

Light Measurement Report

Print date: 26-11-2024

Measurement date and time: 26-11-2024 08:35:06 – Measurement no. VFR-241126-2146-MS

Measurement tracking No. and Link: [VT241126-000197](https://www.viso-systems.com/track/VT241126-000197)

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°
1,99 m
29,6 W – PF 0,81 – DPF 1,0
230 V – 0,159 A
50 Hz
Lamp stabilized in 20 min 17 sec – 2,0%

Tested Light Source

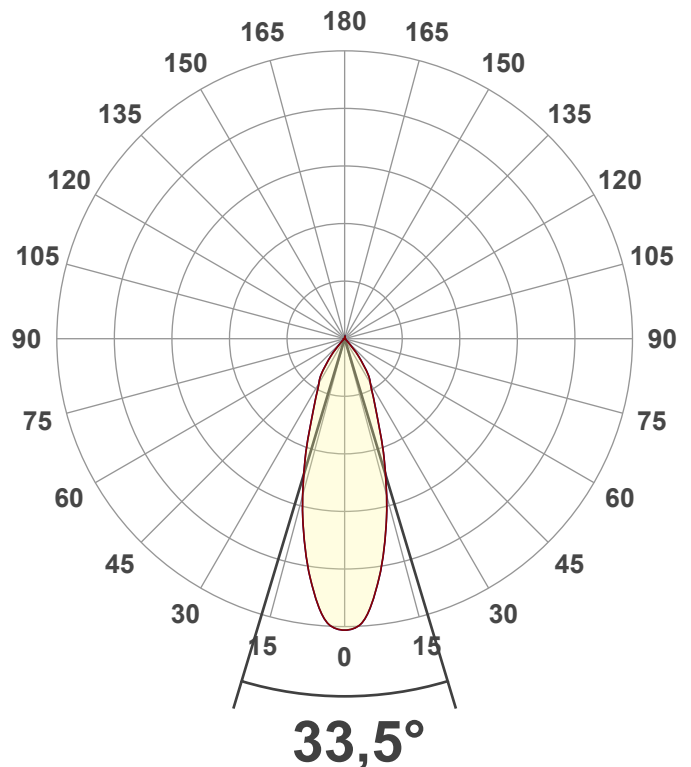
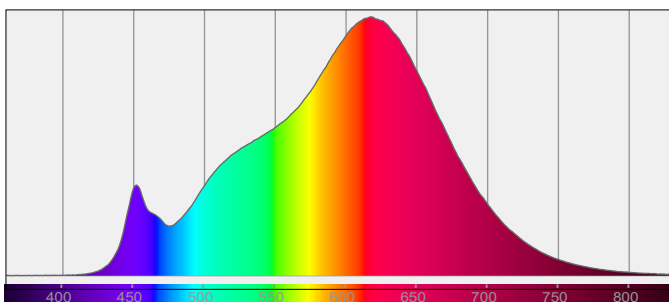
Product Name
Item No. and Manufacturer
Product Description (line 1)
SWITCH

807894-2700K-30W
807894-2700K-30W – Dutchfulfillment
3-FASE RAILSPOT | ROSALIN | 10W-20W-30W | ZWART | DIMBAAR | CCT-

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

1982 lm – 0,08% / 99,92%
67 lm/W
4356 cd – 33,5°
CCT = 2700 K / 2805 K
CRI 92,4
 R_f 91,4 – R_g 96,1
Duv 0,0028 – SDCM 4,9
SVM 0,03 – PstLM 0,02



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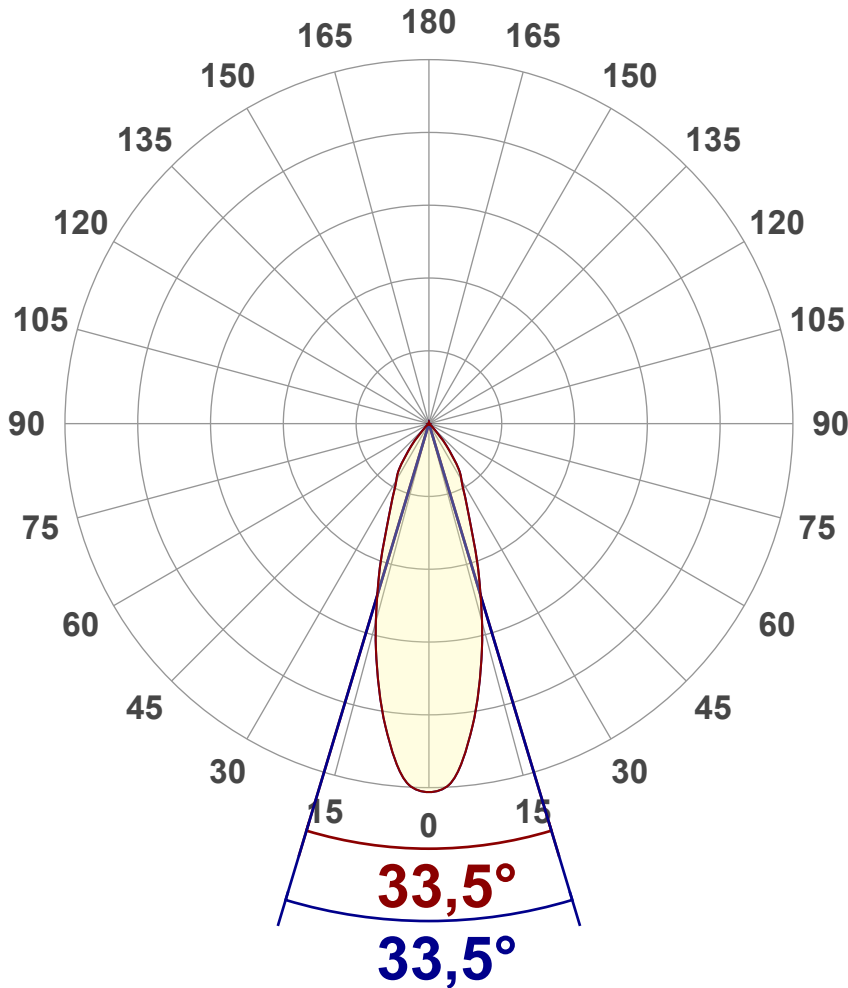
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1982 lm
Lumen Up% / Down%	0,08% / 99,92%
Peak Intensity	4356 cd
Beam Angle (50%)	33,5°
Beam Angle (90%)	33,5°
Beam Angle (10%)	33,5°

