

Light Measurement Report

Print date: 18/03/2026

Measurement date and time: 17/03/2026 15:46:08 – Measurement no. VFR-260317-1285-MS

Measurement tracking No. and Link: [VT260317-003492](#)

Operator: LC



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 – 11/12/2024 – 3532797498

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

72 planes – 5°

1°

1,05 m

24,3 W – PF 0,96 – DPF 0,96

226 V – 0,113 A

50,1 Hz

Lamp stabilized in 19 min 24 sec – 2,0%

Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

GRACE 30 LENS 3000K 24D WHITE

00251200302403 – ELECTRUM

650mA

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

4003 lm – 0% / 100%

165 lm/W

16628 cd – 27°

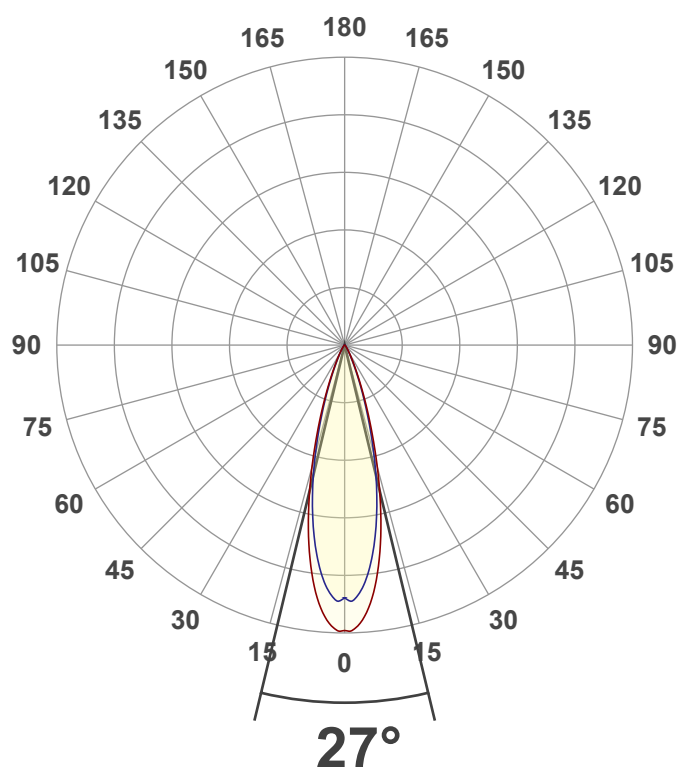
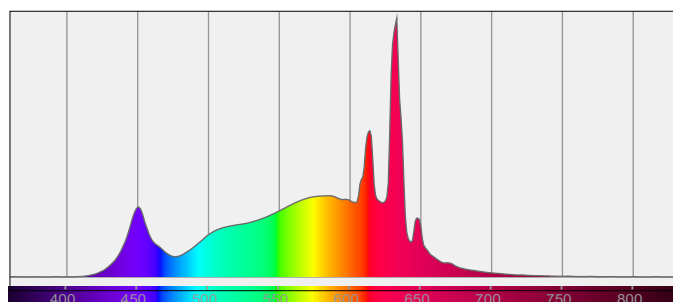
CCT = 3000 K / 3089 K

CRI 94,1

R_f 90,6 – R_g 102,2

Duv -0,0035 – SDCM 5,1

SVM 0 – PstLM 0,01



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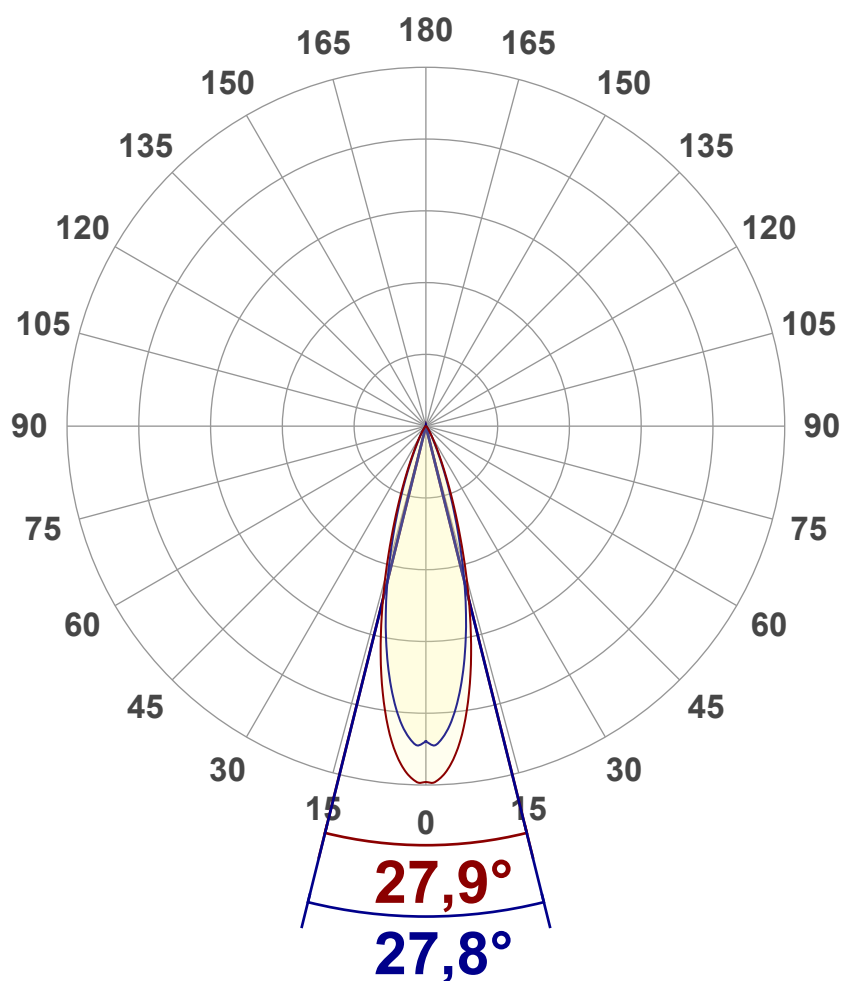
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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	4003 lm
Lumen Up% / Down%	0% / 100%
Peak Intensity	16628 cd
Beam Angle (50%-FWHM)	27,02°

