

Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 15:42:08 – Measurement no. VFR-250219-0067-MS

Measurement tracking No. and Link: [VT250219-003667](#)

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

28 planes – 12,86°

5°

2,09 m

41,2 W – PF 0,97 – DPF 0,98

230 V – 0,184 A

50 Hz

Lamp stabilized in 21 min 52 sec – 2,0%

Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

809010-4000K

809010-4000K – Dutchfulfillment

3-FASE RAILSPOT | DURHAM | 38W | ZWART

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

3413 lm – 0,05% / 99,95%

83 lm/W

5355 cd – 42,2°

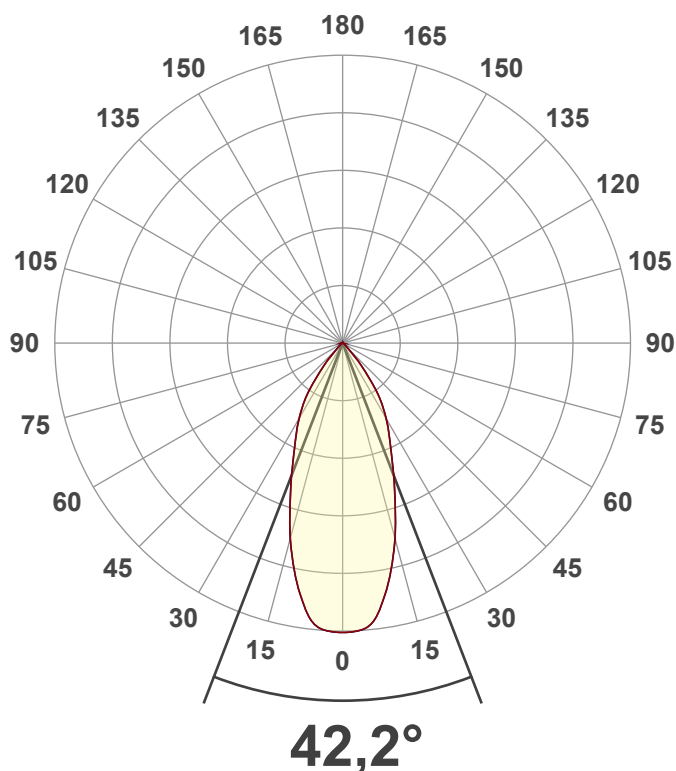
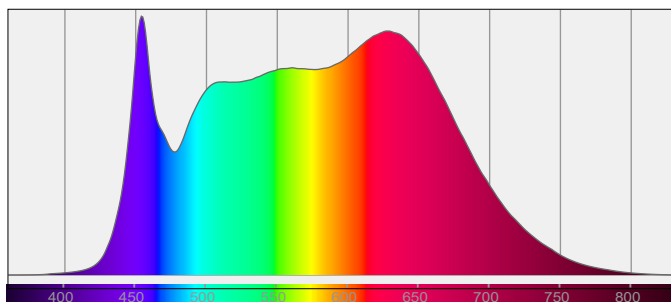
CCT = 4000 K / 4172 K

CRI 97,3

R_f 91,8 – R_g 97,7

Duv 0,0037 – SDCM 4,4

SVM 0 – PstLM 0,06



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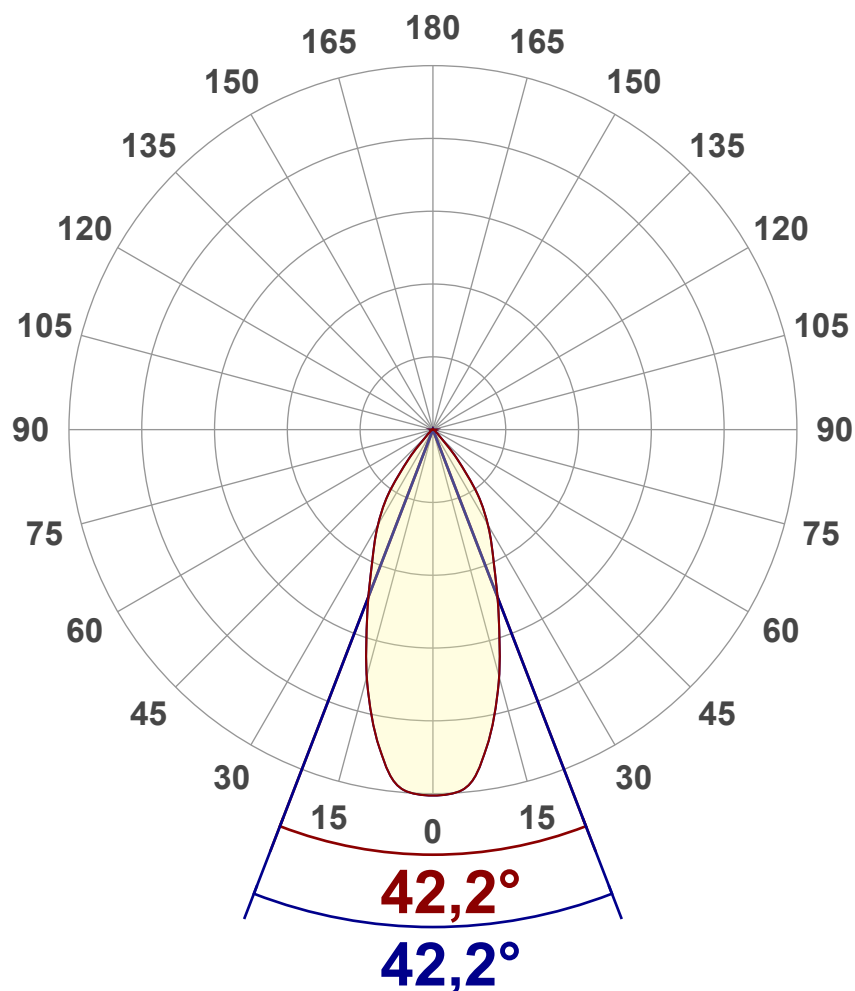
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3413 lm
Lumen Up% / Down%	0,05% / 99,95%
Peak Intensity	5355 cd
Beam Angle (50%)	42,2°
Beam Angle (90%)	42,2°
Beam Angle (10%)	42,2°

