

Light Measurement Report

Print date: 11-9-2025

Measurement date and time: 11-9-2025 13:04:40 – Measurement no. VFR-250911-3097-MS

Measurement tracking No. and Link: [VT250911-004661](#)

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°
8,41 m
63,4 W – PF 0,97 – DPF 0,98
230 V – 0,283 A
50 Hz
Lamp stabilized in 15 min 3 sec – 2,0%

Tested Light Source

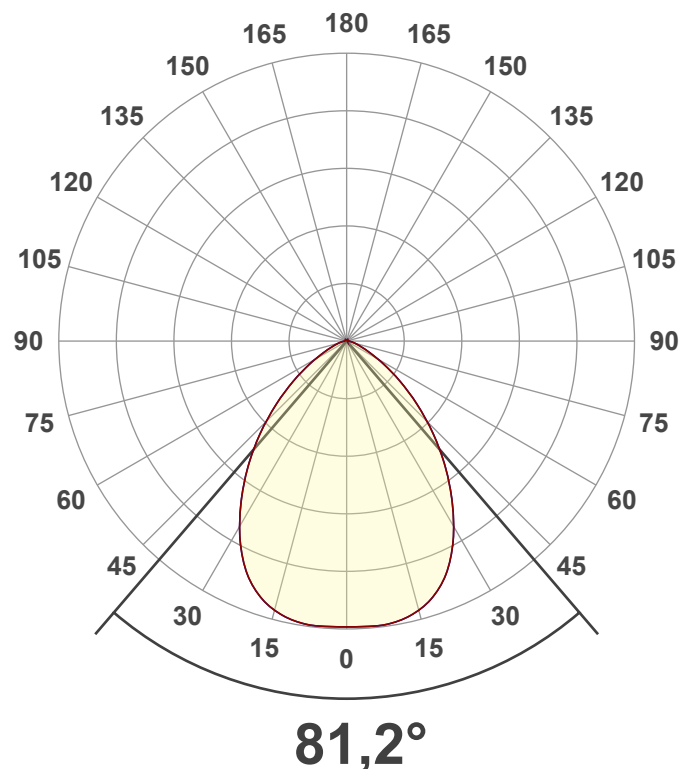
Product Name
Item No. and Manufacturer
Product Description (line 1)

812546-6500K
812546-6500K – Dutchfulfillment
RETROFIT TITAN XL | LED MODULE | 140W WATTAGE SWITCH | 90°

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

10291 lm – 2% / 98%
162 lm/W
5710 cd – 81,2°
CCT = 6500 K / 6416 K
CRI 83,1
R_f 83,2 – R_g 96,4
Duv 0,0086 – SDCM 11,5
SVM 0,01 – PstLM 0,01



