

Light Measurement Report

Print date: 2-7-2025

Measurement date and time: 1-7-2025 17:01:09 – Measurement no. VFR-250701-1856-MS

Measurement tracking No. and Link: [VT250701-001679](#)

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°
2,99 m
148,5 W – PF 0,99 – DPF 1,0
230 V – 0,650 A
50 Hz
Lamp stabilized in 28 min 49 sec – 2,0%

Tested Light Source

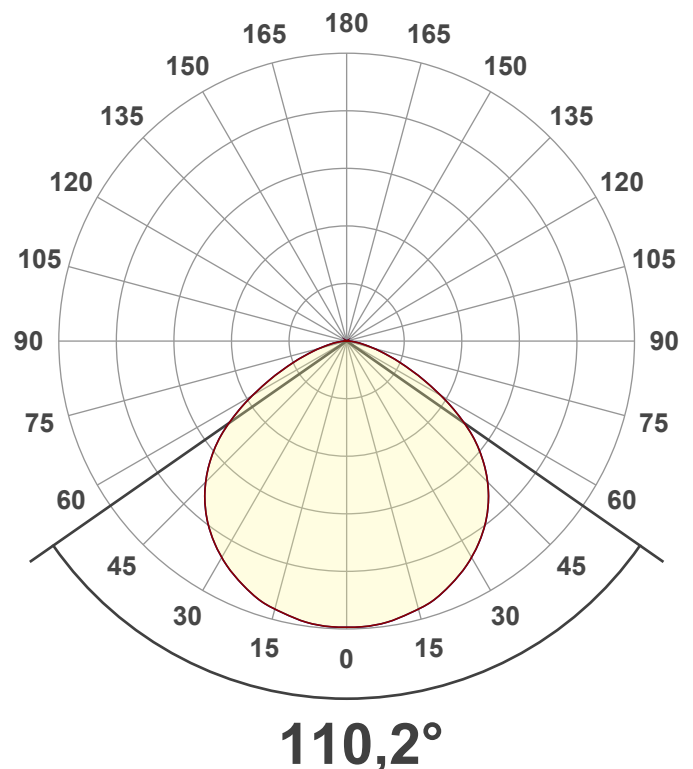
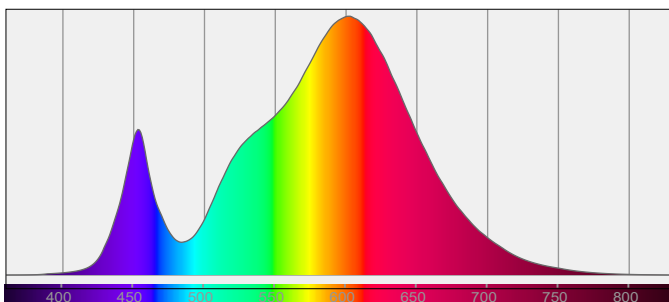
Product Name
Item No. and Manufacturer
Product Description (line 1)

811532-3000K
811532-3000K – Dutchfulfillment
LED FLOODLIGHT ISTOS | 150W | CCT-SWITCH

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

13153 lm – 0,14% / 99,86%
89 lm/W
4887 cd – 110,2°
CCT = 3000 K / 2993 K
CRI 79,4
 R_f 80,6 – R_g 97,0
Duv -0,0019 – SDCM 1,9
SVM 3,76 – PstLM 0,07



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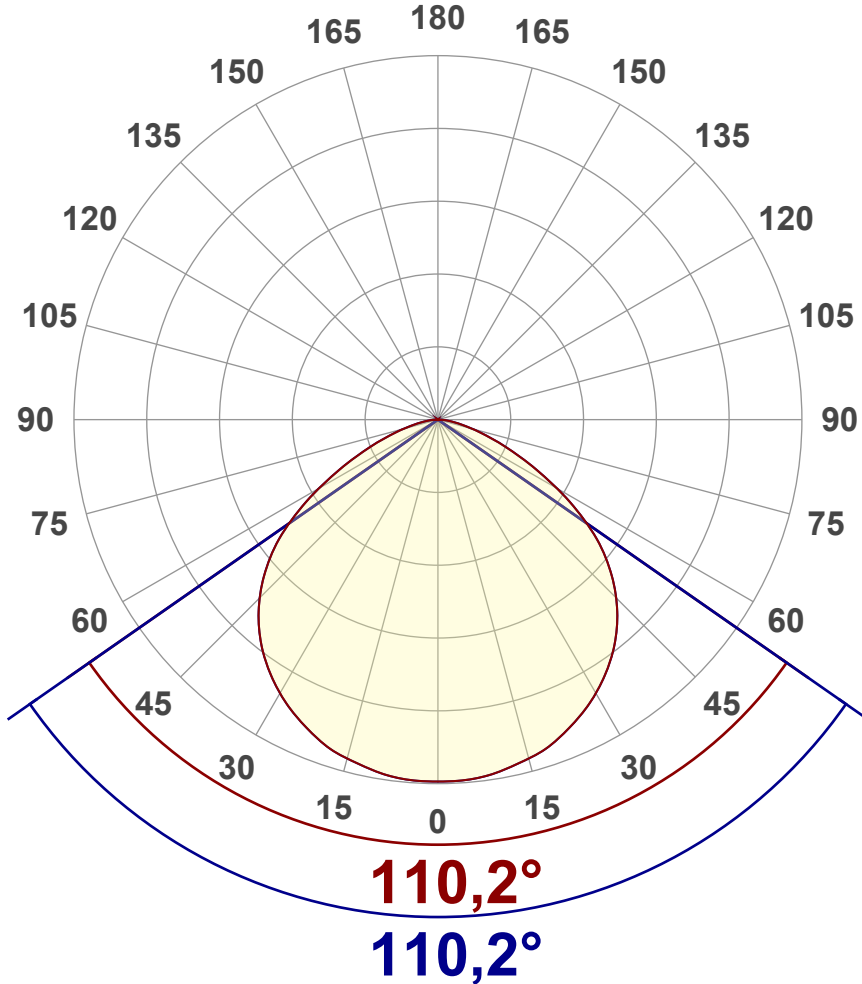
Measurement tracking No. and Link: [VT250701-001679](https://www.viso-systems.com/VT250701-001679)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	13153 lm
Lumen Up% / Down%	0,14% / 99,86%
Peak Intensity	4887 cd
Beam Angle (50%)	110,2°
Beam Angle (90%)	110,2°
Beam Angle (10%)	110,2°