Cut-off Angle

Average 2,5%	91,8°
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Field Angle

Average 10%	79,7°
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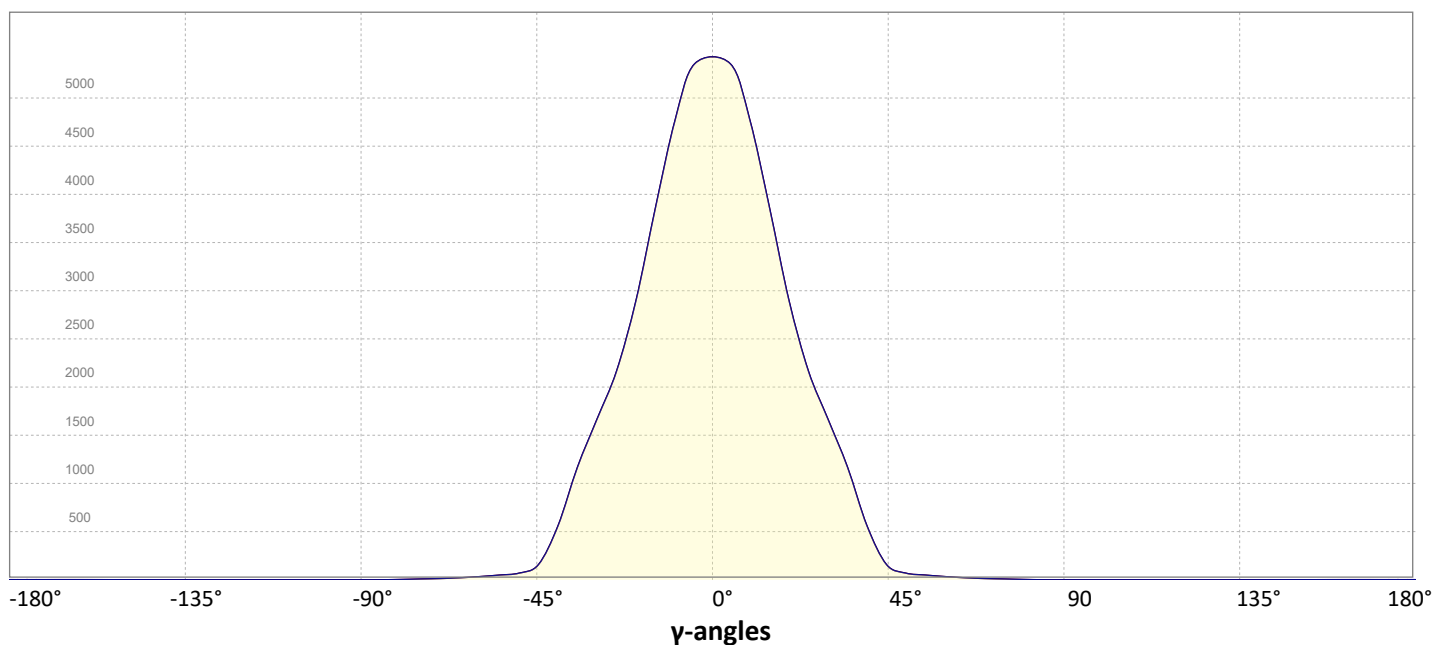
Intensity Ratio