Cut-off Angle

Average 2,5%	86°
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Field Angle

Average 10%	73,7°
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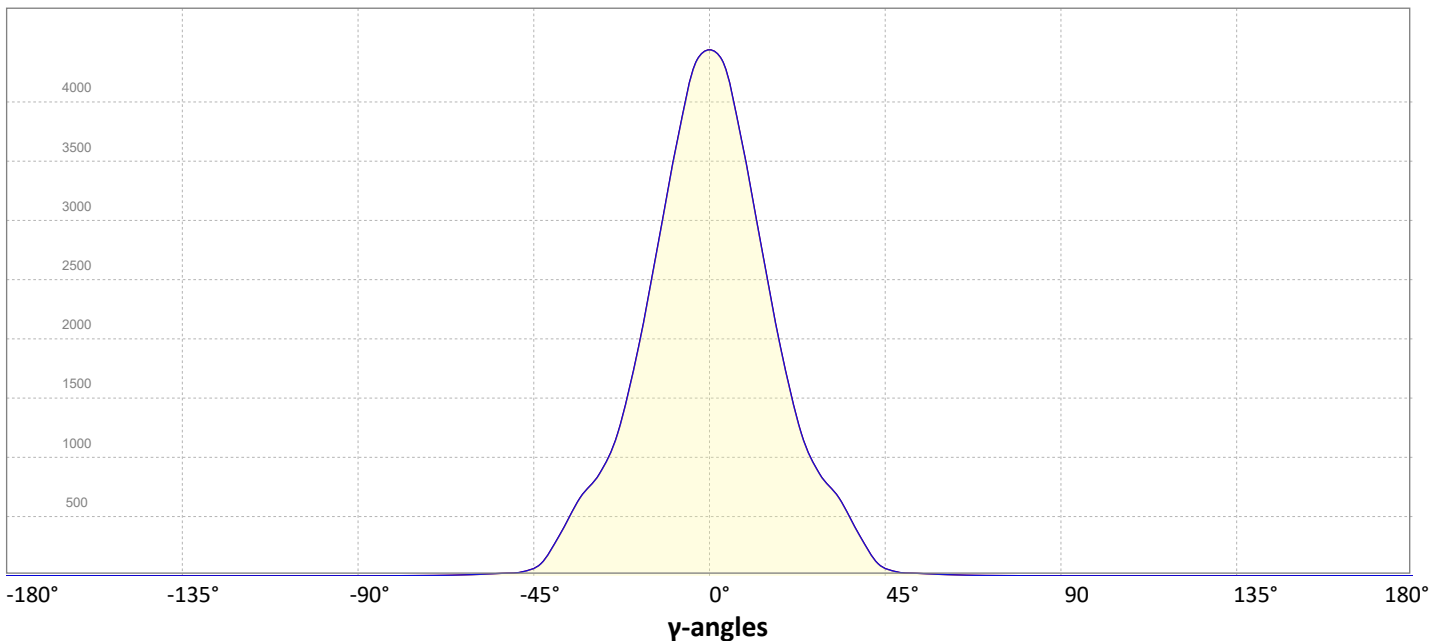
Intensity Ratio