Cut-off Angle

Average 2,5%	62,4°
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Field Angle

Average 10%	46,3°
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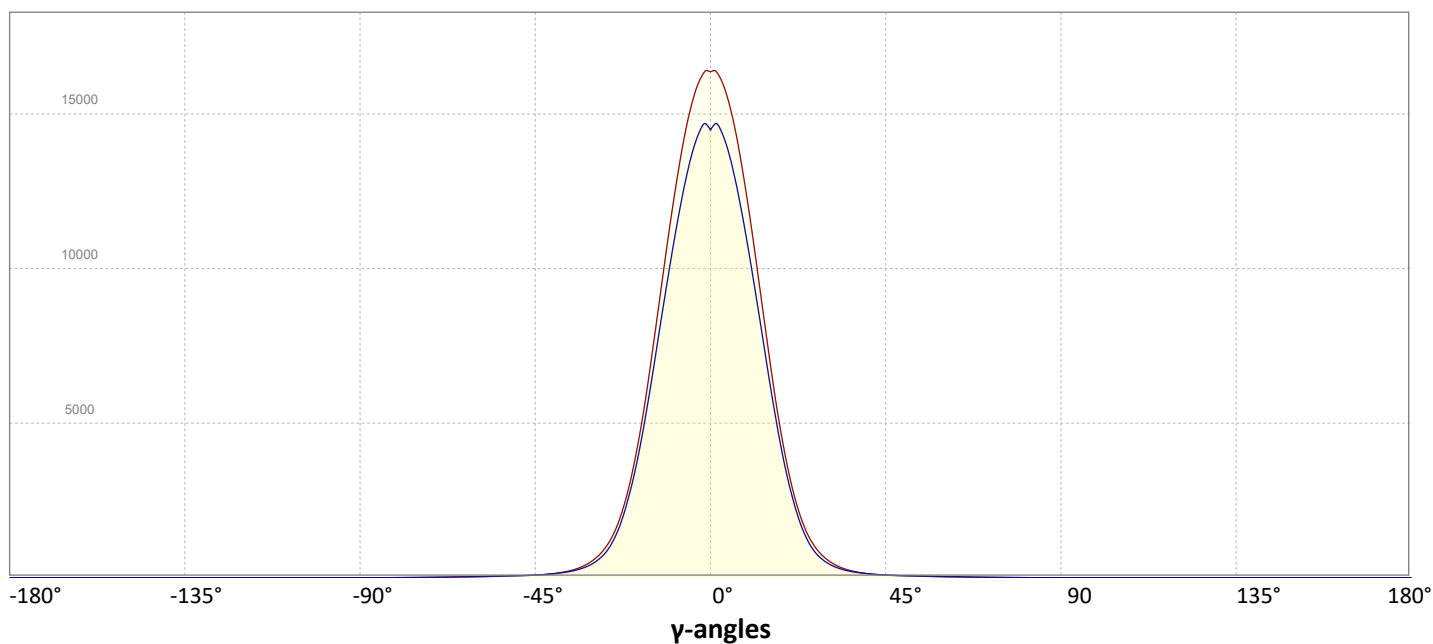
Intensity Ratio

In 120° cone	99,1%
In 90° cone	97,3%

C000-C180

C090-C270

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



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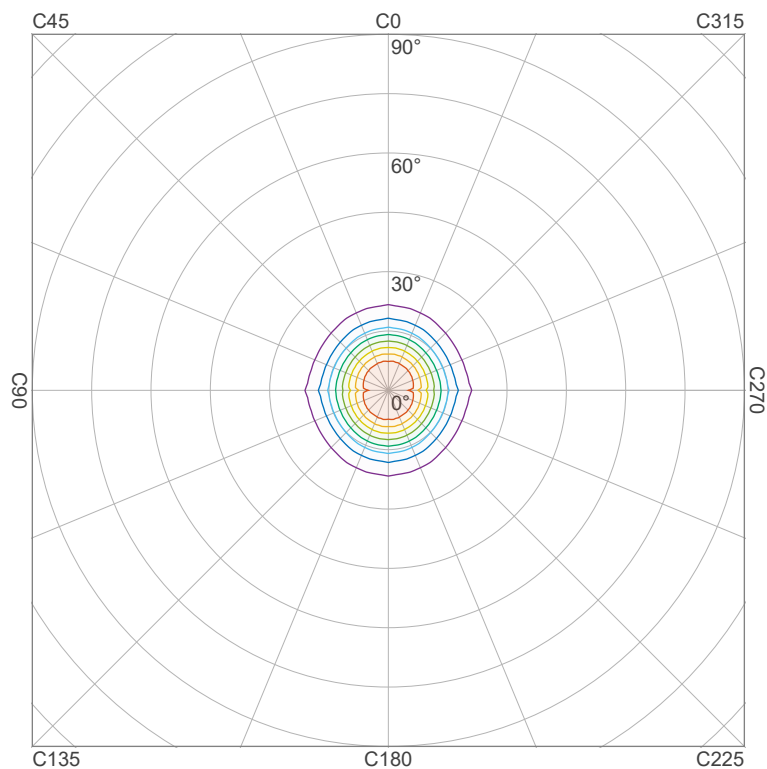
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Iso-intensity Diagram (Iso-candela)