In 120° cone	99,1%
In 90° cone	96,6%

C000-C180

C090-C270

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

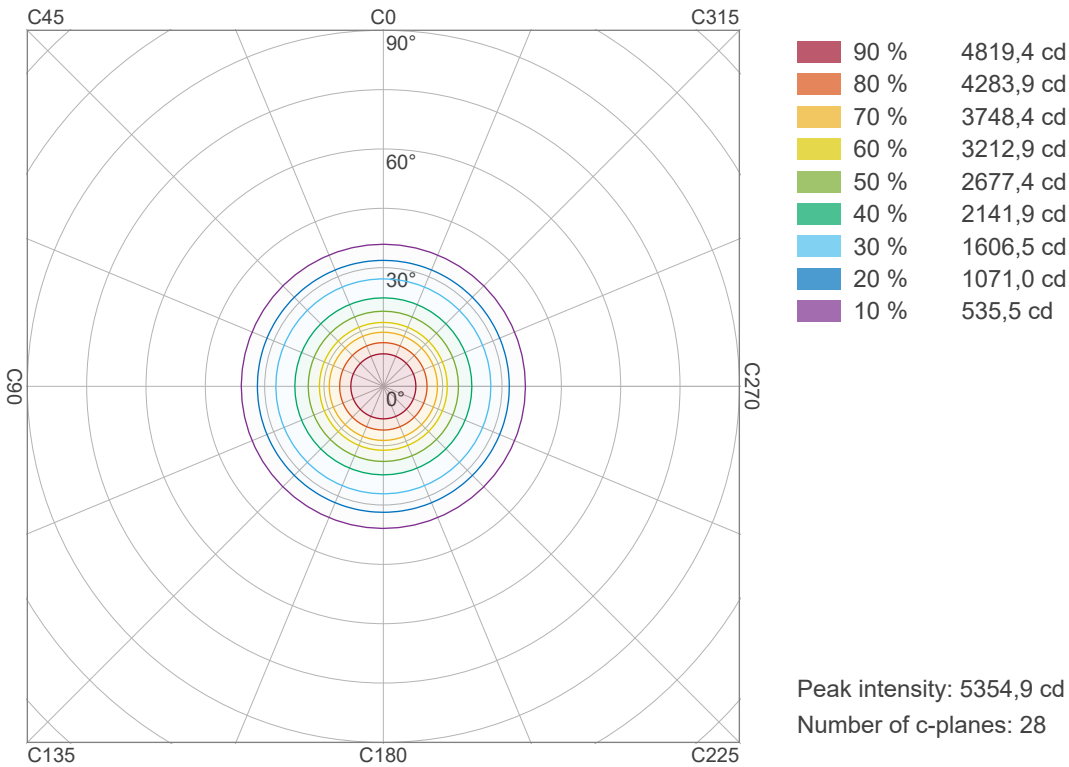


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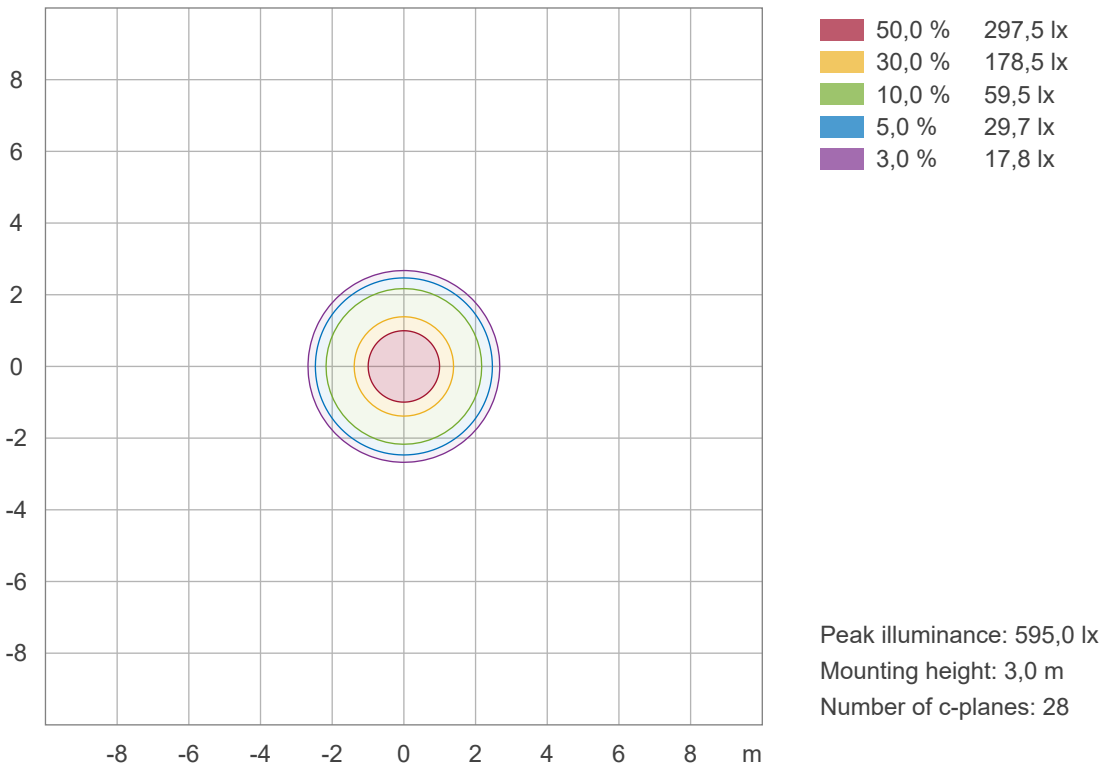
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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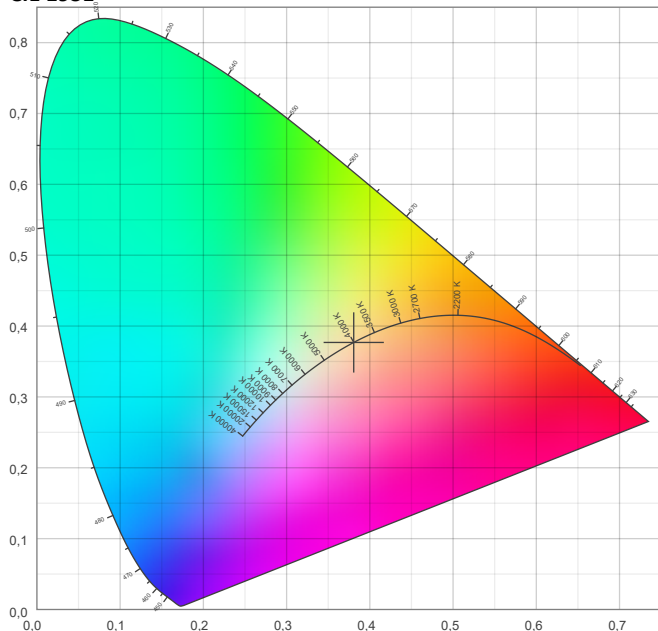


Color details

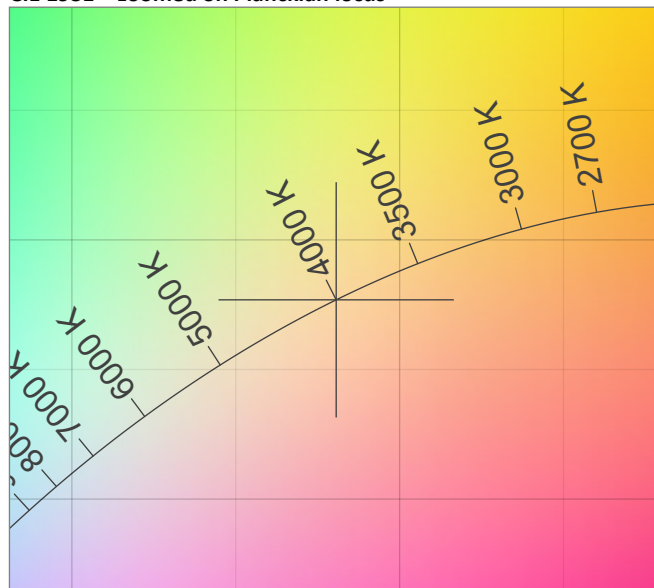
Correlated Color Temperature, Target CCT = 4000 K
Correlated Color Temperature, Measured CCT = 4172 K
Color Rendering Index CRI 97,3
Color Rendering Index, R9 (red component) R9 = 95,8
Color Rendering TM30-18 R_f 91,8 – R_g 97,7
Color Quality Scale CQS = 94,9