In 120° cone	99,5%
In 90° cone	97,9%

C000-C180

C090-C270

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



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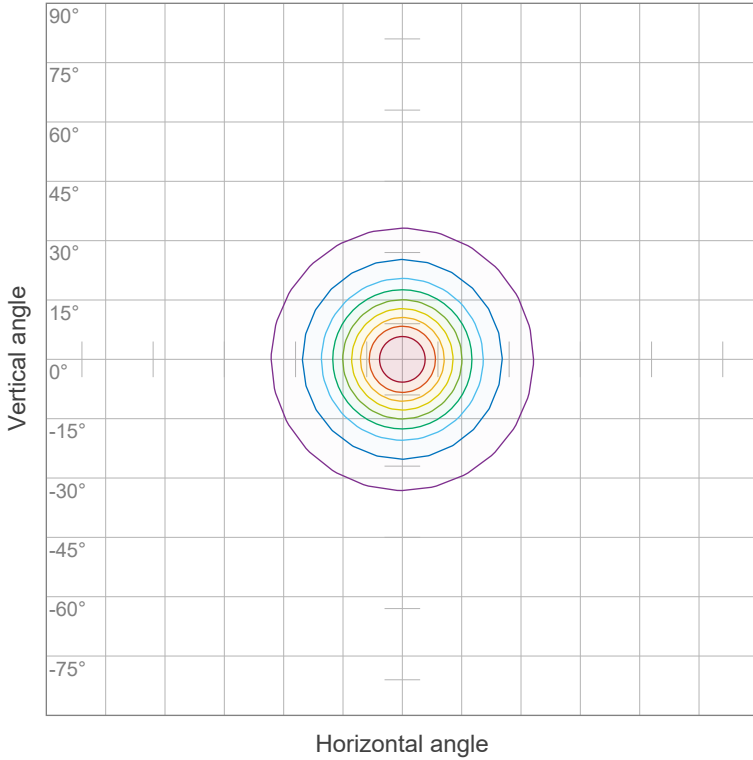
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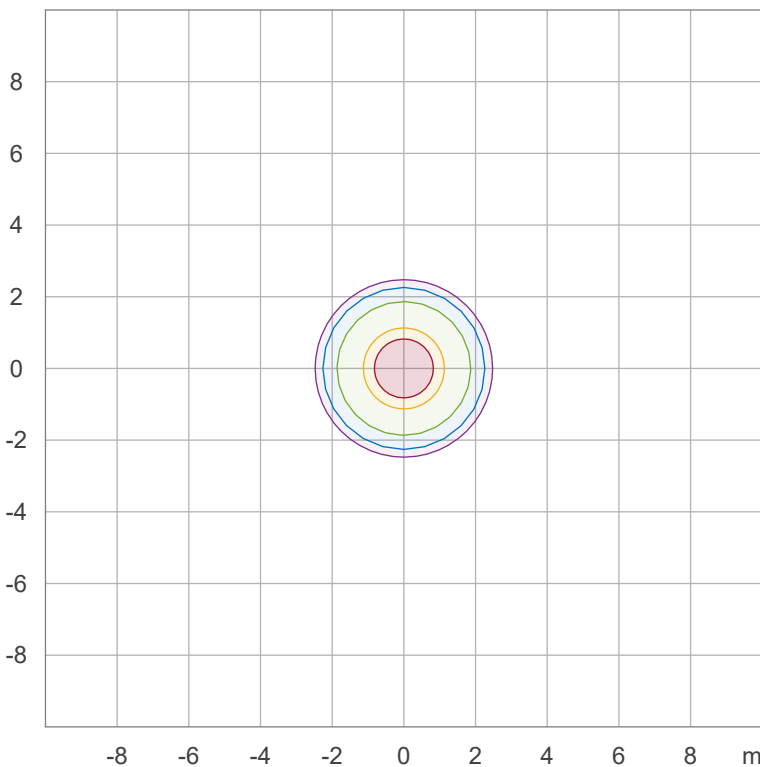
Iso-intensity Diagram (Iso-candela)



90 %	3920,2 cd
80 %	3484,7 cd
70 %	3049,1 cd
60 %	2613,5 cd
50 %	2177,9 cd
40 %	1742,3 cd
30 %	1306,7 cd
20 %	871,2 cd
10 %	435,6 cd

Peak intensity: 4355,8 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	242,0 lx
30,0 %	145,2 lx
10,0 %	48,4 lx
5,0 %	24,2 lx
3,0 %	14,5 lx

Peak illuminance: 484,0 lx
Mounting height: 3,0 m
Number of c-planes: 12

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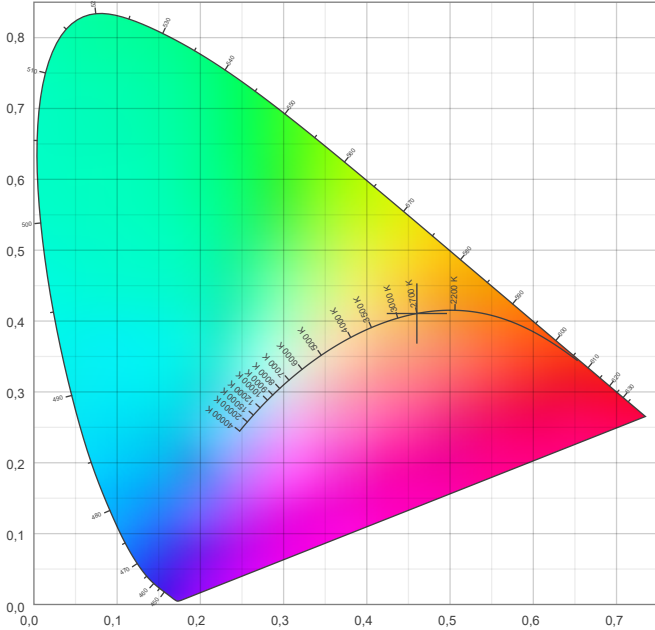


Color details

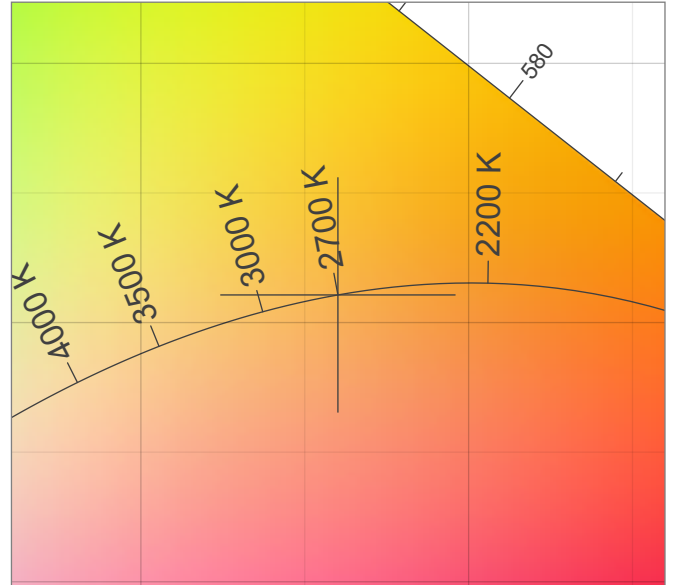
Correlated Color Temperature, Target CCT = 2700 K
 Correlated Color Temperature, Measured CCT = 2805 K
 Color Rendering Index CRI 92,4
 Color Rendering Index, R9 (red component) R9 = 50,5
 Color Rendering TM30-18 R_f 91,4 – R_g 96,1
 Color Quality Scale CQS = 90,5