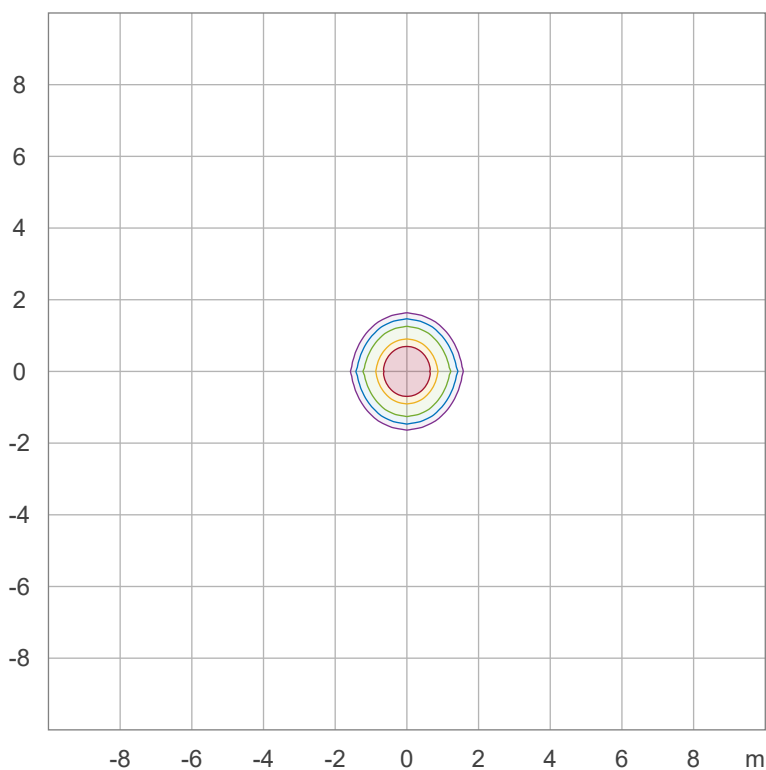


90 %	14917,7 cd
80 %	13260,2 cd
70 %	11602,7 cd
60 %	9945,2 cd
50 %	8287,6 cd
40 %	6630,1 cd
30 %	4972,6 cd
20 %	3315,1 cd
10 %	1657,5 cd

Peak intensity: 16575,3 cd

Number of c-planes: 72

Iso-illuminance Diagram (Iso-lux)



50,0 %	920,4 lx
30,0 %	552,3 lx
10,0 %	184,1 lx
5,0 %	92,0 lx
3,0 %	55,2 lx

Peak illuminance: 1840,9 lx

Mounting height: 3,0 m

Number of c-planes: 72

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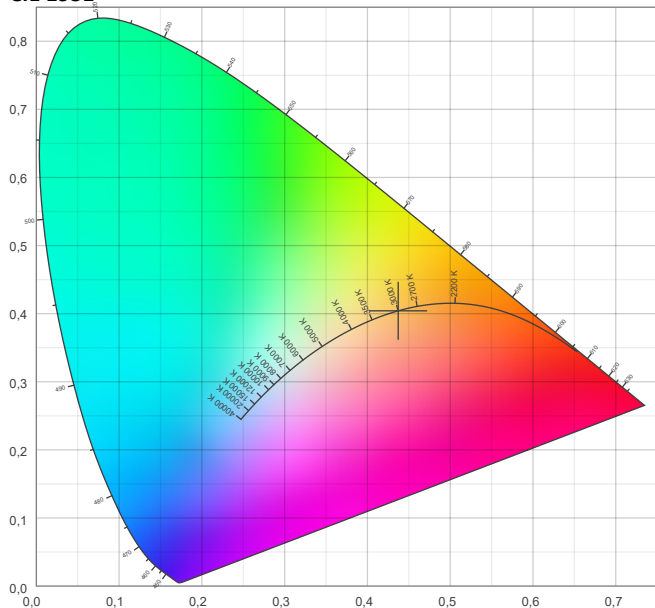


Color details

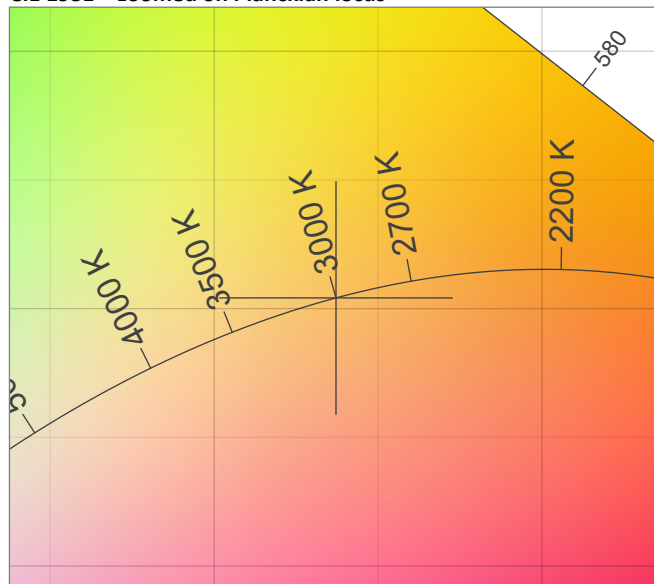
Correlated Color Temperature, Target CCT = 3000 K
Correlated Color Temperature, Measured CCT = 3089 K
Color Rendering Index CRI 94,1
Color Rendering Index, R9 (red component) R9 = 67,3
Color Rendering TM30-18 R_f 90,6 – R_g 102,2
Color Quality Scale CQS = 90,3

MacAdam Steps
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 = -0,0035
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,251;0,521)

