA8/10 200 Hz: 0,05 %
 JA8/10 400 Hz: 0,06 %
 JA8/10 1000 Hz: 0,06 %

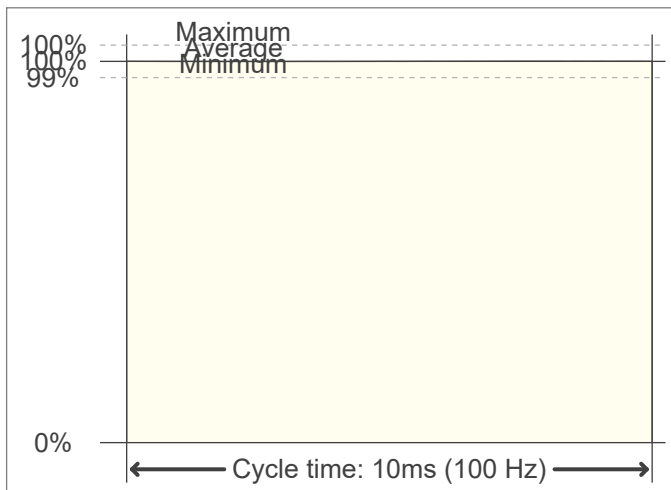
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