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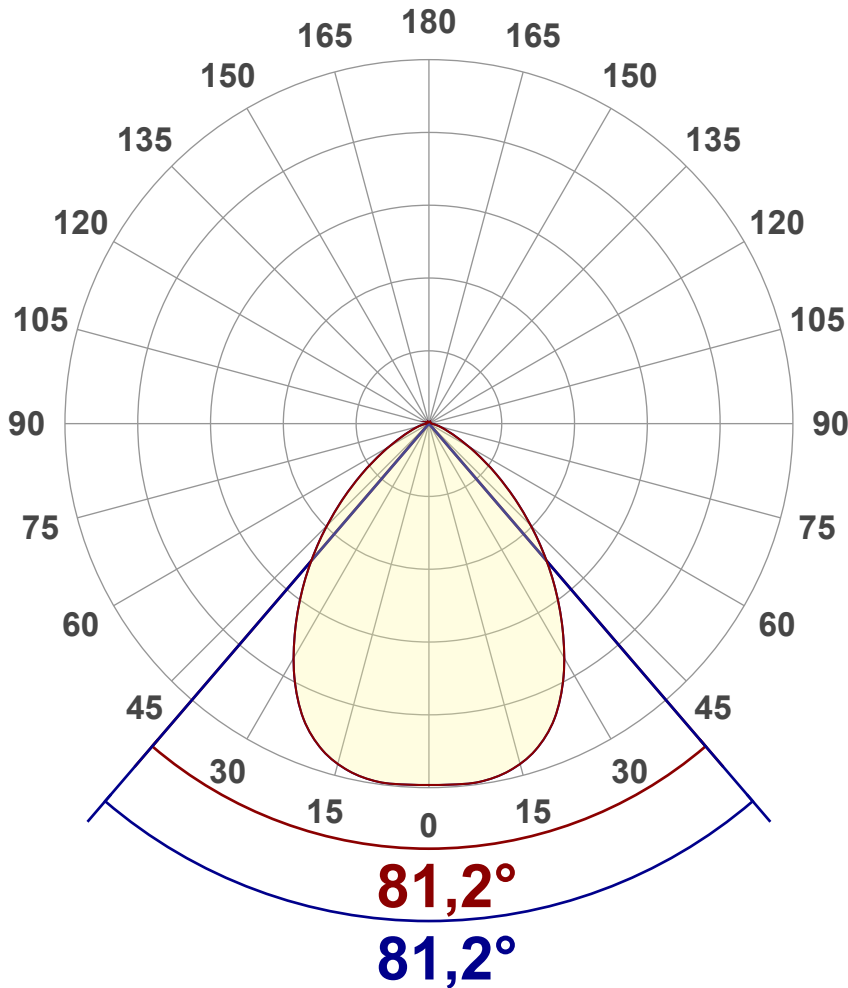
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	10291 lm
Lumen Up% / Down%	2% / 98%
Peak Intensity	5710 cd
Beam Angle (50%)	81,2°
Beam Angle (90%)	81,2°
Beam Angle (10%)	81,2°

Cut-off Angle

Average 2,5%	154,5°
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Field Angle

Average 10%	124,9°
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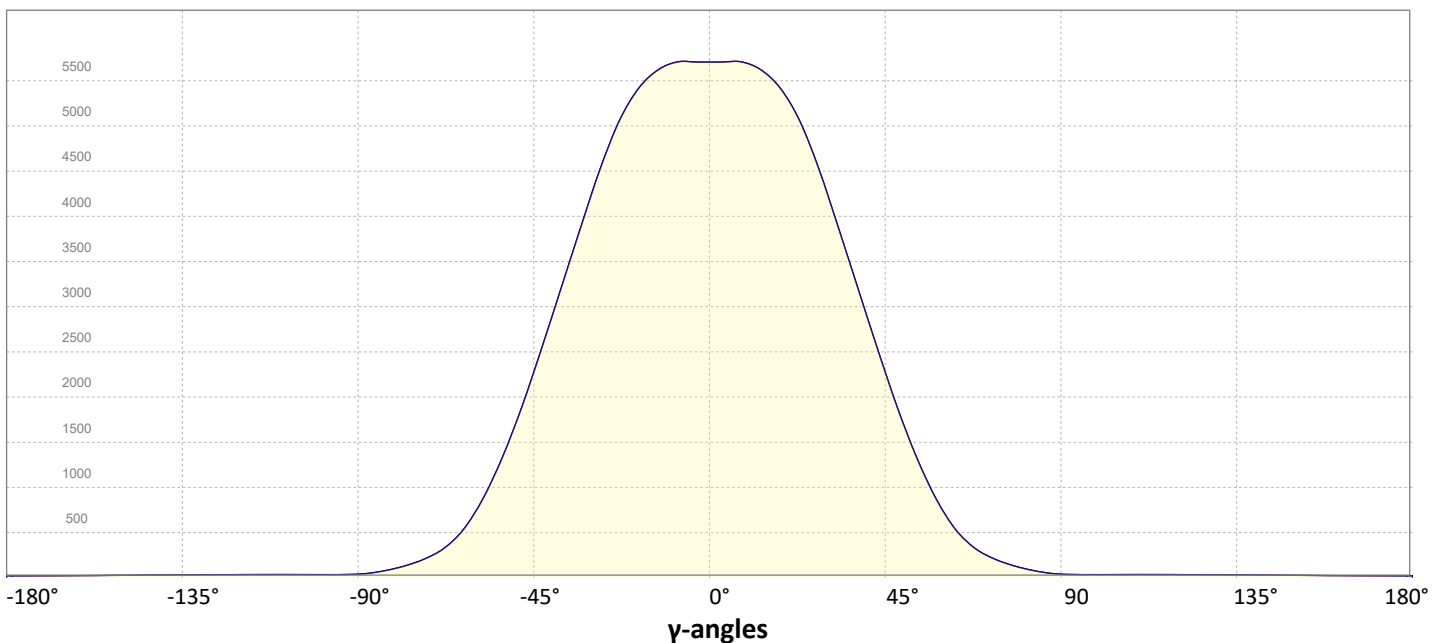
Intensity Ratio