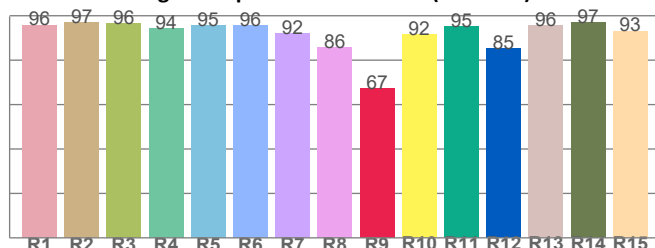
CIE 1931



CIE 1931 – zoomed on Planckian locus



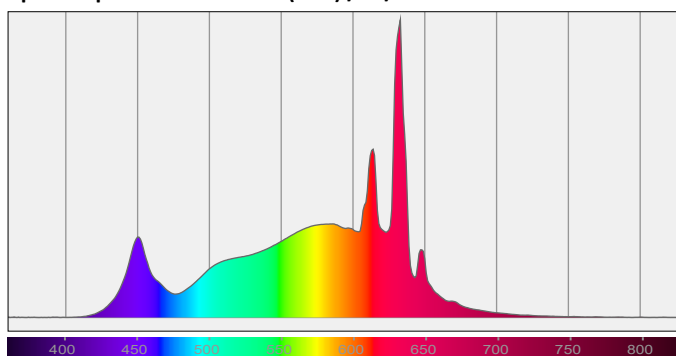
Color Rendering Index per reference color (CIE 1995)



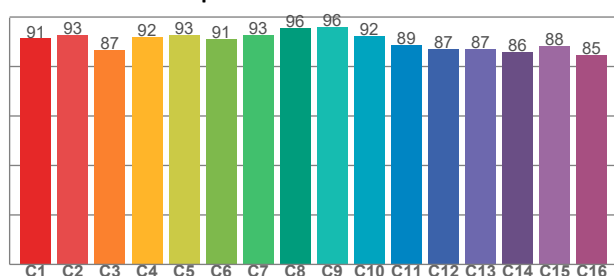
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
95,8	97,1	96,4	94,4	95,5	95,5	92,0	85,9	67,3	91,6	95,1	85,3	95,8	96,9	93,2

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



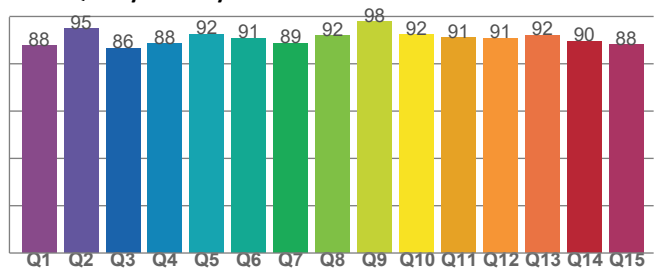
TM30-18 Rf-values per hue bin



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
91,3	92,7	86,8	91,9	92,6	91,2	92,6	95,7	95,8	92,2	88,8	86,9	87,1	85,7	88,1	84,8

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
87,7	94,8	86,5	88,4	92,4	90,7	88,7	91,9	97,7	92,3	91,1	90,9	92,1	89,5	88,0

Beam Details

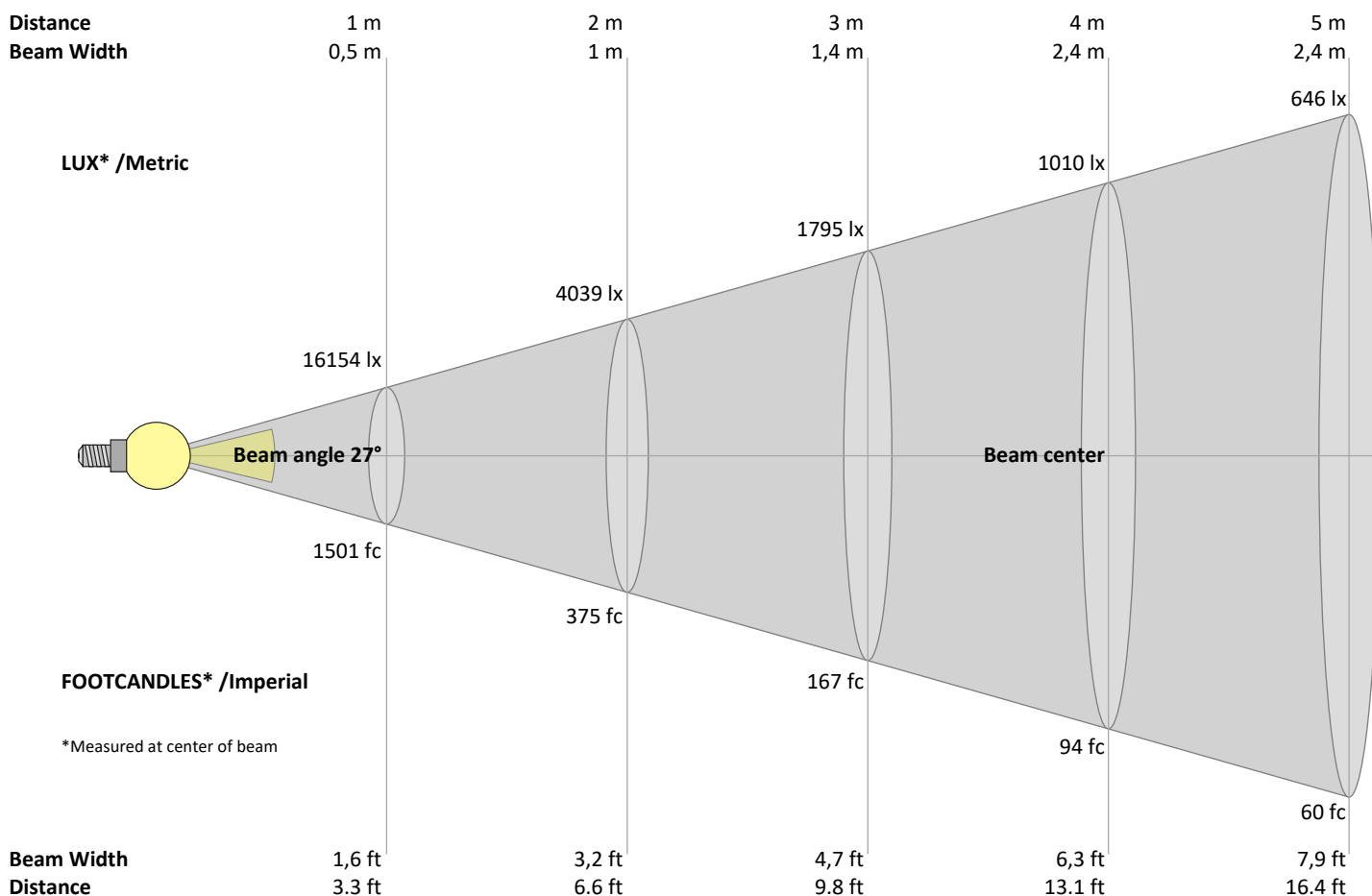
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Beam intensities from 1 – 20 m