Cut-off Angle

Average 2,5%	169,4°
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Field Angle

Average 10%	150,2°
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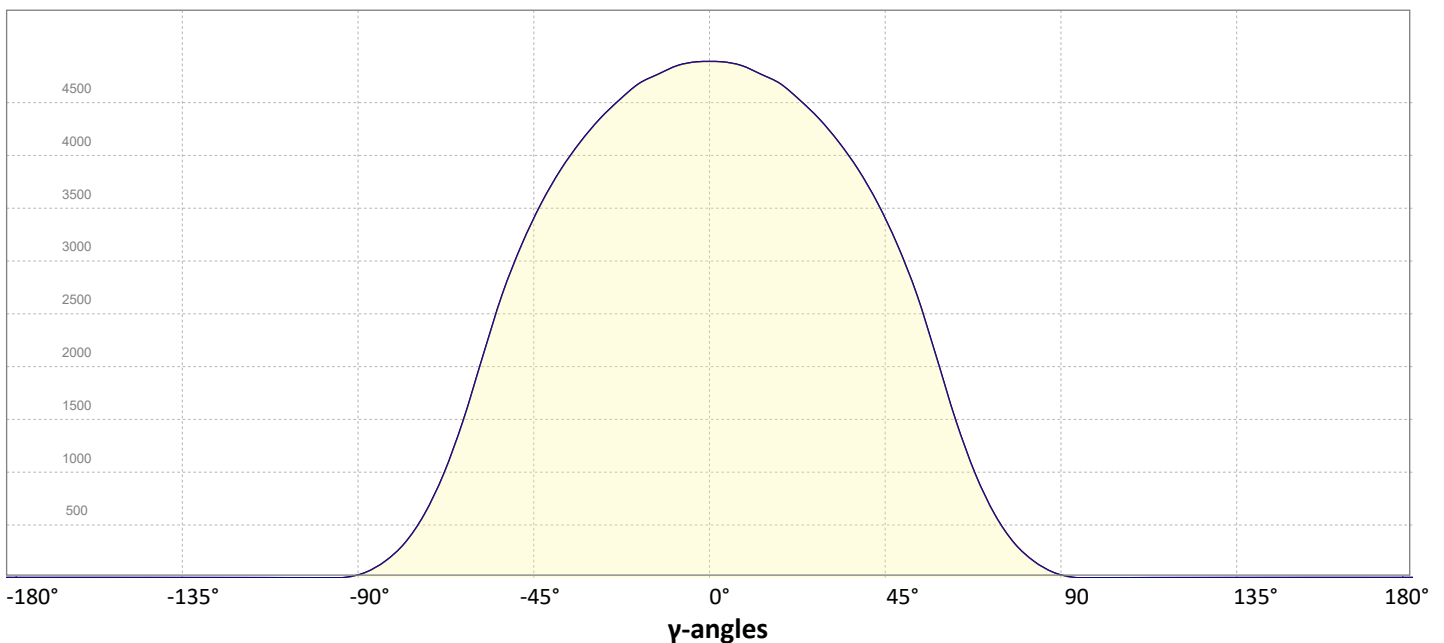
Intensity Ratio

In 120° cone	85,1%
In 90° cone	58,6%

C000-C180

C090-C270

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



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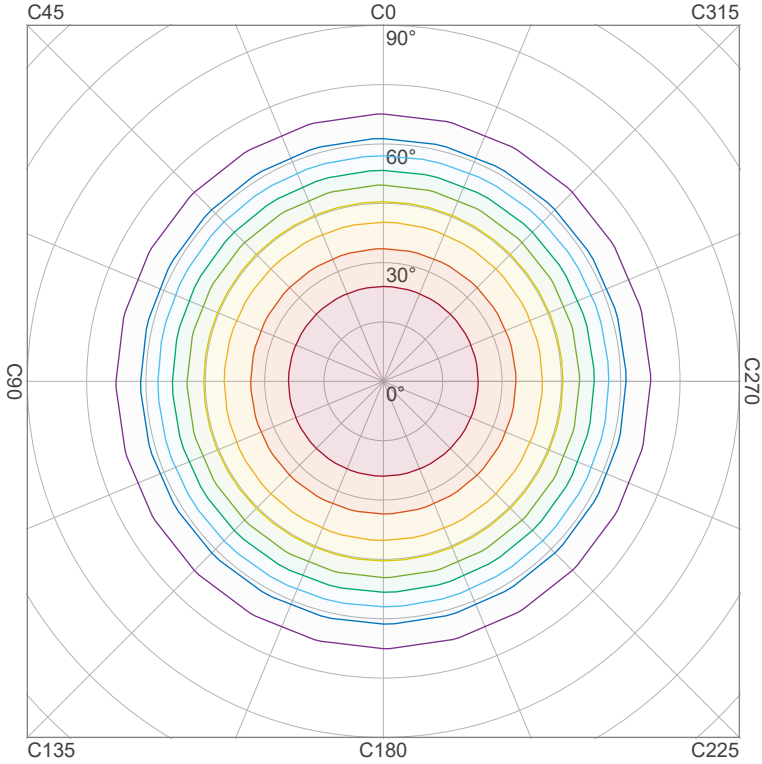
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Iso-intensity Diagram (Iso-candela)