In 120° cone	91,1%
In 90° cone	73,4%

C000-C180

C090-C270

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



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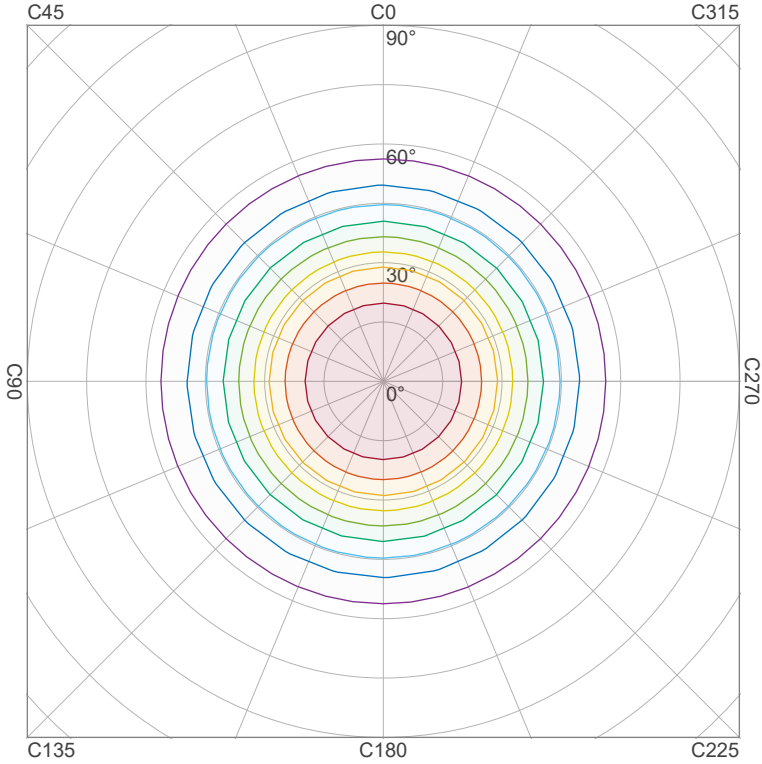
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Iso-intensity Diagram (Iso-candela)