MacAdam Steps SDCM = 4,9
 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 = 0,0028
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,263;0,527)

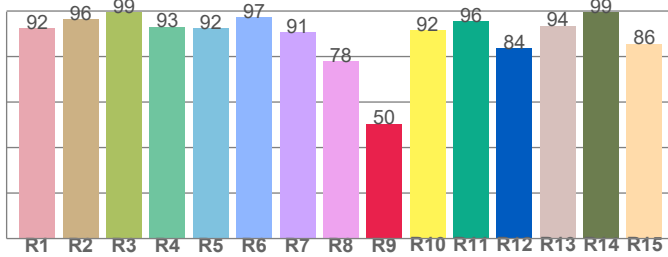
CIE 1931



CIE 1931 – zoomed on Planckian locus



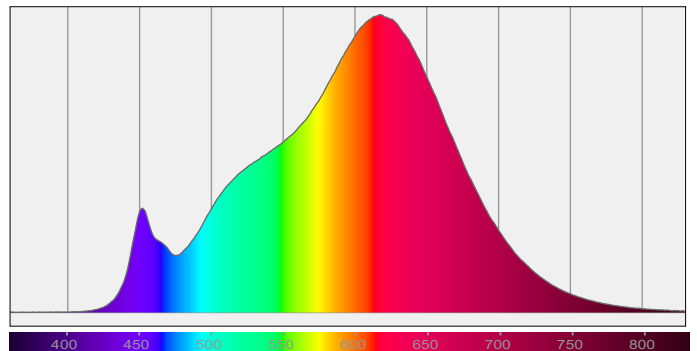
Color Rendering Index per reference color (CIE 1995)



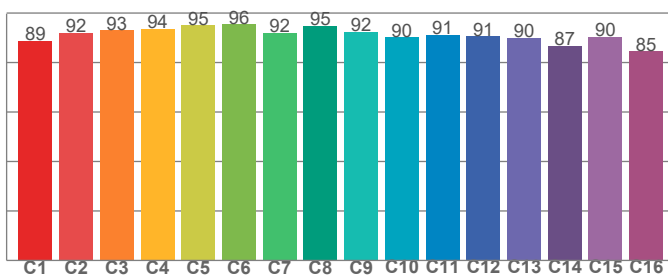
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
92,3	96,4	99,3	93,2	92,4	97,3	90,7	77,9	50,5	91,6	95,6	83,6	93,5	99,4	85,6

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



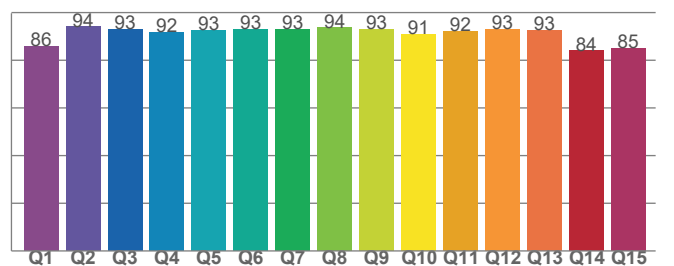
TM30-18 R_f-values per hue bin



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
88,9	92,0	93,2	93,6	95,0	95,5	92,0	94,9	92,4	90,2	91,3	90,7	90,0	86,8	90,4	84,6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
85,8	94,1	93,1	91,8	92,6	93,0	93,1	93,7	92,9	91,0	92,1	93,0	92,6	84,1	85,1