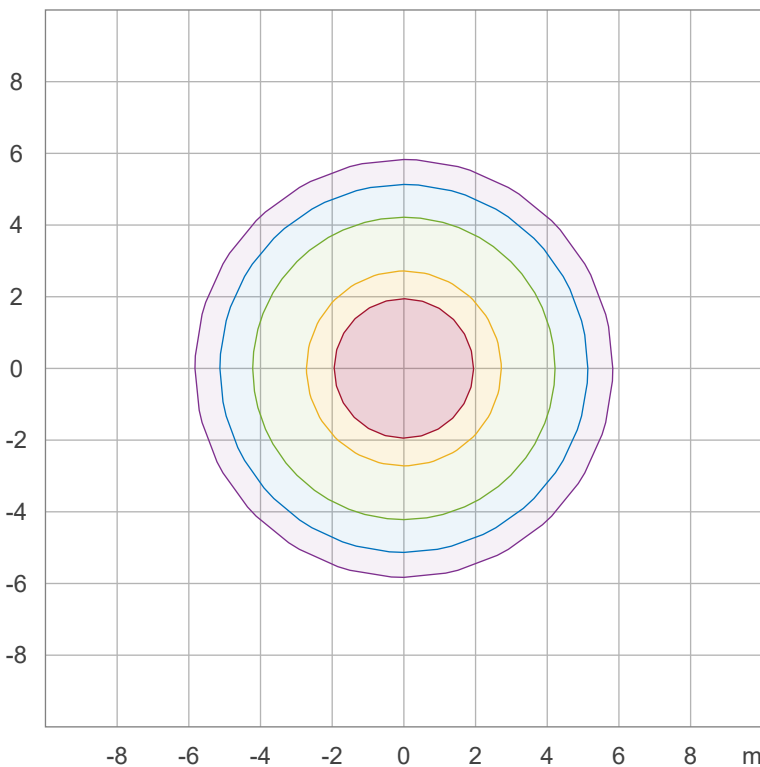


90 %	4397,9 cd
80 %	3909,3 cd
70 %	3420,6 cd
60 %	2932,0 cd
50 %	2443,3 cd
40 %	1954,6 cd
30 %	1466,0 cd
20 %	977,3 cd
10 %	488,7 cd

Peak intensity: 4886,6 cd

Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	271,5 lx
30,0 %	162,9 lx
10,0 %	54,3 lx
5,0 %	27,1 lx
3,0 %	16,3 lx

Peak illuminance: 543,0 lx

Mounting height: 3,0 m

Number of c-planes: 12

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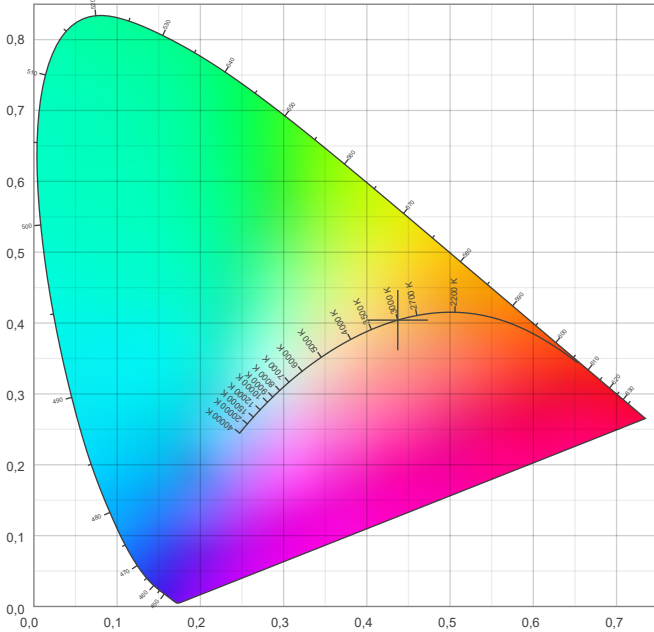


Color details

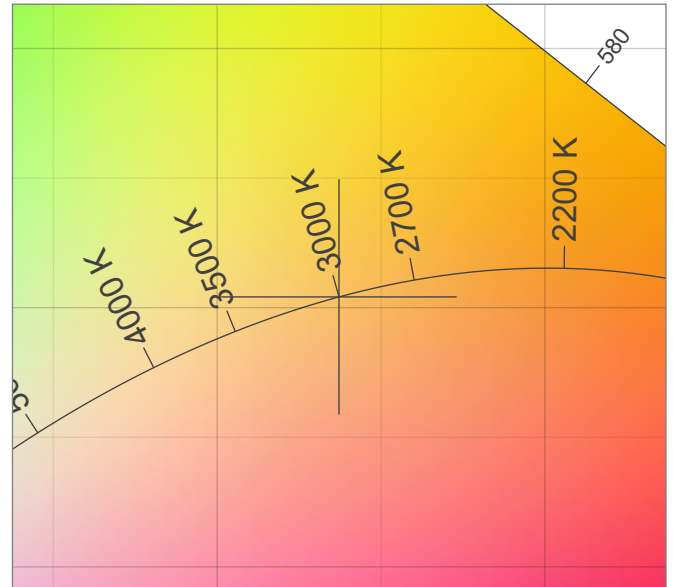
Correlated Color Temperature, Target CCT = 3000 K
 Correlated Color Temperature, Measured CCT = 2993 K
 Color Rendering Index CRI 79,4
 Color Rendering Index, R9 (red component) R9 = -2,3
 Color Rendering TM30-18 R_f 80,6 – R_g 97,0
 Color Quality Scale CQS = 77,6