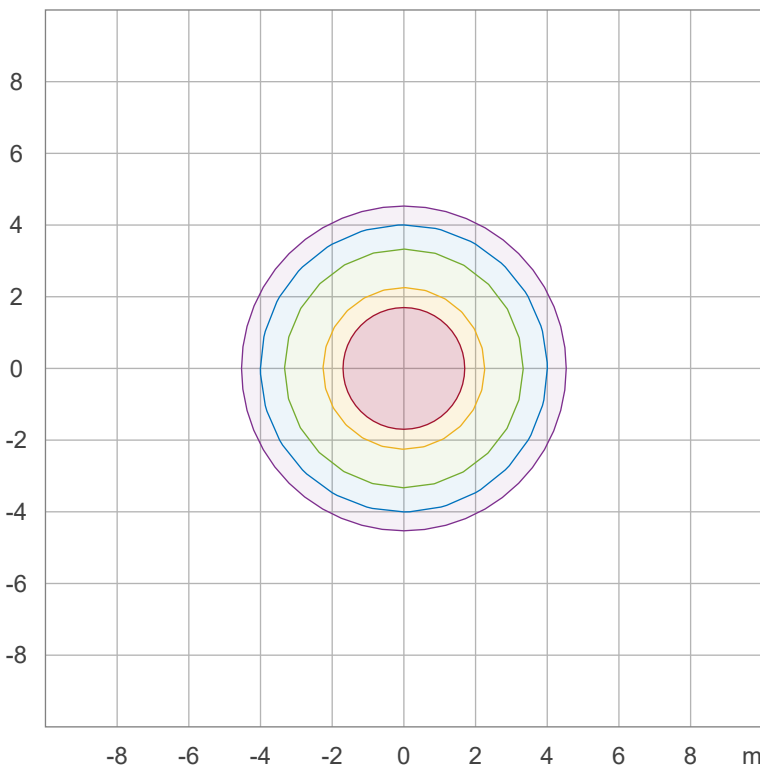


90 %	5138,8 cd
80 %	4567,8 cd
70 %	3996,8 cd
60 %	3425,9 cd
50 %	2854,9 cd
40 %	2283,9 cd
30 %	1712,9 cd
20 %	1142,0 cd
10 %	571,0 cd

Peak intensity: 5709,8 cd

Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	317,0 lx
30,0 %	190,2 lx
10,0 %	63,4 lx
5,0 %	31,7 lx
3,0 %	19,0 lx

Peak illuminance: 634,1 lx

Mounting height: 3,0 m

Number of c-planes: 12

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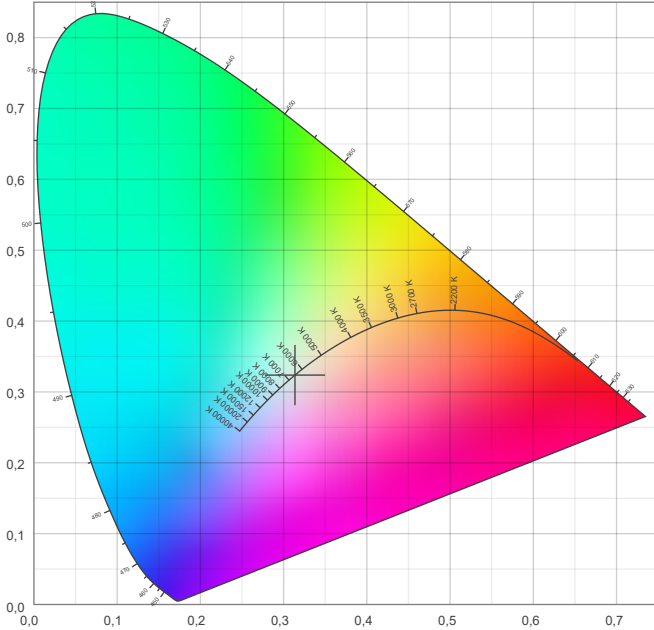


Color details

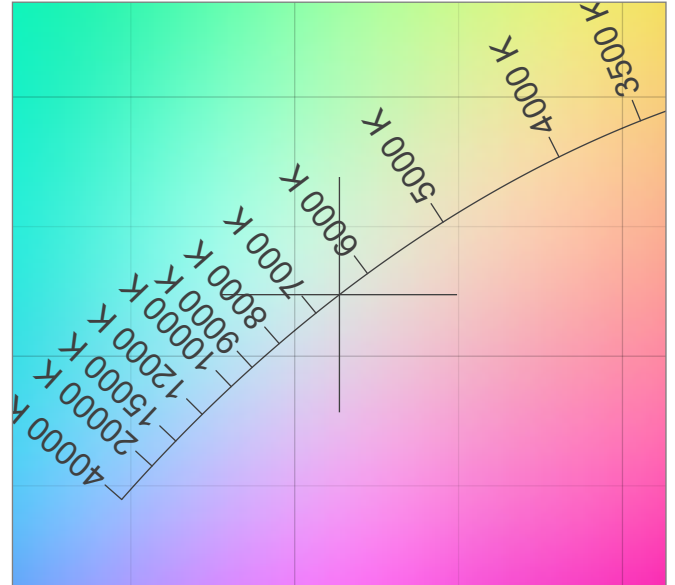
Correlated Color Temperature, Target CCT = 6500 K
 Correlated Color Temperature, Measured CCT = 6416 K
 Color Rendering Index CRI 83,1
 Color Rendering Index, R9 (red component) R9 = 32,8
 Color Rendering TM30-18 R_f 83,2 – R_g 96,4
 Color Quality Scale CQS = 82,9