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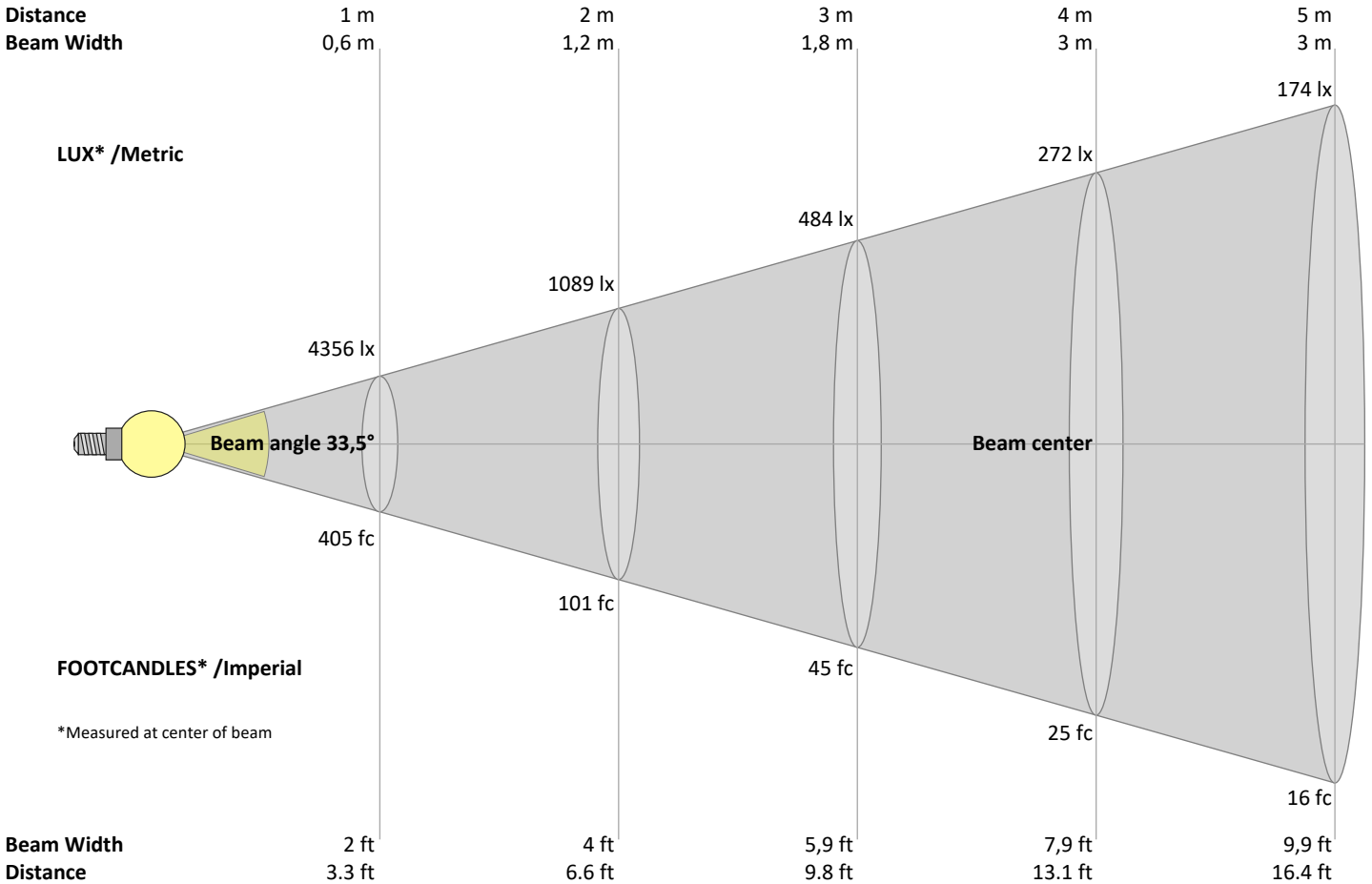
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Beam Details



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
4356	1089	484	272	174	121	89	68	54	44	36	30	26	22	19	17	15	13	12	11	lux
404,7	101,2	45	25,3	16,2	11,2	8,3	6,3	5	4	3,3	2,8	2,4	2,1	1,8	1,6	1,4	1,2	1,1	1	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
4356	4356	4245	3975	3706	3360	3006	2655	2307	1960	1680	1407	1167	1020	874	786	705	607	487	367	cd
100%	100%	97%	91%	85%	77%	69%	61%	53%	45%	39%	32%	27%	23%	20%	18%	16%	14%	11%	8%	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
4356	4356	4245	3975	3706	3360	3006	2655	2307	1960	1680	1407	1167	1020	874	786	705	607	487	367	cd
100%	100%	97%	91%	85%	77%	69%	61%	53%	45%	39%	32%	27%	23%	20%	18%	16%	14%	11%	8%	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
4356	4356	4245	3975	3706	3360	3006	2655	2307	1960	1680	1407	1167	1020	874	786	705	607	487	367	cd
100%	100%	97%	91%	85%	77%	69%	61%	53%	45%	39%	32%	27%	23%	20%	18%	16%	14%	11%	8%	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
4356	4356	4245	3975	3706	3360	3006	2655	2307	1960	1680	1407	1167	1020	874	786	705	607	487	367	cd
100%	100%	97%	91%	85%	77%	69%	61%	53%	45%	39%	32%	27%	23%	20%	18%	16%	14%	11%	8%	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	19,2	19,8	19,3	20,0	20,2	19,2	19,8	19,3	20,0	20,2
	3H	18,9	19,6	19,3	19,8	20,0	18,9	19,6	19,3	19,8	20,0
	4H	18,9	19,5	19,3	19,8	20,0	18,9	19,5	19,3	19,8	20,0
	6H	18,9	19,4	19,2	19,7	20,1	18,9	19,4	19,2	19,7	20,1
	8H	18,8	19,4	19,1	19,7	20,1	18,8	19,4	19,1	19,7	20,1
	12H	18,8	19,3	19,1	19,6	20,1	18,8	19,3	19,1	19,6	20,1
4H	2H	18,9	19,5	19,3	19,8	20,0	18,9	19,5	19,3	19,8	20,0
	3H	18,8	19,3	19,1	19,6	20,1	18,8	19,3	19,1	19,6	20,1
	4H	18,6	19,1	19,0	19,5	20,0	18,6	19,1	19,0	19,5	20,0
	6H	18,5	19,1	19,0	19,4	19,7	18,5	19,1	19,0	19,4	19,7
	8H	18,5	19,0	19,0	19,3	19,7	18,5	19,0	19,0	19,3	19,7
	12H	18,4	18,8	18,9	19,2	19,7	18,4	18,8	18,9	19,2	19,7
8H	4H	18,5	19,0	19,0	19,3	19,7	18,5	19,0	19,0	19,3	19,7
	6H	18,4	18,7	18,9	19,2	19,7	18,4	18,7	18,9	19,2	19,7
	8H	18,4	18,7	18,9	19,2	19,8	18,4	18,7	18,9	19,2	19,8
	12H	18,3	18,6	18,9	19,1	19,7	18,3	18,6	18,9	19,1	19,7
12H	4H	18,4	18,8	18,9	19,2	19,7	18,4	18,8	18,9	19,2	19,7
	6H	18,4	18,7	18,9	19,2	19,8	18,4	18,7	18,9	19,2	19,8
	8H	18,3	18,6	18,9	19,1	19,7	18,3	18,6	18,9	19,1	19,7