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
16154	4039	1795	1010	646	449	330	252	199	162	134	112	96	82	72	63	56	50	45	40	lux
1500,8	375,2	166,8	93,8	60	41,7	30,6	23,4	18,5	15	12,4	10,4	8,9	7,7	6,7	5,9	5,2	4,6	4,2	3,8	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
16,2k	16,3k	15,7k	14,7k	13,3k	11,7k	10,0k	8,1k	6,4k	4,8k	3,5k	2,4k	1,7k	1,2k	0,8k	0,6k	0,4k	0,3k	0,2k	0,2k	cd
100%	101%	97%	91%	83%	73%	62%	50%	39%	30%	21%	15%	10%	7%	5%	4%	3%	2%	1%	1%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
16,2k	14,6k	14,0k	13,1k	11,8k	10,4k	8,9k	7,3k	5,7k	4,3k	3,1k	2,2k	1,5k	1,0k	0,7k	0,5k	0,4k	0,3k	0,2k	0,2k	cd
100%	90%	87%	81%	73%	64%	55%	45%	35%	27%	19%	14%	9%	6%	4%	3%	2%	2%	1%	1%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
16,2k	16,3k	15,7k	14,7k	13,3k	11,7k	10,0k	8,1k	6,4k	4,8k	3,5k	2,4k	1,7k	1,2k	0,8k	0,6k	0,4k	0,3k	0,2k	0,2k	cd
100%	101%	97%	91%	83%	73%	62%	50%	39%	30%	21%	15%	10%	7%	5%	4%	3%	2%	1%	1%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
16,2k	14,6k	14,0k	13,1k	11,8k	10,4k	8,9k	7,3k	5,7k	4,3k	3,1k	2,2k	1,5k	1,0k	0,7k	0,5k	0,4k	0,3k	0,2k	0,2k	cd
100%	90%	87%	81%	73%	64%	55%	45%	35%	27%	19%	14%	9%	6%	4%	3%	2%	2%	1%	1%	of 0°val

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Light Planning – UGR table

Corrected, 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												
X Y			Viewed Crosswise (Viewing direction orthogonal to lamp length axis)					Viewed Endwise (Viewing direction parallel to lamp length axis)				
2H	2H	2H	17,0	17,4	17,1	17,6	17,8	16,5	16,9	16,6	17,1	17,3
		3H	17,2	17,8	17,6	18,0	18,2	16,8	17,4	17,2	17,6	17,8
		4H	17,4	18,0	17,8	18,2	18,4	17,0	17,6	17,4	17,8	18,0
		6H	17,5	18,0	17,8	18,3	18,6	17,1	17,6	17,4	17,9	18,3
		8H	17,5	18,0	17,8	18,3	18,7	17,1	17,6	17,5	17,9	18,3
		12H	17,5	17,9	17,8	18,3	18,7	17,1	17,6	17,5	17,9	18,3
4H	4H	2H	17,0	17,6	17,4	17,8	18,0	16,5	17,1	16,9	17,3	17,6
		3H	17,6	18,0	17,9	18,4	18,8	17,2	17,6	17,5	18,0	18,4
		4H	17,7	18,1	18,1	18,6	19,1	17,4	17,8	17,8	18,2	18,7
		6H	17,9	18,3	18,4	18,7	19,0	17,5	18,0	18,0	18,3	18,7
		8H	17,9	18,3	18,4	18,6	19,0	17,5	18,0	18,1	18,3	18,7
		12H	17,8	18,2	18,3	18,6	19,0	17,5	17,8	18,0	18,2	18,7
8H	8H	4H	17,7	18,2	18,3	18,5	18,9	17,4	17,8	17,9	18,2	18,5
		6H	17,9	18,2	18,5	18,7	19,2	17,6	17,9	18,1	18,4	18,9
		8H	18,0	18,2	18,5	18,8	19,4	17,7	17,9	18,2	18,5	19,1
		12H	18,0	18,2	18,6	18,7	19,3	17,7	17,9	18,3	18,4	19,0
12H	12H	4H	17,7	18,0	18,2	18,4	18,9	17,4	17,7	17,9	18,1	18,5
		6H	18,0	18,2	18,5	18,7	19,3	17,7	17,9	18,2	18,4	19,0
		8H	18,0	18,2	18,6	18,7	19,3	17,7	17,9	18,3	18,4	19,0
Variations with the observer position for the luminaire spacings, S:												
S = 1.0H			2,4 / -1,2					1,9 / -1,0				
S = 1.5H			4,3 / -1,9					3,6 / -1,6				
S = 2.0H			5,9 / -2,6					5,1 / -2,4				