MacAdam Steps SDCM = 1,9
 Color coordinates CIE 1931 (x;y) = (0,437;0,404)
 Color coordinate CIEs 1960 (u;v) = (0,251;0,348)
 Color deviation from BBL Duv = -0,0019
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,251;0,521)

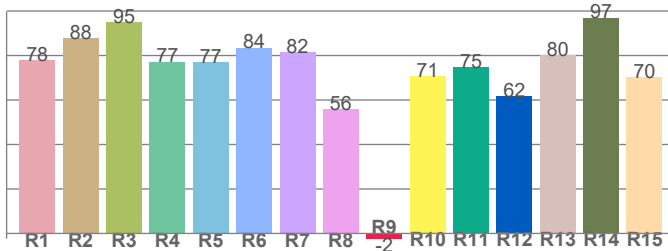
CIE 1931



CIE 1931 – zoomed on Planckian locus



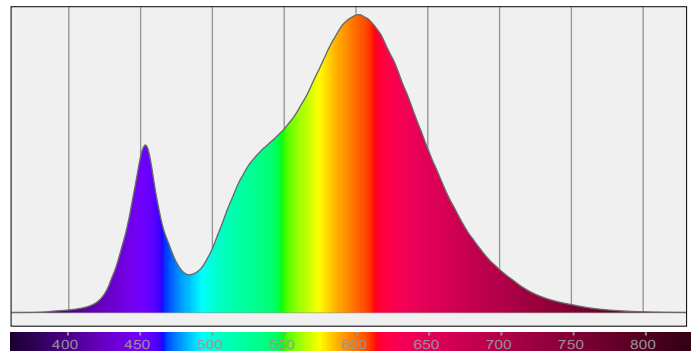
Color Rendering Index per reference color (CIE 1995)



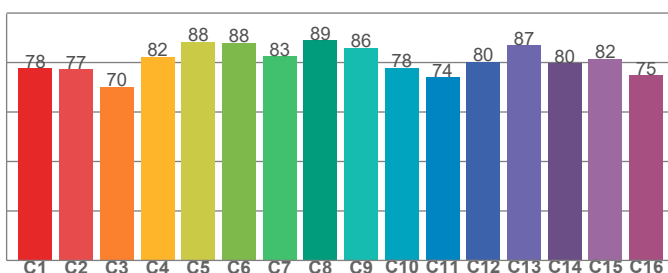
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
77,8	87,7	94,9	77,2	76,8	83,6	81,6	55,7	-2,3	70,6	74,8	61,6	80,1	97,0	70,3

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



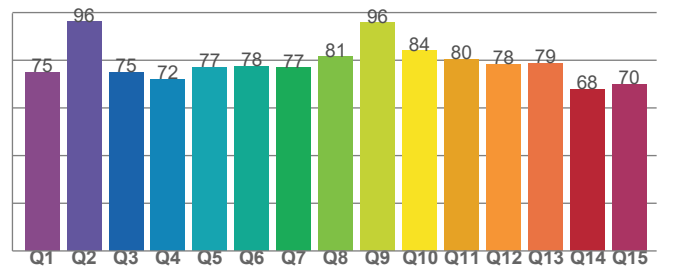
TM30-18 R_f-values per hue bin



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
77,6	77,2	70,2	82,3	88,3	88,0	82,6	88,9	86,0	77,9	74,0	80,4	87,0	79,7	81,5	74,8

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
75,0	96,3	75,0	72,1	77,1	77,6	76,8	81,5	95,7	84,0	80,3	78,4	78,8	67,8	70,0

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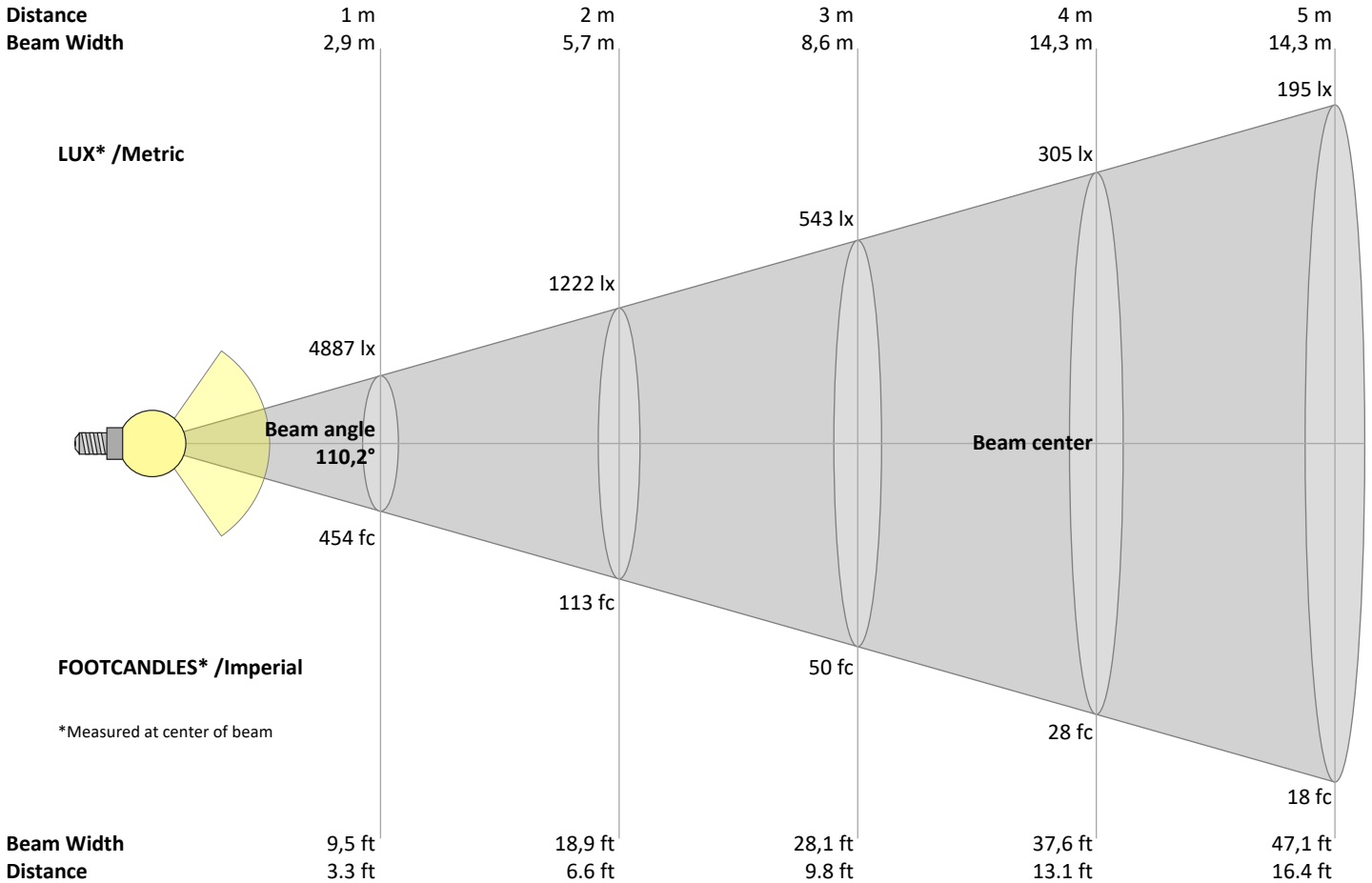
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Operator:



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
4887	1222	543	305	195	136	100	76	60	49	40	34	29	25	22	19	17	15	14	12	lux
454	113,5	50,4	28,4	18,2	12,6	9,3	7,1	5,6	4,5	3,8	3,2	2,7	2,3	2	1,8	1,6	1,4	1,3	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
4887	4874	4821	4736	4621	4457	4262	4027	3743	3396	2975	2458	1863	1295	835	494	262	116	33	3	cd
100%	100%	99%	97%	95%	91%	87%	82%	77%	69%	61%	50%	38%	27%	17%	10%	5%	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
4887	4874	4821	4736	4621	4457	4262	4027	3743	3396	2975	2458	1863	1295	835	494	262	116	33	3	cd
100%	100%	99%	97%	95%	91%	87%	82%	77%	69%	61%	50%	38%	27%	17%	10%	5%	2%	1%	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
4887	4874	4821	4736	4621	4457	4262	4027	3743	3396	2975	2458	1863	1295	835	494	262	116	33	3	cd
100%	100%	99%	97%	95%	91%	87%	82%	77%	69%	61%	50%	38%	27%	17%	10%	5%	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
4887	4874	4821	4736	4621	4457	4262	4027	3743	3396	2975	2458	1863	1295	835	494	262	116	33	3	cd
100%	100%	99%	97%	95%	91%	87%	82%	77%	69%	61%	50%	38%	27%	17%	10%	5%	2%	1%	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	29,3	30,5	29,5	30,8	31,0	29,3	30,4	29,5	30,7	30,9
	3H	30,0	31,2	30,5	31,5	31,7	30,0	31,2	30,4	31,5	31,7
	4H	30,3	31,4	30,7	31,7	32,0	30,2	31,4	30,6	31,6	31,9
	6H	30,5	31,5	30,8	31,8	32,1	30,4	31,4	30,7	31,7	32,1
	8H	30,5	31,5	30,8	31,8	32,2	30,4	31,4	30,8	31,7	32,1
	12H	30,5	31,4	30,9	31,8	32,2	30,4	31,3	30,8	31,7	32,1
4H	2H	29,7	30,8	30,1	31,1	31,3	29,6	30,8	30,0	31,0	31,3
	3H	30,7	31,6	31,0	31,9	32,4	30,6	31,5	31,0	31,9	32,3
	4H	30,9	31,8	31,4	32,2	32,7	30,8	31,7	31,3	32,1	32,7
	6H	31,1	31,9	31,6	32,3	32,7	31,0	31,9	31,5	32,2	32,6
	8H	31,2	31,9	31,7	32,3	32,7	31,1	31,8	31,6	32,2	32,6
	12H	31,2	31,8	31,7	32,2	32,7	31,1	31,7	31,6	32,1	32,6
8H	4H	31,0	31,8	31,5	32,1	32,5	30,9	31,7	31,4	32,1	32,4
	6H	31,3	31,8	31,8	32,3	32,9	31,2	31,8	31,7	32,2	32,8
	8H	31,4	31,9	31,9	32,4	33,1	31,3	31,8	31,8	32,3	33,0
	12H	31,5	31,9	32,1	32,4	33,0	31,4	31,8	32,0	32,3	32,9
12H	4H	31,0	31,6	31,5	32,0	32,5	30,9	31,5	31,4	32,0	32,4
	6H	31,3	31,8	31,8	32,3	33,0	31,2	31,7	31,8	32,2	32,9
	8H	31,4	31,8	32,0	32,3	32,9	31,3	31,7	31,9	32,3	32,9