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

S = 1.0H	4,9 / -12,3	4,9 / -12,3
S = 1.5H	7,6 / -15,2	7,6 / -15,2
S = 2.0H	9,6 / -17,8	9,6 / -17,8

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	114	111	109	107	112	109	107	105	105	104	102	102	100	99	98	97	96	95
2	109	105	101	98	107	103	100	97	100	97	95	97	95	93	94	92	91	89
3	104	98	94	90	102	97	93	90	95	91	88	92	89	87	90	88	86	84
4	100	93	88	84	98	92	87	84	90	86	83	88	84	82	86	83	81	79
5	95	88	83	79	94	87	82	78	85	81	78	84	80	77	82	79	76	75
6	91	83	78	74	90	83	78	74	81	77	73	80	76	73	79	75	72	71
7	88	79	74	70	86	79	74	70	77	73	70	76	72	69	75	72	69	68
8	84	76	70	66	83	75	70	66	74	69	66	73	69	66	72	68	66	64
9	81	72	67	63	80	72	67	63	71	66	63	70	66	63	69	65	63	61
10	78	69	64	60	77	68	64	60	68	63	60	67	63	60	66	62	60	59

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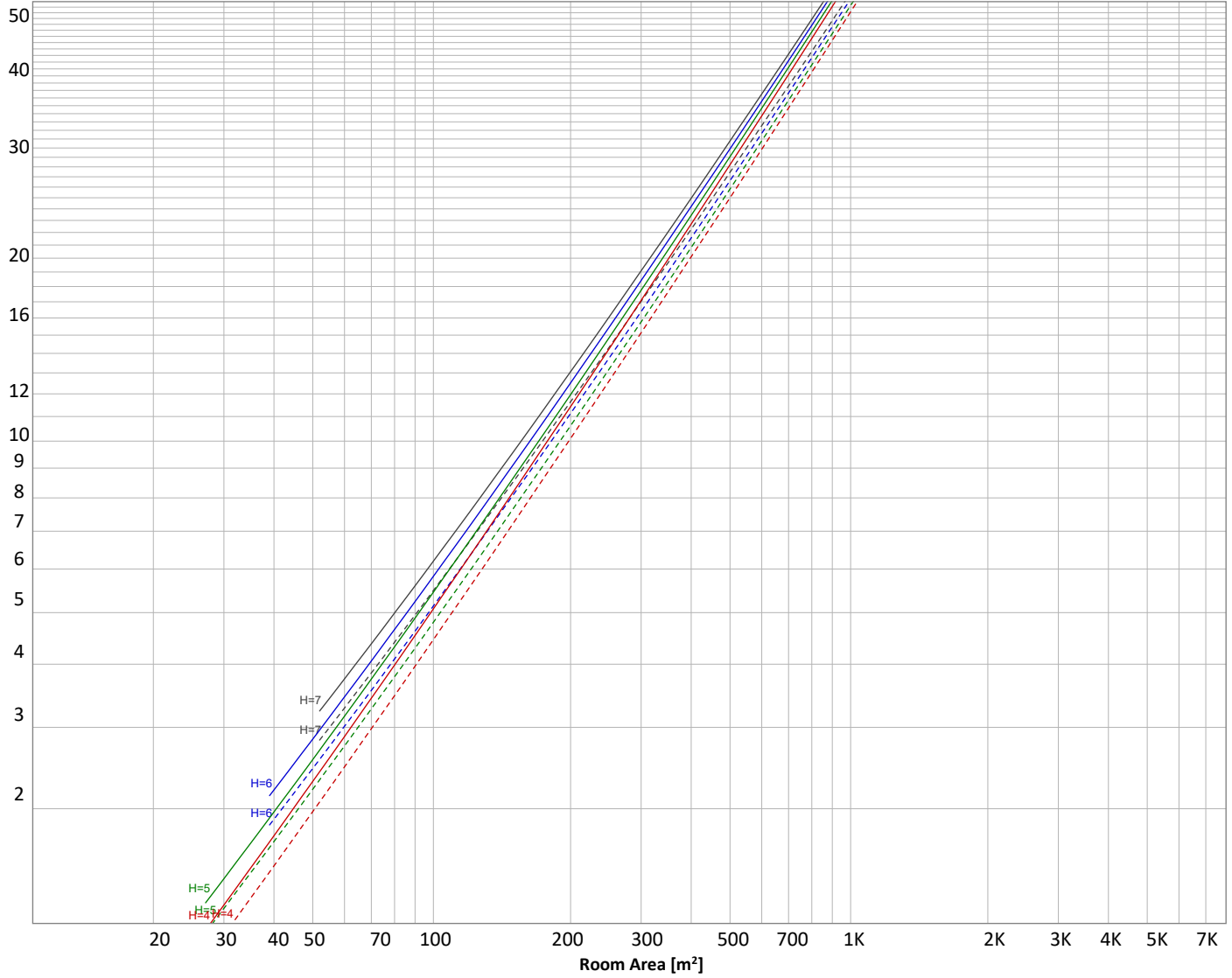
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1982 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°
372 lm	679 lm	507 lm	330 lm	68,0 lm	16,1 lm	5,89 lm	1,85 lm	0,316 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,161 lm	0,140 lm	0,124 lm	0,133 lm	0,150 lm	0,203 lm	0,278 lm	0,245 lm	0,075 lm