MacAdam Steps
Color coordinates CIE 1931 (x;y) = (0,381;0,377)
Color coordinate CIEs 1960 (u;v) = (0,225;0,334)
Color deviation from BBL Duv = 0,0037
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

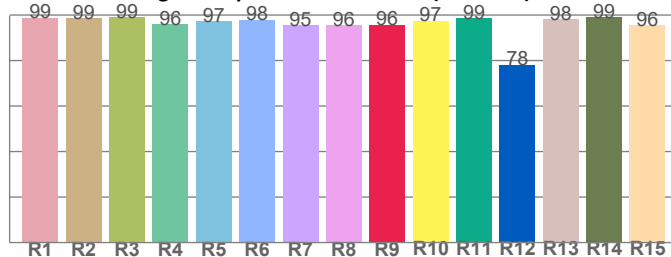
CIE 1931



CIE 1931 – zoomed on Planckian locus



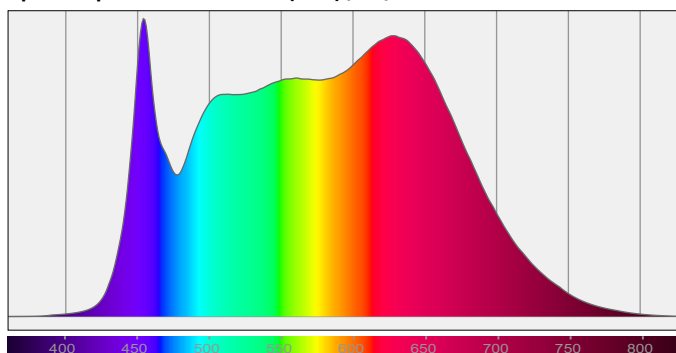
Color Rendering Index per reference color (CIE 1995)



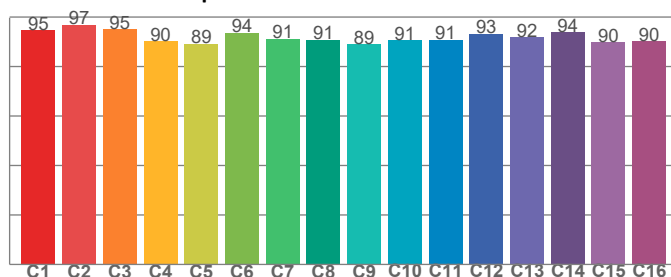
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
98,8	98,5	99,1	96,0	97,3	98,0	95,4	95,6	95,8	97,5	98,5	78,1	98,1	99,0	95,6

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



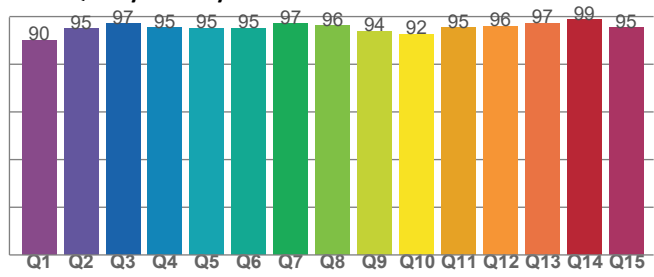
TM30-18 R_f-values per hue bin



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
94,6	96,9	95,0	90,3	89,2	93,6	91,3	90,9	89,1	90,6	90,8	93,3	91,9	93,8	89,9	90,2

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
90,1	94,9	97,1	95,4	95,2	95,1	97,1	96,2	93,9	92,5	95,4	95,9	97,2	98,7	95,2