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	111	106	106	106	102	102	102	100
1	115	113	111	109	112	110	109	107	106	105	104	103	102	101	99	99	98	96
2	111	107	104	101	109	105	102	100	102	100	98	99	97	96	97	95	94	92
3	107	102	98	95	105	101	97	94	98	95	93	96	94	92	94	92	90	89
4	103	98	94	90	102	97	93	90	95	91	89	93	90	88	91	89	87	86
5	100	94	90	86	99	93	89	86	91	88	85	90	87	85	89	86	84	83
6	97	91	86	83	96	90	86	83	88	85	82	87	84	82	86	83	81	80
7	94	87	83	80	93	87	83	80	86	82	79	85	81	79	84	81	79	78
8	91	85	80	77	91	84	80	77	83	80	77	82	79	77	81	79	76	75
9	89	82	78	75	88	82	78	75	81	77	75	80	77	74	79	76	74	73
10	87	80	75	73	86	79	75	73	79	75	72	78	75	72	77	74	72	71

Light Measurement Report

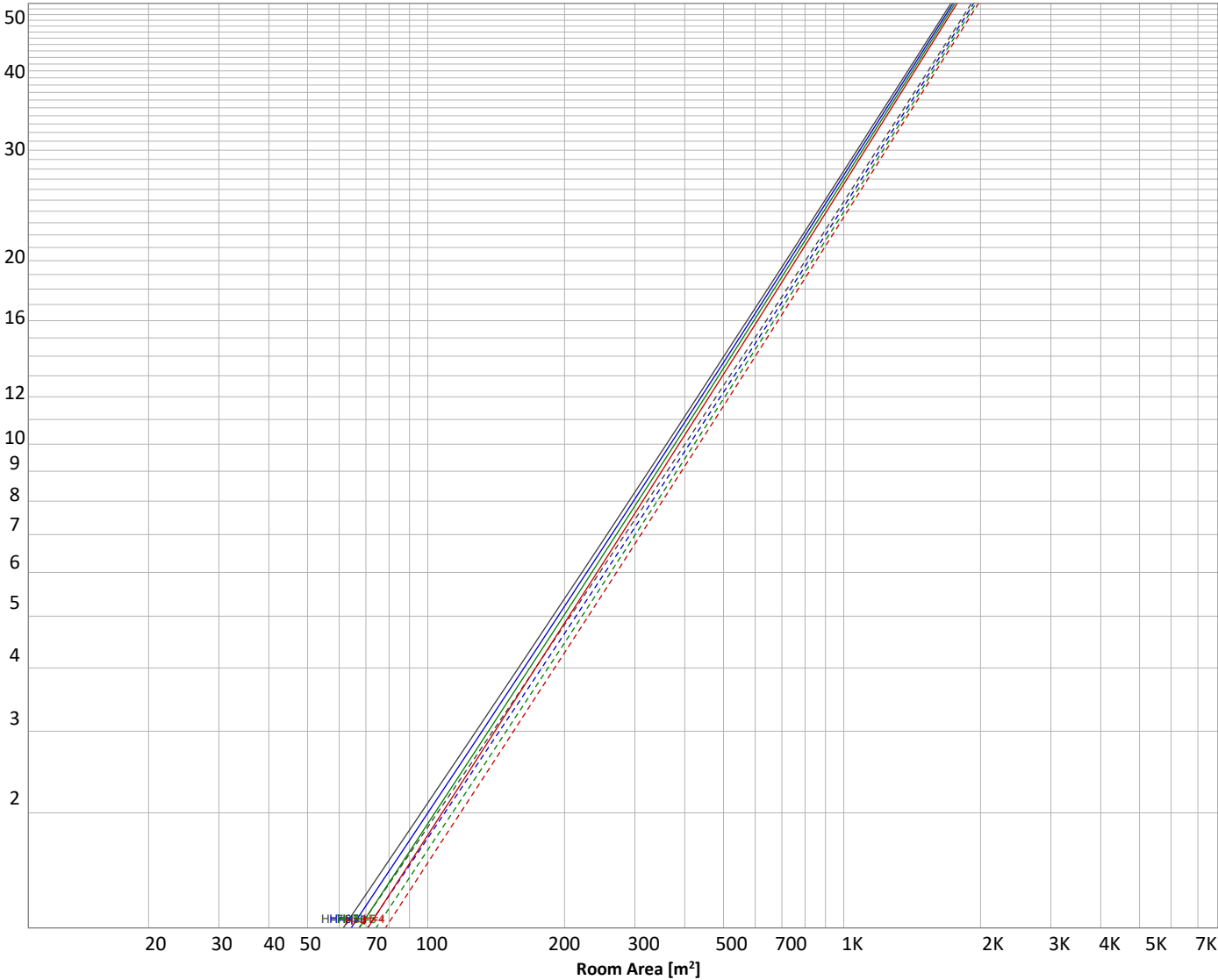
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 4003 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = Average lux on work area =	100 lx	-----	50	30
				Floor reflectance
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
1301 lm	1816 lm	582 lm	158 lm	66,2 lm	43,0 lm	23,7 lm	11,0 lm	2,17 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,008 lm	0,000 lm	0,000 lm	0,000 lm	0,000 lm	0,000 lm	0,000 lm	0,000 lm	0,000 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	1301 lm	32,5%
10-20°	1816 lm	45,4%
20-30°	582 lm	14,5%
30-40°	158 lm	3,9%
40-50°	66 lm	1,7%
50-60°	43 lm	1,1%
60-70°	24 lm	0,6%
70-80°	11 lm	0,3%
80-90°	2 lm	0,1%
90-100°	0 lm	0,0%
100-110°	0 lm	0,0%
110-120°	0 lm	0,0%
120-130°	0 lm	0,0%
130-140°	0 lm	0,0%
140-150°	0 lm	0,0%
150-160°	0 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	4003 lm	100,0%