MacAdam Steps
 Color coordinates CIE 1931 (x;y) = (0,314;0,324)
 Color coordinate CIEs 1960 (u;v) = (0,200;0,310)
 Color deviation from BBL Duv = 0,0086
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,200;0,466)

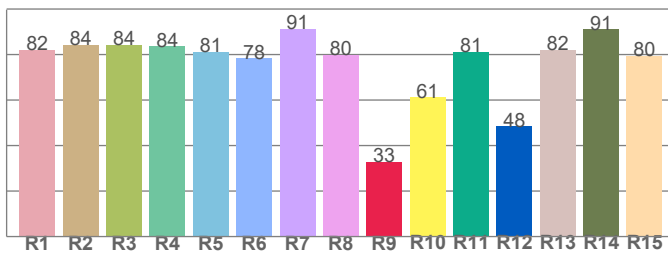
CIE 1931



CIE 1931 – zoomed on Planckian locus



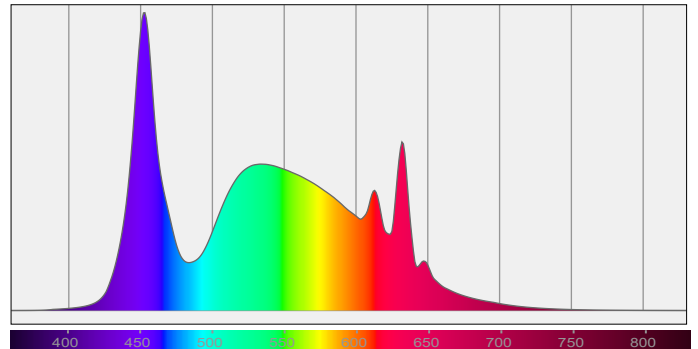
Color Rendering Index per reference color (CIE 1995)



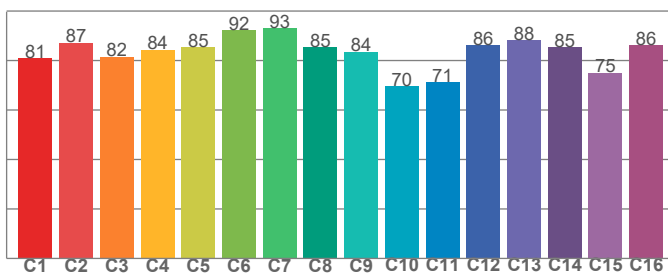
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,1	84,3	84,2	83,8	81,1	78,3	91,3	79,9	32,8	61,3	81,2	48,4	82,2	91,1	79,6

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



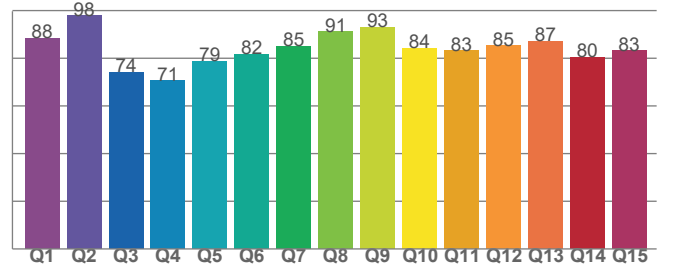
TM30-18 R_f-values per hue bin



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
80,8	87,2	81,6	84,3	85,4	92,3	92,9	85,4	83,5	69,5	71,2	86,1	88,1	85,5	75,0	86,3

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88,5	97,8	74,2	70,6	78,7	81,7	85,0	91,1	93,1	84,2	83,1	85,3	87,1	80,3	83,1