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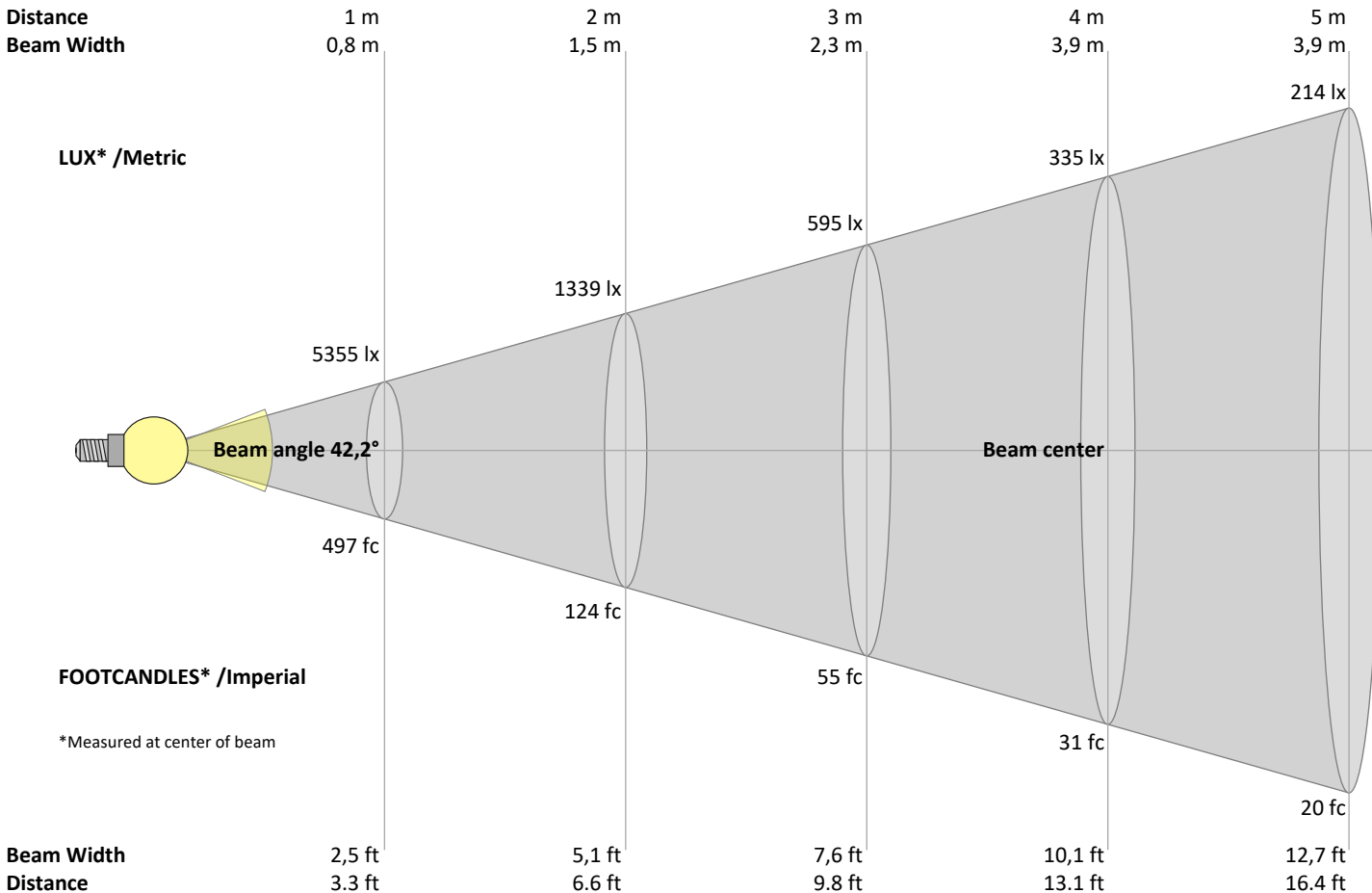
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Beam Details



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
5355	1339	595	335	214	149	109	84	66	54	44	37	32	27	24	21	19	17	15	13	lux
497,5	124,4	55,3	31,1	19,9	13,8	10,2	7,8	6,1	5	4,1	3,5	2,9	2,5	2,2	1,9	1,7	1,5	1,4	1,2	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
5355	5355	5355	5188	4955	4694	4333	3971	3592	3206	2839	2544	2250	2024	1824	1625	1426	1227	995	751	cd
100%	100%	100%	97%	93%	88%	81%	74%	67%	60%	53%	48%	42%	38%	34%	30%	27%	23%	19%	14%	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
5355	5355	5355	5188	4955	4694	4333	3971	3592	3206	2839	2544	2250	2024	1824	1625	1426	1227	995	751	cd
100%	100%	100%	97%	93%	88%	81%	74%	67%	60%	53%	48%	42%	38%	34%	30%	27%	23%	19%	14%	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
5355	5355	5355	5188	4955	4694	4333	3971	3592	3206	2839	2544	2250	2024	1824	1625	1426	1227	995	751	cd
100%	100%	100%	97%	93%	88%	81%	74%	67%	60%	53%	48%	42%	38%	34%	30%	27%	23%	19%	14%	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
5355	5355	5355	5188	4955	4694	4333	3971	3592	3206	2839	2544	2250	2024	1824	1625	1426	1227	995	751	cd
100%	100%	100%	97%	93%	88%	81%	74%	67%	60%	53%	48%	42%	38%	34%	30%	27%	23%	19%	14%	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		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	21,2	21,8	21,3	22,0	22,2	21,2	21,8	21,3	22,0	22,2
	3H	20,9	21,7	21,3	21,9	22,0	20,9	21,7	21,3	21,9	22,0
	4H	20,8	21,6	21,2	21,8	22,0	20,8	21,6	21,2	21,8	22,0
	6H	20,8	21,4	21,1	21,7	22,1	20,8	21,4	21,1	21,7	22,1
	8H	20,8	21,4	21,1	21,7	22,1	20,8	21,4	21,1	21,7	22,1
	12H	20,7	21,3	21,1	21,6	22,1	20,7	21,3	21,1	21,6	22,1
4H	2H	20,8	21,6	21,2	21,8	22,0	20,8	21,6	21,2	21,8	22,0
	3H	20,8	21,3	21,1	21,7	22,1	20,8	21,3	21,1	21,7	22,1
	4H	20,6	21,1	21,0	21,6	22,1	20,6	21,1	21,0	21,6	22,1
	6H	20,5	21,1	21,0	21,4	21,8	20,5	21,1	21,0	21,4	21,8
	8H	20,5	21,0	21,0	21,3	21,7	20,5	21,0	21,0	21,3	21,7
	12H	20,4	20,8	20,9	21,2	21,7	20,4	20,8	20,9	21,2	21,7
8H	4H	20,5	21,0	21,0	21,3	21,7	20,5	21,0	21,0	21,3	21,7
	6H	20,4	20,8	20,9	21,2	21,8	20,4	20,8	20,9	21,2	21,8
	8H	20,4	20,7	20,9	21,2	21,8	20,4	20,7	20,9	21,2	21,8
	12H	20,4	20,6	21,0	21,1	21,7	20,4	20,6	21,0	21,1	21,7
12H	4H	20,4	20,8	20,9	21,2	21,7	20,4	20,8	20,9	21,2	21,7
	6H	20,4	20,7	20,9	21,2	21,8	20,4	20,7	20,9	21,2	21,8
	8H	20,4	20,6	21,0	21,1	21,7	20,4	20,6	21,0	21,1	21,7
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		5,0 / -10,0					5,0 / -10,0				
S = 1.5H		7,6 / -11,7					7,6 / -11,7				
S = 2.0H		9,6 / -13,3					9,6 / -13,3				