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

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

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	100	100
1	110	105	102	98	107	103	100	96	99	96	93	95	93	90	91	90	88	86
2	100	93	86	81	98	91	85	80	87	82	78	84	80	76	81	78	75	73
3	92	82	74	68	90	80	73	68	77	71	66	75	70	65	72	68	64	62
4	84	73	65	58	82	72	64	58	69	62	57	67	61	56	65	60	55	53
5	78	65	57	50	76	64	56	50	62	55	49	60	54	49	58	53	48	46
6	72	59	50	44	70	58	50	44	56	49	43	54	48	43	53	47	43	41
7	67	53	45	39	65	53	44	39	51	44	38	50	43	38	48	42	38	36
8	62	49	40	35	60	48	40	35	47	39	34	45	39	34	44	38	34	32
9	58	45	37	31	56	44	36	31	43	36	31	42	35	31	41	35	31	29
10	54	41	33	28	53	41	33	28	40	33	28	39	32	28	38	32	28	26

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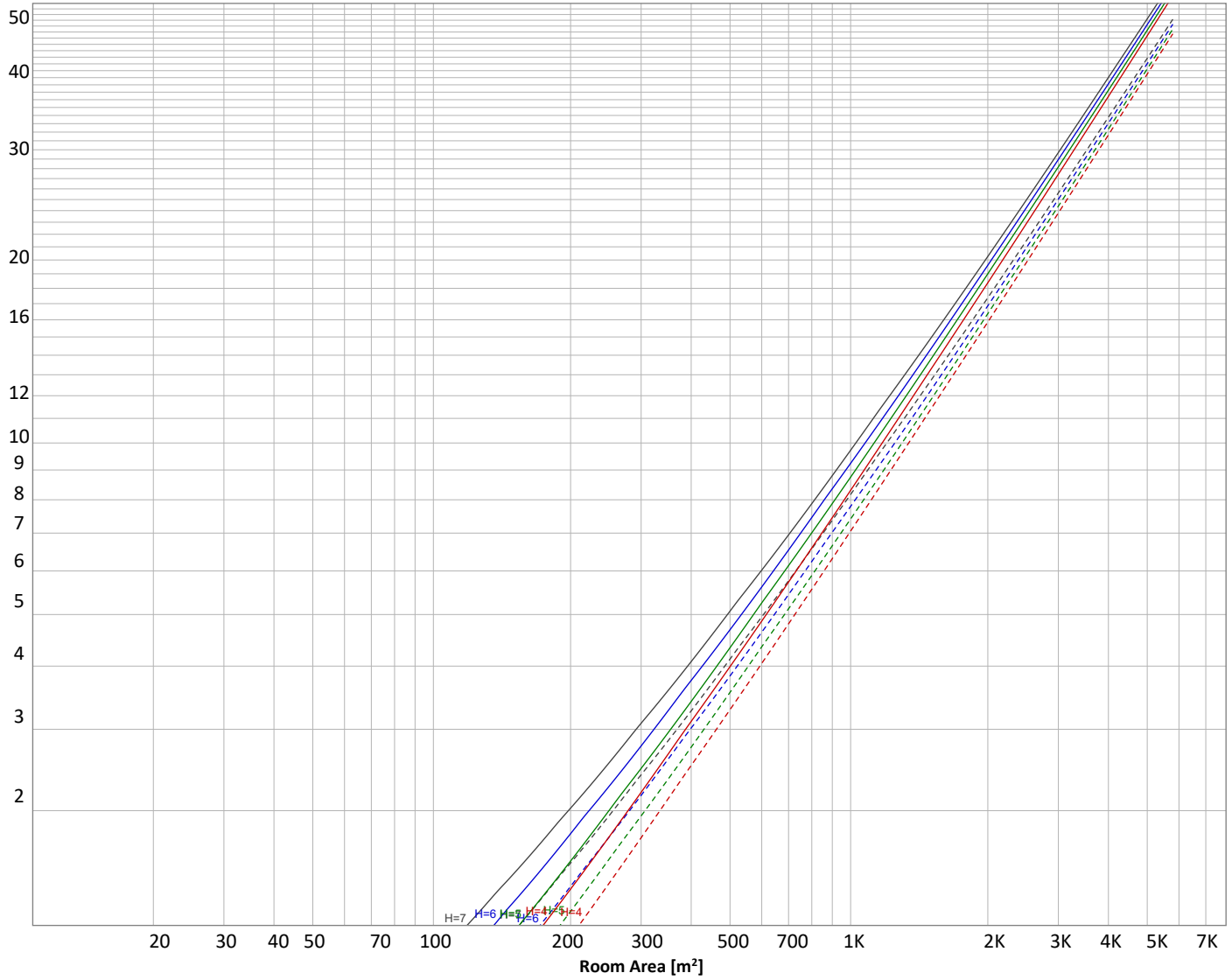
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 13153 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°
464 lm	1340 lm	2058 lm	2522 lm	2619 lm	2190 lm	1285 lm	527 lm	130 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
6,21 lm	1,21 lm	1,85 lm	2,08 lm	2,05 lm	1,83 lm	1,44 lm	0,883 lm	0,293 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	464 lm	3,5%
10-20°	1340 lm	10,2%
20-30°	2058 lm	15,6%
30-40°	2522 lm	19,2%
40-50°	2619 lm	19,9%
50-60°	2190 lm	16,6%
60-70°	1285 lm	9,8%
70-80°	527 lm	4,0%
80-90°	130 lm	1,0%
90-100°	6 lm	0,0%
100-110°	1 lm	0,0%
110-120°	2 lm	0,0%
120-130°	2 lm	0,0%
130-140°	2 lm	0,0%
140-150°	2 lm	0,0%
150-160°	1 lm	0,0%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
Total	13153 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	3862 lm	29,4%
0-40°	6384 lm	48,5%
0-60°	11193 lm	85,1%
60-90°	1942 lm	14,8%
70-100°	664 lm	5,0%
90-120°	9 lm	0,1%
0-90°	13135 lm	99,9%
90-180°	18 lm	0,1%
0-180°	13153 lm	100,0%