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Operator:



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	372 lm	18,8%
10-20°	679 lm	34,2%
20-30°	507 lm	25,6%
30-40°	330 lm	16,7%
40-50°	68 lm	3,4%
50-60°	16 lm	0,8%
60-70°	6 lm	0,3%
70-80°	2 lm	0,1%
80-90°	0 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°	0 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	1982 lm	100,0%

Intensity peaks

Max intensity	4356 cd
Intensity, 90°	0 cd
Intensity, 0°	4356 cd

Zonal Lumen summary

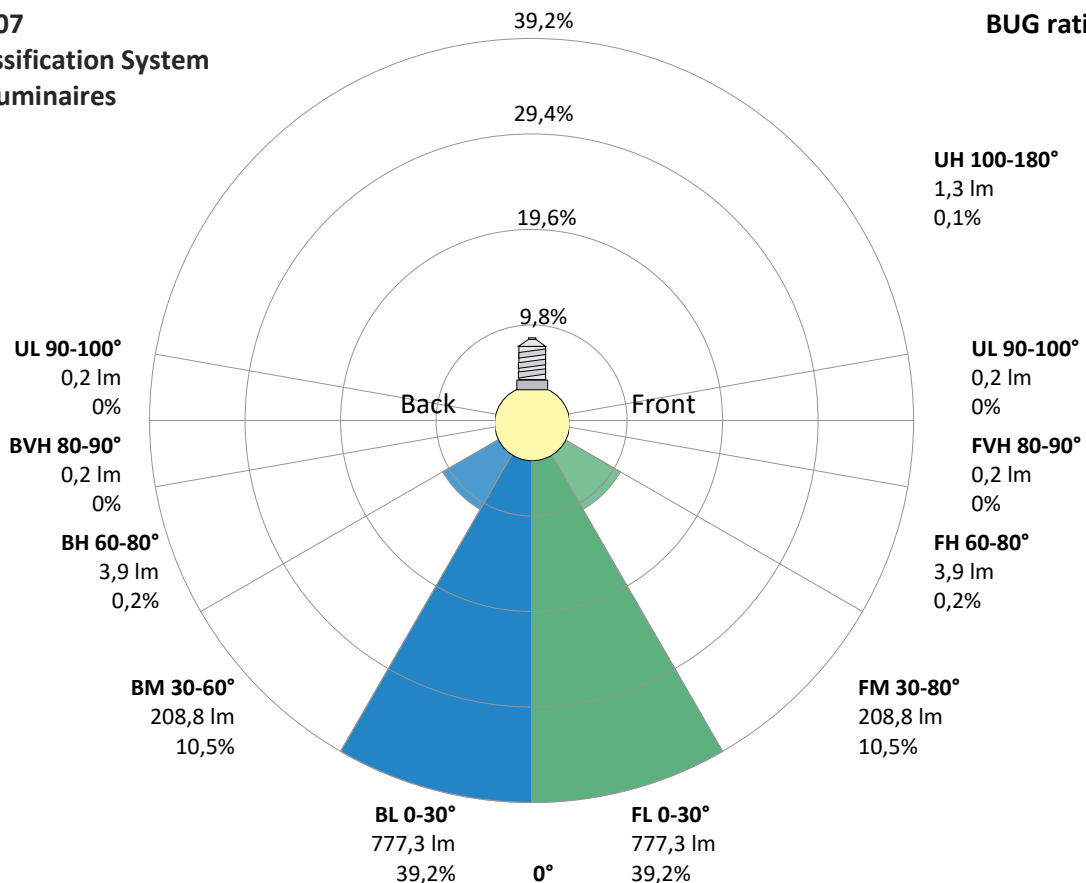
Zone (γ)	Lumen	% Total
0-30°	1558 lm	78,6%
0-40°	1888 lm	95,3%
0-60°	1972 lm	99,5%
60-90°	8 lm	0,4%
70-100°	2 lm	0,1%
90-120°	0 lm	0,0%
0-90°	1980 lm	99,9%
90-180°	2 lm	0,1%
0-180°	1982 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	777 lm	39,2%
Medium(30-60°)	209 lm	10,5%
High(60-80°)	4 lm	0,2%
Very high(80-90°)	0 lm	0,0%
Back light		
Low(0-30°)	777 lm	39,2%
Medium(30-60°)	209 lm	10,5%
High(60-80°)	4 lm	0,2%
Very high(80-90°)	0 lm	0,0%
Uplight		
Low(90-100°)	0 lm	0,0%
High(100-180°)	1 lm	0,1%