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	111	111	111	106	106	106	102	102	102	100	
1	114	111	109	106	111	109	107	105	105	103	101	101	100	98	98	97	96	94
2	108	104	100	96	106	102	98	95	99	96	93	96	93	91	93	91	89	88
3	103	97	92	88	101	95	91	87	93	89	86	90	87	85	88	86	83	82
4	98	91	85	81	96	90	85	81	88	83	80	86	82	79	84	81	78	77
5	93	85	80	76	92	84	79	75	83	78	75	81	77	74	79	76	73	72
6	89	80	75	71	88	80	74	70	78	73	70	77	73	69	76	72	69	68
7	85	76	70	66	84	75	70	66	74	69	66	73	69	65	72	68	65	64
8	81	72	66	62	80	71	66	62	70	65	62	69	65	62	68	64	61	60
9	77	68	63	59	76	68	62	59	67	62	58	66	61	58	65	61	58	57
10	74	65	59	56	73	64	59	56	64	59	55	63	58	55	62	58	55	54

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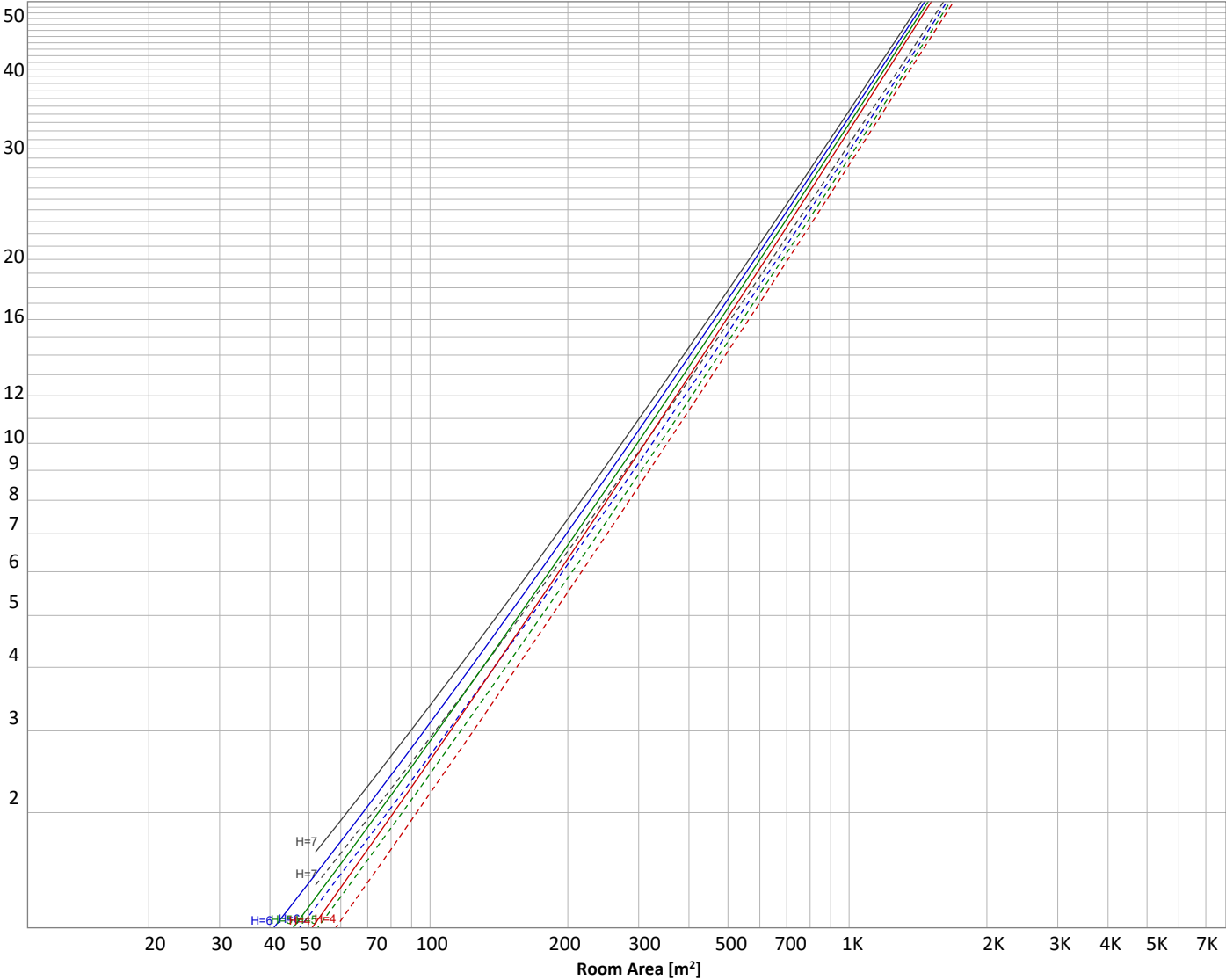
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Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3413 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°
483 lm	1037 lm	986 lm	671 lm	160 lm	43,0 lm	20,8 lm	8,32 lm	1,00 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,019 lm	0,020 lm	0,014 lm	0,050 lm	0,165 lm	0,401 lm	0,520 lm	0,425 lm	0,136 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	483 lm	14,2%
10-20°	1037 lm	30,4%
20-30°	986 lm	28,9%
30-40°	671 lm	19,7%
40-50°	160 lm	4,7%
50-60°	43 lm	1,3%
60-70°	21 lm	0,6%
70-80°	8 lm	0,2%
80-90°	1 lm	0,0%
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°	1 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	3413 lm	100,0%