Intensity peaks

Max intensity	16628 cd
Intensity, 90°	0 cd
Intensity, 0°	16154 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	3699 lm	92,4%
0-40°	3857 lm	96,4%
0-60°	3966 lm	99,1%
60-90°	37 lm	0,9%
70-100°	13 lm	0,3%
90-120°	0 lm	0,0%
0-90°	4003 lm	100,0%
90-180°	0 lm	0,0%
0-180°	4003 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1853 lm	46,3%
Medium(30-60°)	134 lm	3,4%
High(60-80°)	17 lm	0,4%
Very high(80-90°)	1 lm	0,0%

Back light

Low(0-30°)	1853 lm	46,3%
Medium(30-60°)	134 lm	3,4%
High(60-80°)	17 lm	0,4%
Very high(80-90°)	1 lm	0,0%

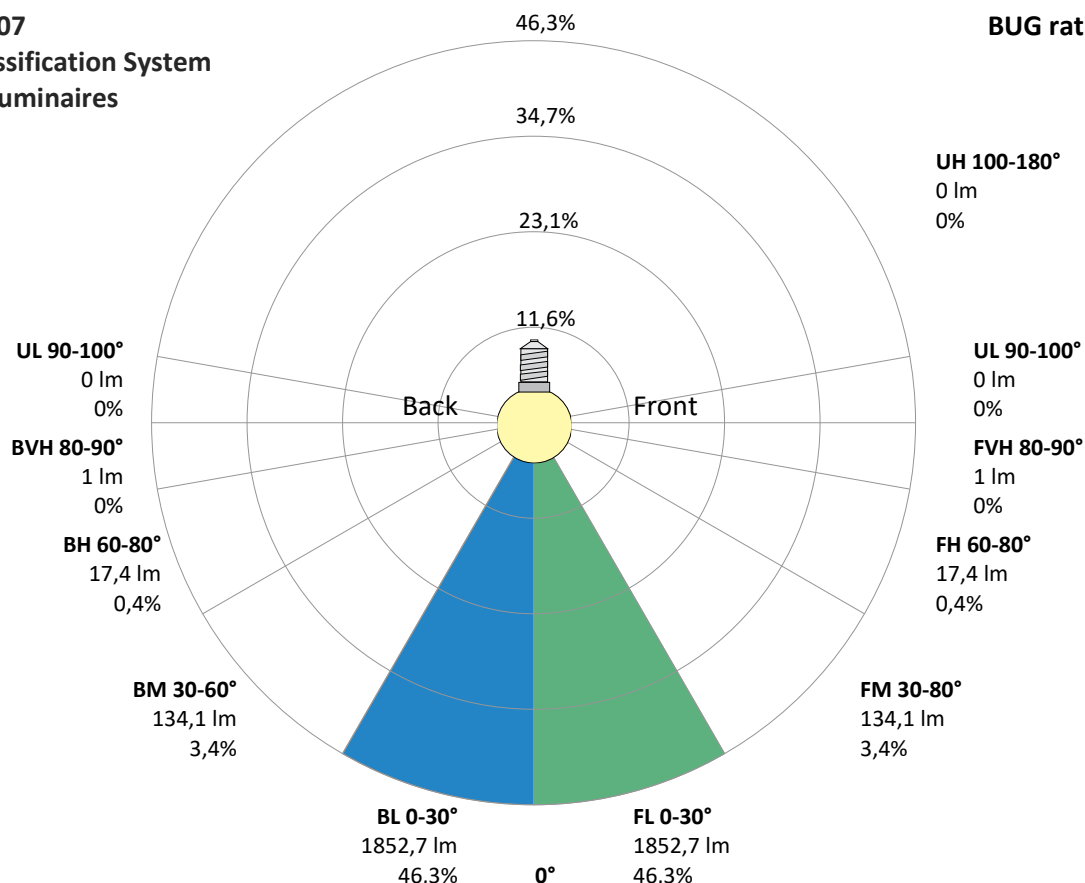
Uplight

Low(90-100°)	0 lm	0,0%
High(100-180°)	0 lm	0,0%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B3 U0 G0



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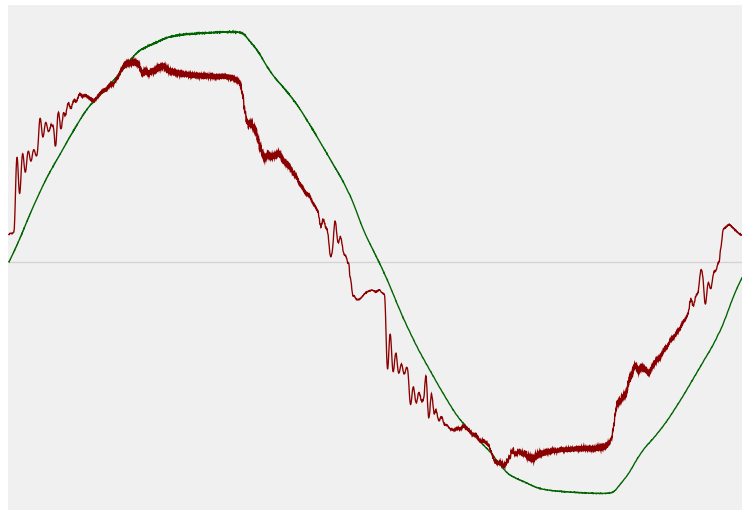


Power Details

Input Power

Power feed to light source	24,3 W
Frequency of input power	50,1 Hz
RMS Input voltage feed, V_{RMS}	226 V
RMS Input current feed, I_{RMS}	0,113 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	25,4 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,96
Total harmonic distortion of the current	7,83%
Total harmonic distortion of the voltage	3,64%

Input Power Curve



Efficiency

Radiated power efficiency 48,6%



Lumen efficiency 165 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3039 K
CCT shift	-39 K
CCT end	3000 K