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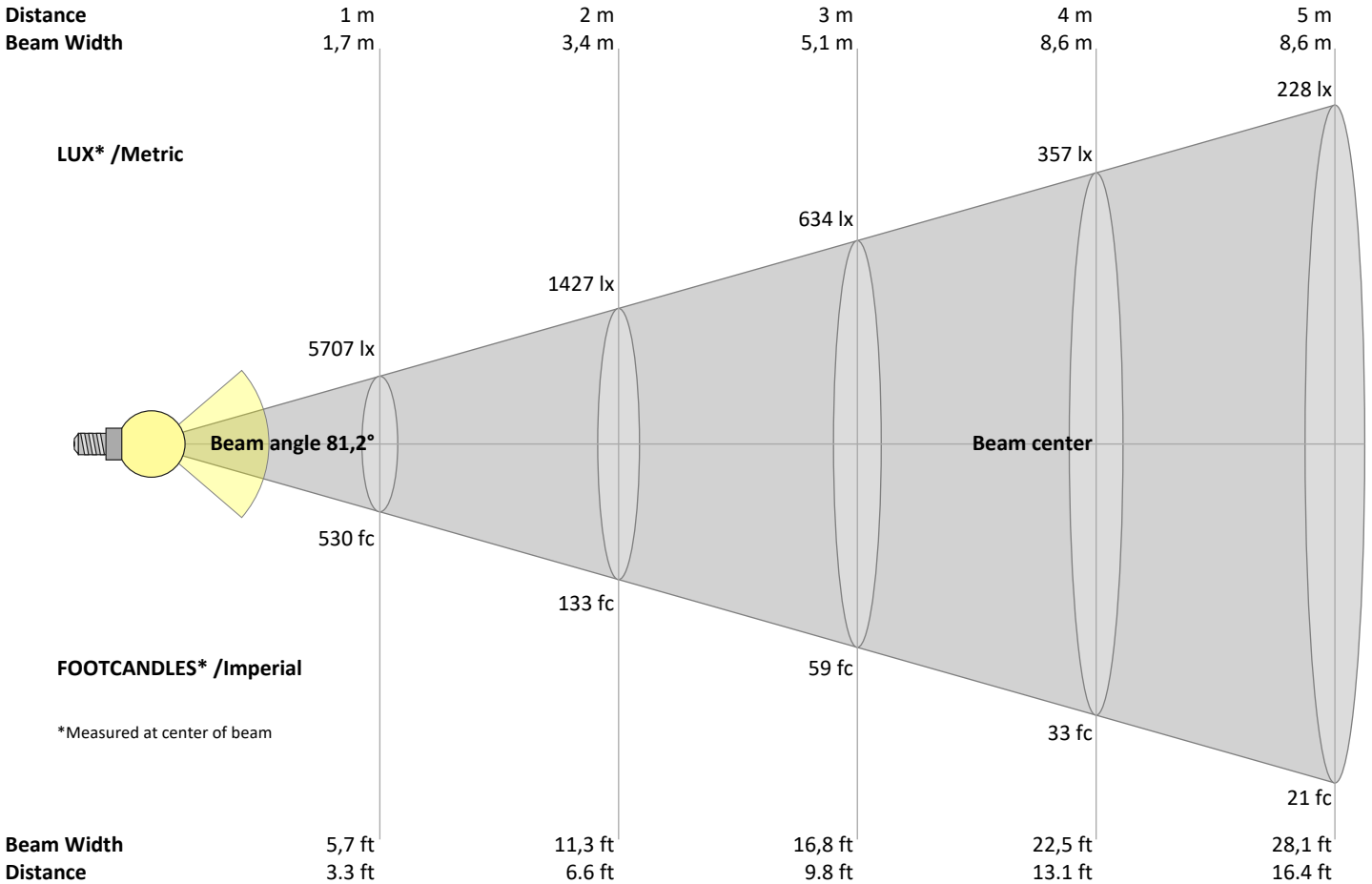
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Beam Details