Intensity peaks

Max intensity	5355 cd
Intensity, 90°	0 cd
Intensity, 0°	5355 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	2507 lm	73,4%
0-40°	3178 lm	93,1%
0-60°	3381 lm	99,1%
60-90°	30 lm	0,9%
70-100°	9 lm	0,3%
90-120°	0 lm	0,0%
0-90°	3411 lm	99,9%
90-180°	2 lm	0,1%
0-180°	3413 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1253 lm	36,7%
Medium(30-60°)	438 lm	12,8%
High(60-80°)	15 lm	0,4%
Very high(80-90°)	1 lm	0,0%
Back light		
Low(0-30°)	1253 lm	36,7%
Medium(30-60°)	438 lm	12,8%
High(60-80°)	15 lm	0,4%
Very high(80-90°)	1 lm	0,0%

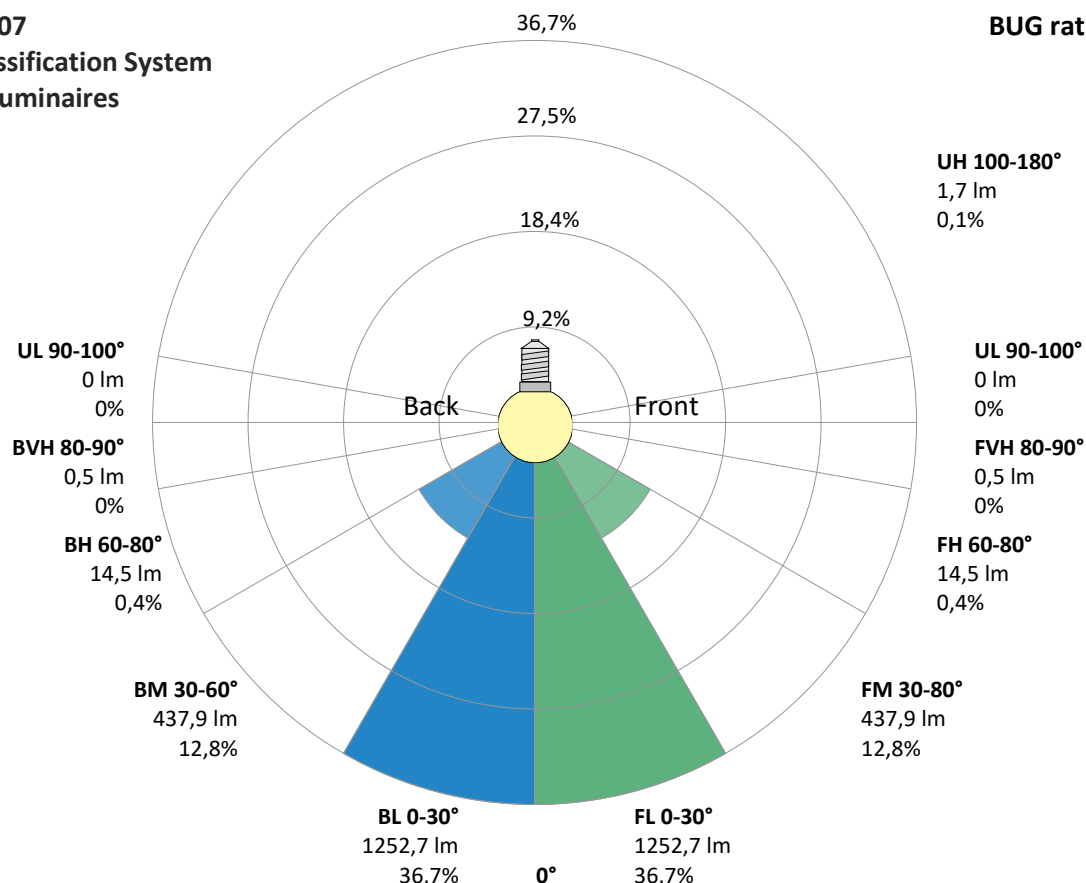
Uplight

Low(90-100°)	0 lm	0,0%
High(100-180°)	2 lm	0,1%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B3 U1 G0



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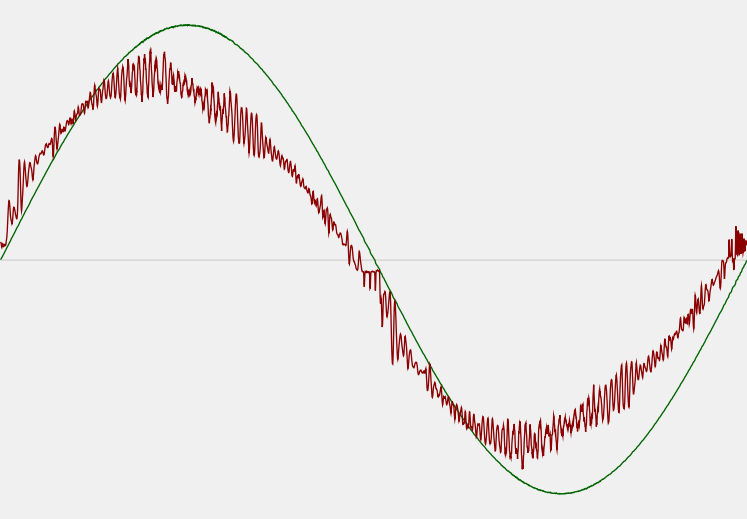


Power Details

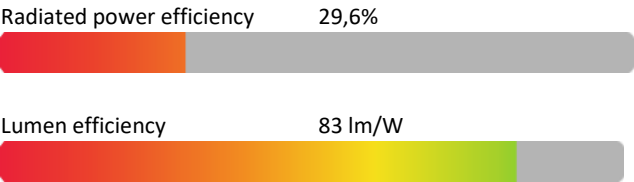
Input Power

Power feed to light source	41,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,184 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	42,33 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	6,55%
Total harmonic distortion of the voltage	0,06%