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

BUG rating B2 U1 G0



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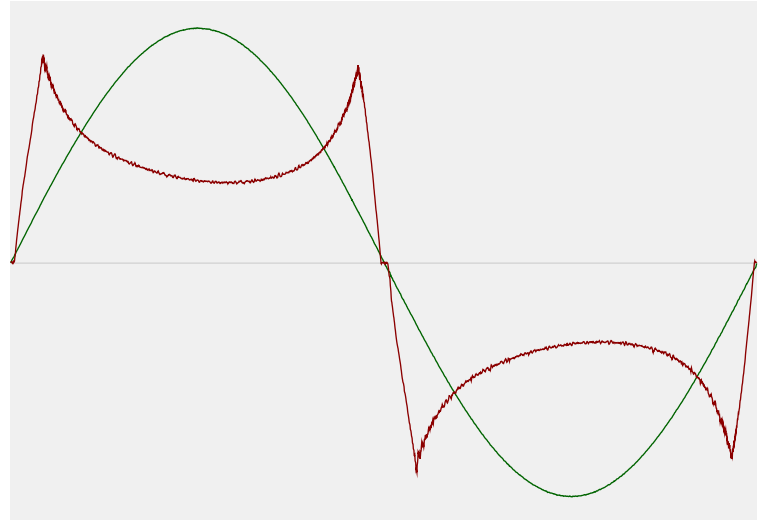


Power Details

Input Power

Power feed to light source	29,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,159 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	36,62 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,81
Total harmonic distortion of the current	74,51%
Total harmonic distortion of the voltage	0,12%

Input Power Curve



Efficiency

Radiated power efficiency	22,6%
Lumen efficiency	67 lm/W

Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	2704 K
CCT shift	-4 K
CCT end	2700 K

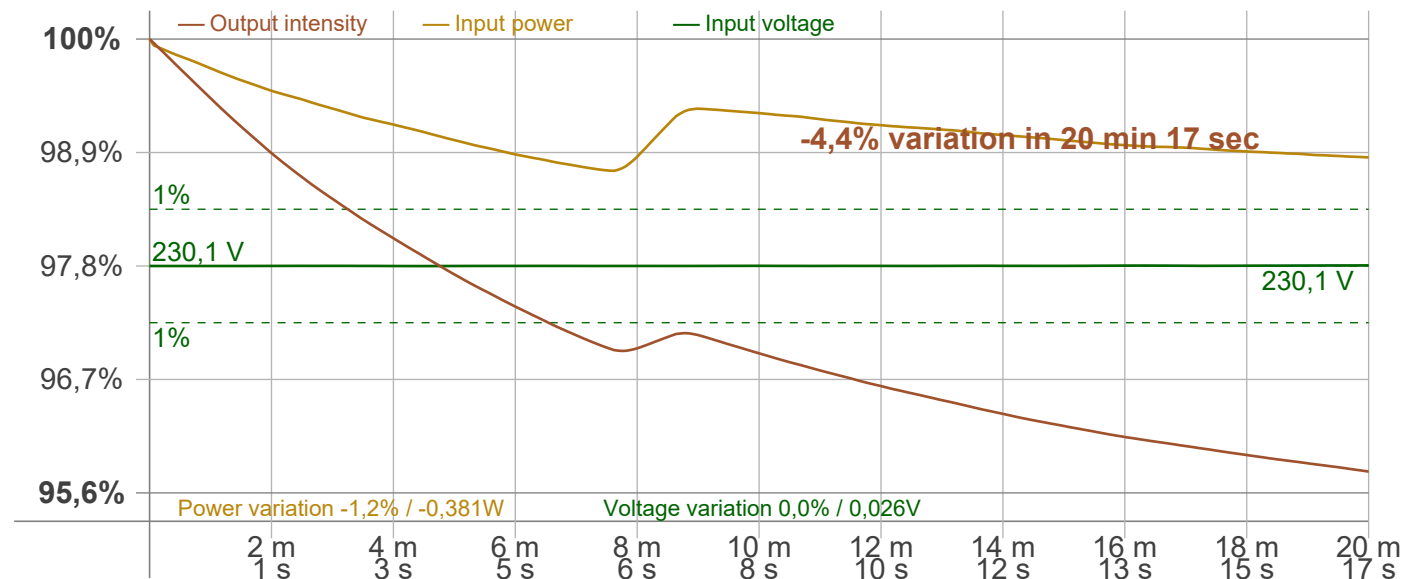
Warmup Result

Total warmup time	Lamp stabilized in 20 min 17 sec
Warmup variation	-4,4%

Output Change

Output start	2071 lm
Output change	-89 lm
Output end	1982 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: 0,96 %
 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: 0,77 %
 JA8/10 400 Hz: 0,94 %
 JA8/10 1000 Hz: 0,94 %

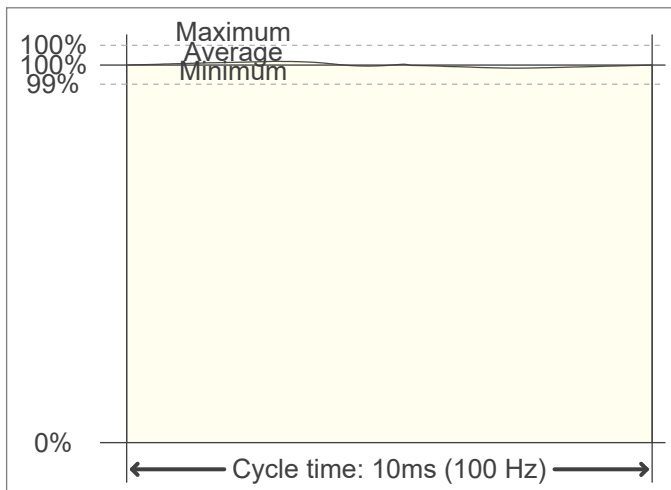
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,02
 SVM value (80 < F < 2000 Hz): 0,03

Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,02

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