BUG rating

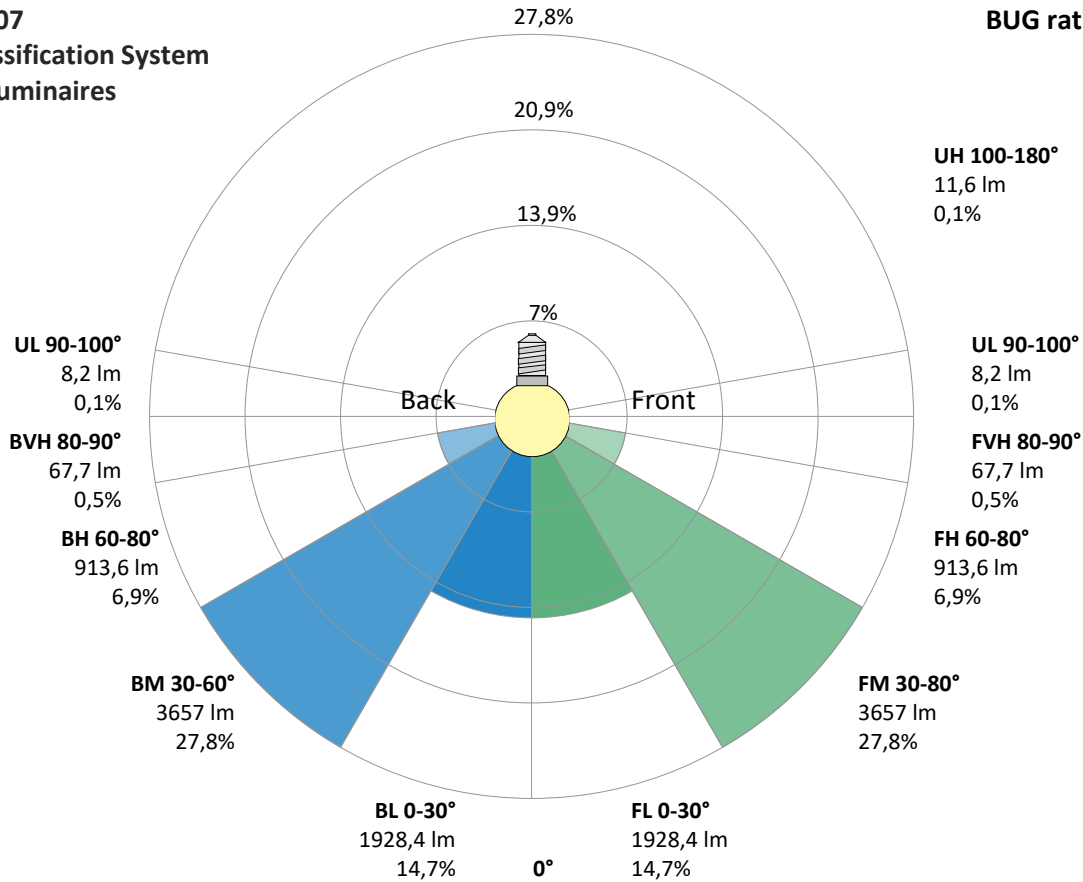
	Lumen	% Total
Forward light		
Low(0-30°)	1928 lm	14,7%
Medium(30-60°)	3657 lm	27,8%
High(60-80°)	914 lm	6,9%
Very high(80-90°)	68 lm	0,5%
Back light		
Low(0-30°)	1928 lm	14,7%
Medium(30-60°)	3657 lm	27,8%
High(60-80°)	914 lm	6,9%
Very high(80-90°)	68 lm	0,5%
Uplight		
Low(90-100°)	8 lm	0,1%
High(100-180°)	12 lm	0,1%

Intensity peaks

Max intensity	4887 cd
Intensity, 90°	33 cd
Intensity, 0°	4887 cd

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

BUG rating B3 U2 G1



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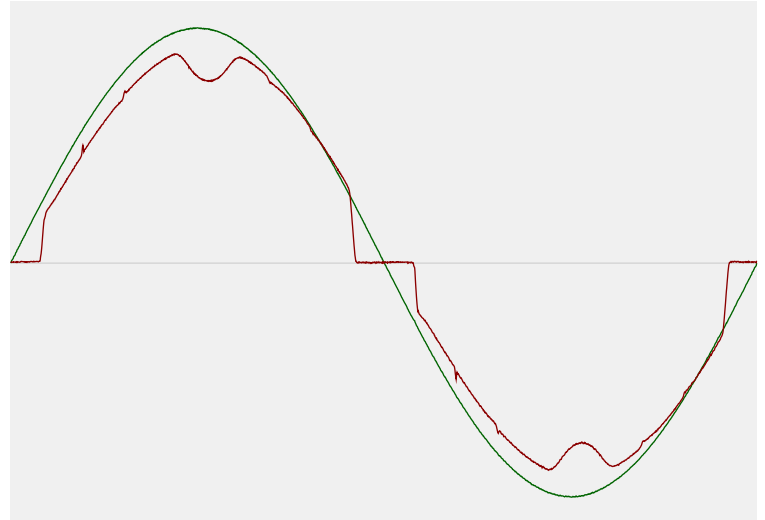


Power Details

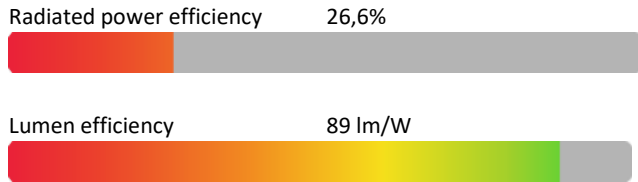
Input Power

Power feed to light source	148,5 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,650 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	149,5 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,99
Total harmonic distortion of the current	10,31%
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	2985 K
CCT shift	+15 K
CCT end	3000 K