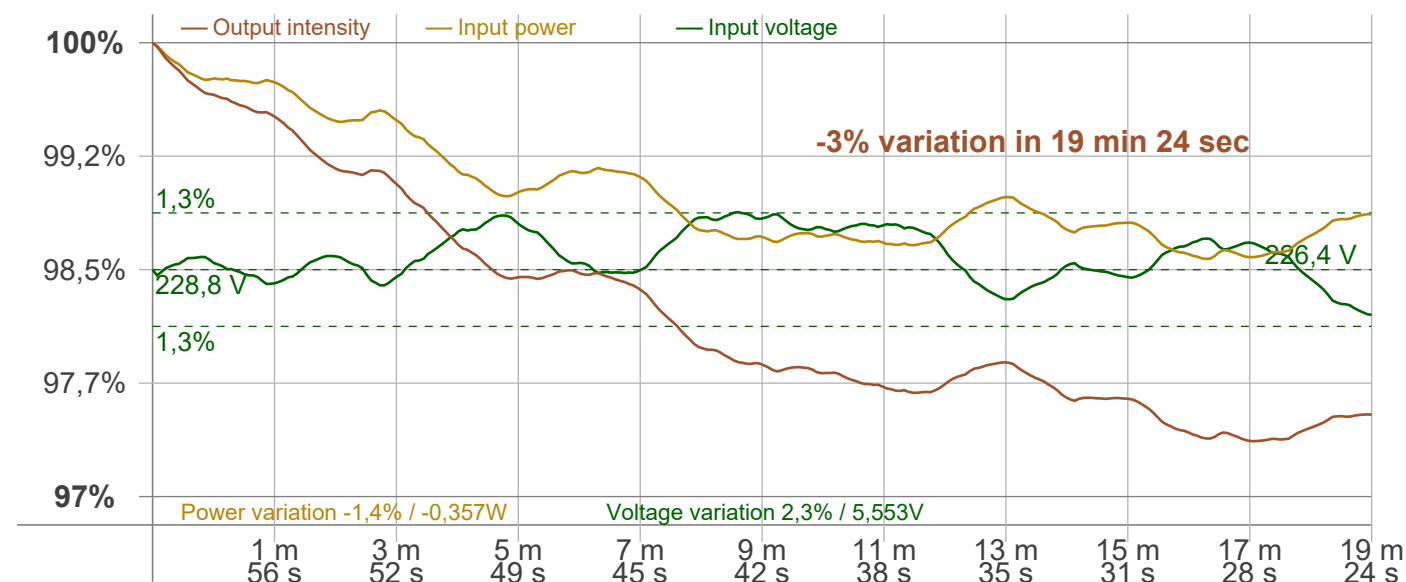
Warmup Result

Total warmup time	Lamp stabilized in 19 min 24 sec
Warmup variation	-3,0%

Output Change

Output start	4113 lm
Output change	-111 lm
Output end	4003 lm

Stabilization Curve



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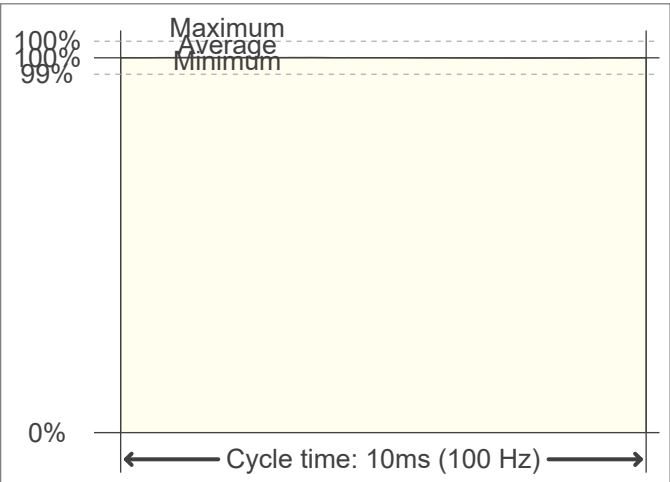
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Operator: LC



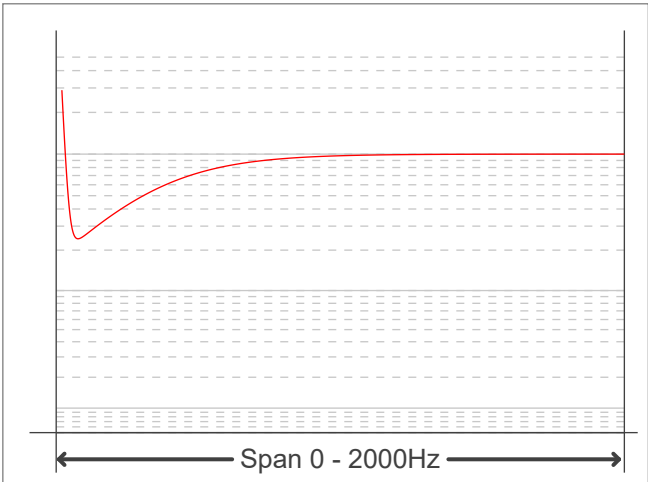
Flicker /TLA details

Flicker Meter Type	Viso Systems LabFlicker	Measurement time	
Frequency of input power	50,1 Hz	PstLM	180 sec
Flicker/TLA sample rate	20000 samples/s	All other indices	1,2 sec
Flicker indices according to Illuminating Engineering Society (IES)		Flicker indices according to California Energy Commission (CEC) 2016b	
Flicker frequency	100 Hz	JA8/10 40 Hz	0,02 %
Percent Flicker	0,17 %	JA8/10 90 Hz	0,03 %
Flicker index	0	JA8/10 200 Hz	0,14 %
		JA8/10 400 Hz	0,15 %
		JA8/10 1000 Hz	0,17 %
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)		Flicker indices according to Lighting Research Center (2015)	
PstLM value (F < 80 Hz)	0,01	Perception metric, Assist Mp	0,01
SVM value (80 < F < 2000 Hz)	0		

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