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	4013 K
CCT shift	-13 K
CCT end	4000 K

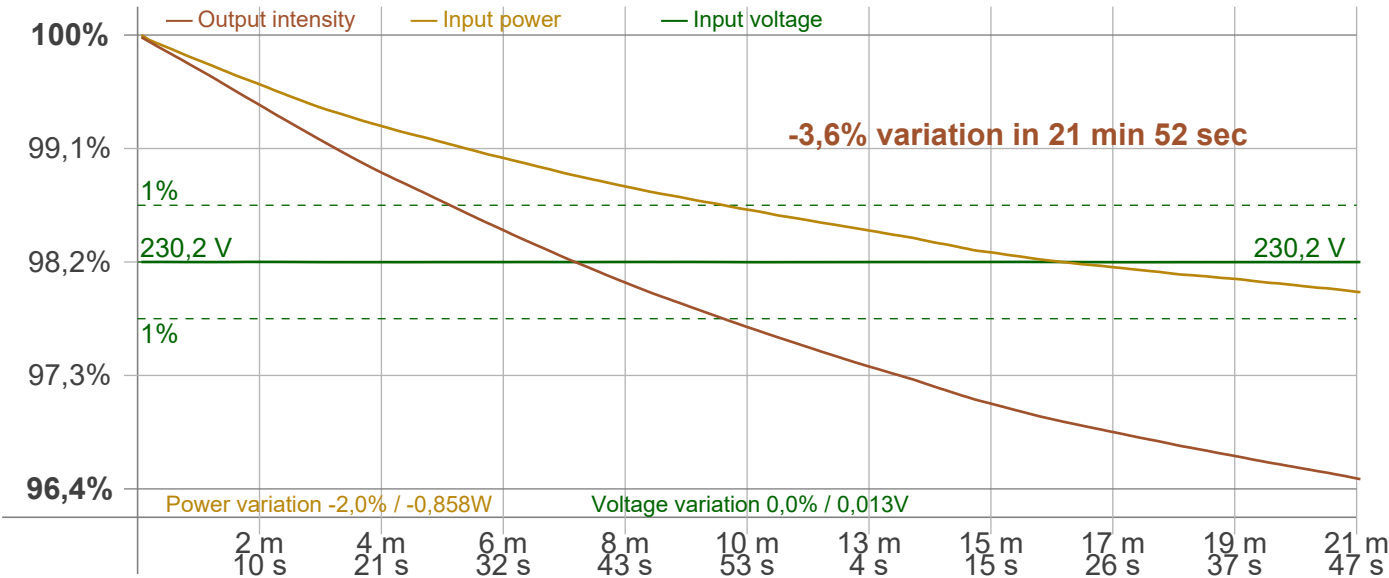
Warmup Result

Total warmup time	Lamp stabilized in 21 min 52 sec
Warmup variation	-3,6%

Output Change

Output start	3538 lm
Output change	-126 lm
Output end	3413 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

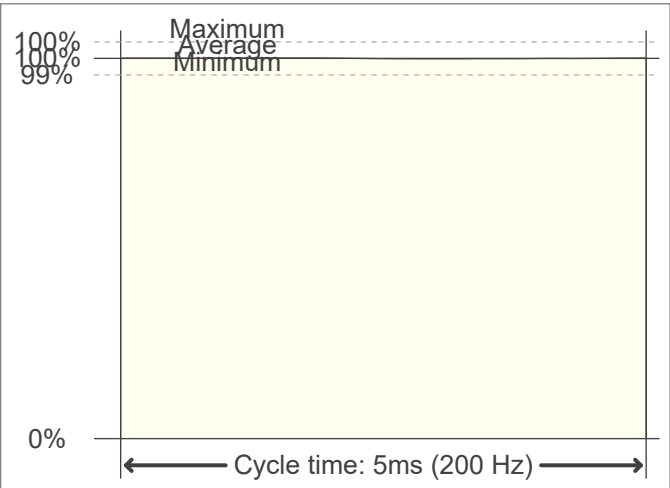
Flicker indices according to Illuminating Engineering Society (IES)
Flicker frequency 200 Hz
Percent Flicker 0,29 %
Flicker index 0

Flicker indices according to California Energy Commission (CEC) 2016b
JA8/10 40 Hz 0,08 %
JA8/10 90 Hz 0,12 %
JA8/10 200 Hz 0,23 %
JA8/10 400 Hz 0,28 %
JA8/10 1000 Hz 0,28 %

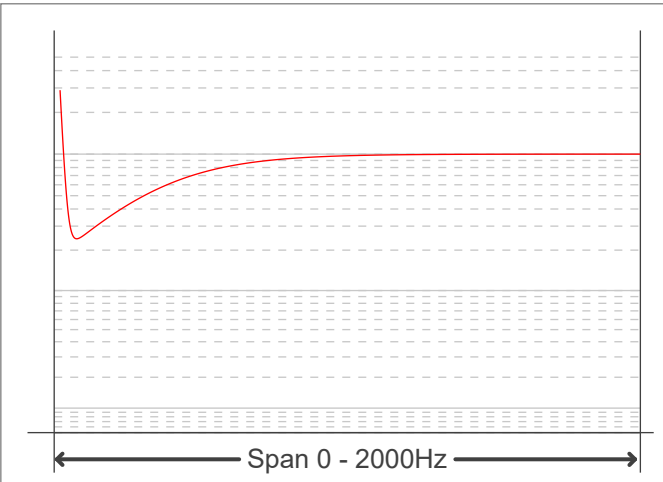
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)
PstLM value (F < 80 Hz) 0,06
SVM value (80 < F < 2000 Hz) 0

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