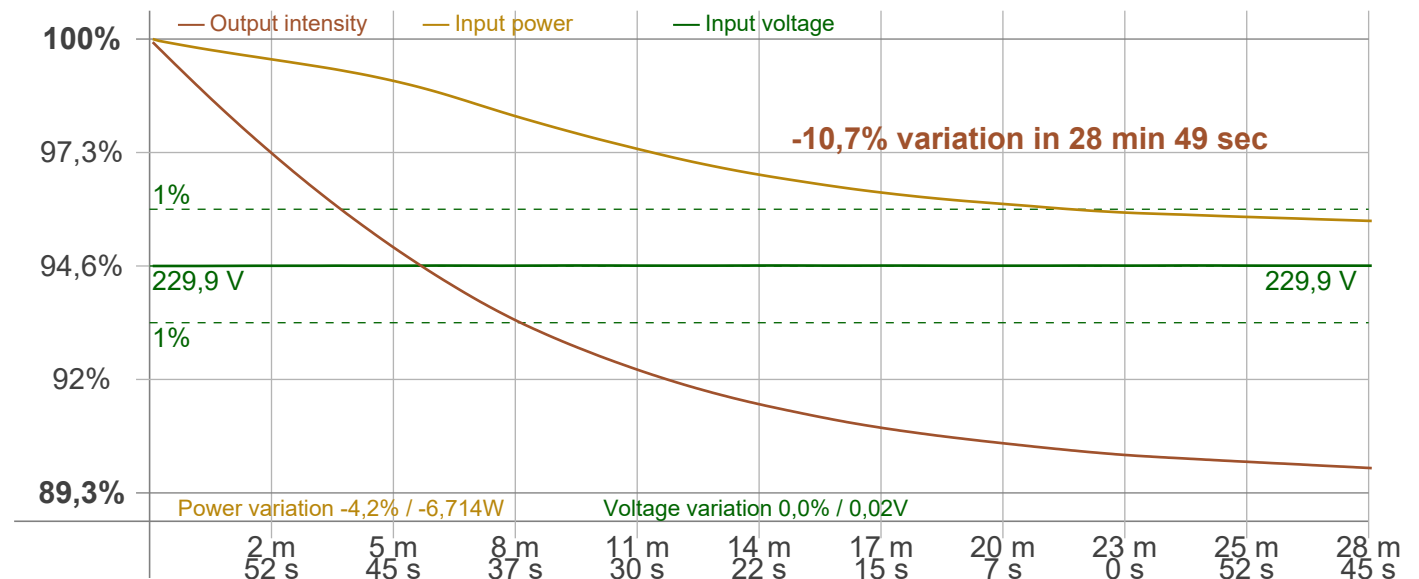
Warmup Result

Total warmup time	Lamp stabilized in 28 min 49 sec
Warmup variation	-10,7%

Output Change

Output start	14706 lm
Output change	-1553 lm
Output end	13153 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 100 Hz
 Percent Flicker 99,95 %
 Flicker index 0,32

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

JA8/10 40 Hz 0,23 %
 JA8/10 90 Hz 0,93 %
 JA8/10 200 Hz 103,61 %
 JA8/10 400 Hz 102,04 %
 JA8/10 1000 Hz 102,75 %

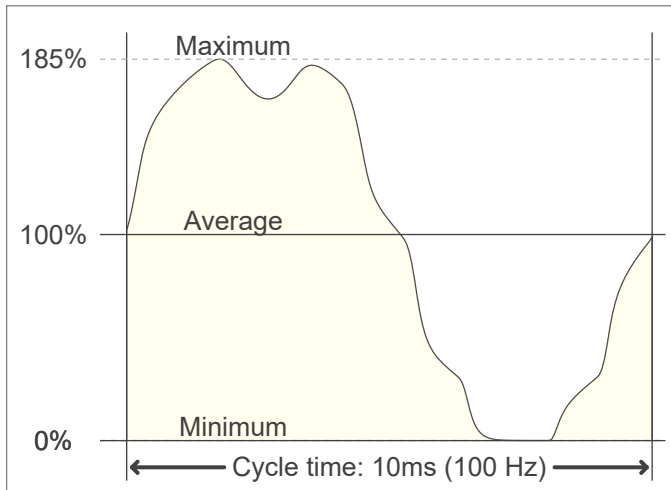
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,07
 SVM value (80 < F < 2000 Hz) 3,76

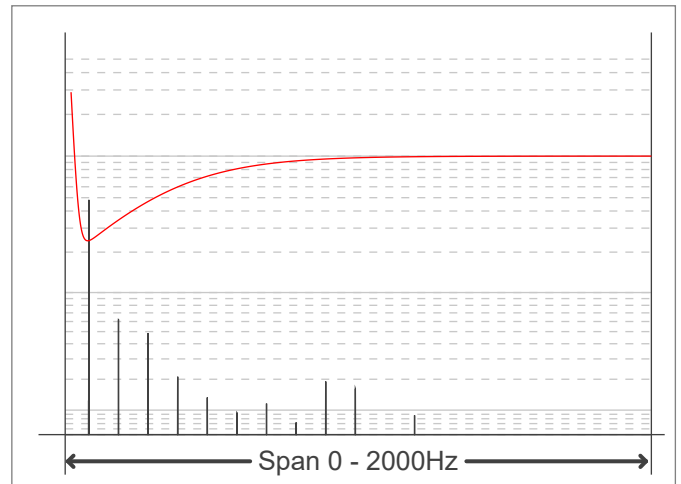
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,04

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