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
5707	1427	634	357	228	159	116	89	70	57	47	40	34	29	25	22	20	18	16	14	lux
530,2	132,5	58,9	33,1	21,2	14,7	10,8	8,3	6,5	5,3	4,4	3,7	3,1	2,7	2,4	2,1	1,8	1,6	1,5	1,3	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
5707	5708	5676	5545	5281	4849	4265	3607	2937	2281	1673	1152	739	451	278	177	111	66	42	36	cd
100%	100%	99%	97%	93%	85%	75%	63%	51%	40%	29%	20%	13%	8%	5%	3%	2%	1%	1%	1%	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
5707	5708	5676	5545	5281	4849	4265	3607	2937	2281	1673	1152	739	451	278	177	111	66	42	36	cd
100%	100%	99%	97%	93%	85%	75%	63%	51%	40%	29%	20%	13%	8%	5%	3%	2%	1%	1%	1%	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
5707	5708	5676	5545	5281	4849	4265	3607	2937	2281	1673	1152	739	451	278	177	111	66	42	36	cd
100%	100%	99%	97%	93%	85%	75%	63%	51%	40%	29%	20%	13%	8%	5%	3%	2%	1%	1%	1%	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
5707	5708	5676	5545	5281	4849	4265	3607	2937	2281	1673	1152	739	451	278	177	111	66	42	36	cd
100%	100%	99%	97%	93%	85%	75%	63%	51%	40%	29%	20%	13%	8%	5%	3%	2%	1%	1%	1%	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	23,2	24,1	23,4	24,4	24,7	23,4	24,3	23,6	24,6	24,9
	3H	23,3	24,3	23,7	24,6	24,8	23,5	24,5	23,9	24,8	25,0
	4H	23,4	24,4	23,8	24,6	24,9	23,6	24,6	24,0	24,9	25,1
	6H	23,5	24,3	23,8	24,6	25,0	23,7	24,6	24,1	24,9	25,3
	8H	23,5	24,3	23,9	24,6	25,1	23,8	24,6	24,1	24,9	25,3
	12H	23,5	24,3	23,9	24,6	25,1	23,8	24,5	24,2	24,9	25,4
4H	2H	23,2	24,2	23,7	24,5	24,8	23,4	24,3	23,8	24,6	24,9
	3H	23,6	24,4	24,0	24,8	25,2	23,8	24,6	24,2	24,9	25,4
	4H	23,7	24,4	24,1	24,8	25,4	23,9	24,6	24,3	25,0	25,6
	6H	23,8	24,5	24,3	24,8	25,2	24,0	24,7	24,5	25,1	25,5
	8H	23,8	24,4	24,3	24,8	25,2	24,1	24,7	24,6	25,1	25,5
	12H	23,8	24,3	24,3	24,8	25,3	24,1	24,6	24,6	25,1	25,6
8H	4H	23,7	24,3	24,2	24,7	25,1	23,9	24,5	24,4	24,9	25,3
	6H	23,8	24,3	24,4	24,8	25,4	24,1	24,5	24,6	25,0	25,6
	8H	23,9	24,3	24,5	24,9	25,5	24,2	24,6	24,7	25,1	25,8
	12H	24,0	24,3	24,6	24,9	25,5	24,3	24,6	24,9	25,2	25,8
12H	4H	23,6	24,1	24,2	24,6	25,1	23,8	24,3	24,4	24,8	25,3
	6H	23,9	24,2	24,4	24,8	25,5	24,1	24,5	24,6	25,0	25,7
	8H	23,9	24,3	24,6	24,8	25,4	24,2	24,5	24,8	25,1	25,7

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

S = 1.0H	0,4 / -0,8	0,4 / -0,7
S = 1.5H	1,4 / -2,0	1,4 / -1,8
S = 2.0H	2,7 / -3,1	2,6 / -2,9

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	110	110	105	105	105	100	100	100	98	
1	111	107	104	101	108	105	102	99	100	98	96	96	94	92	92	91	89	87
2	103	97	91	87	100	95	90	85	91	87	83	87	84	81	84	82	79	77
3	96	87	81	75	93	86	79	75	82	77	73	80	75	72	77	73	70	68
4	89	79	72	66	87	78	71	66	75	69	65	73	68	64	70	66	63	61
5	83	72	65	59	81	71	64	59	69	63	58	67	61	57	65	60	56	54
6	77	66	58	53	75	65	58	53	63	57	52	61	56	51	60	55	51	49
7	72	61	53	48	71	60	53	47	58	52	47	57	51	47	55	50	46	44
8	68	56	48	43	66	55	48	43	54	47	43	52	47	42	51	46	42	40
9	64	52	45	40	62	51	44	39	50	44	39	49	43	39	48	43	39	37
10	60	48	41	36	59	48	41	36	47	40	36	46	40	36	45	39	36	34

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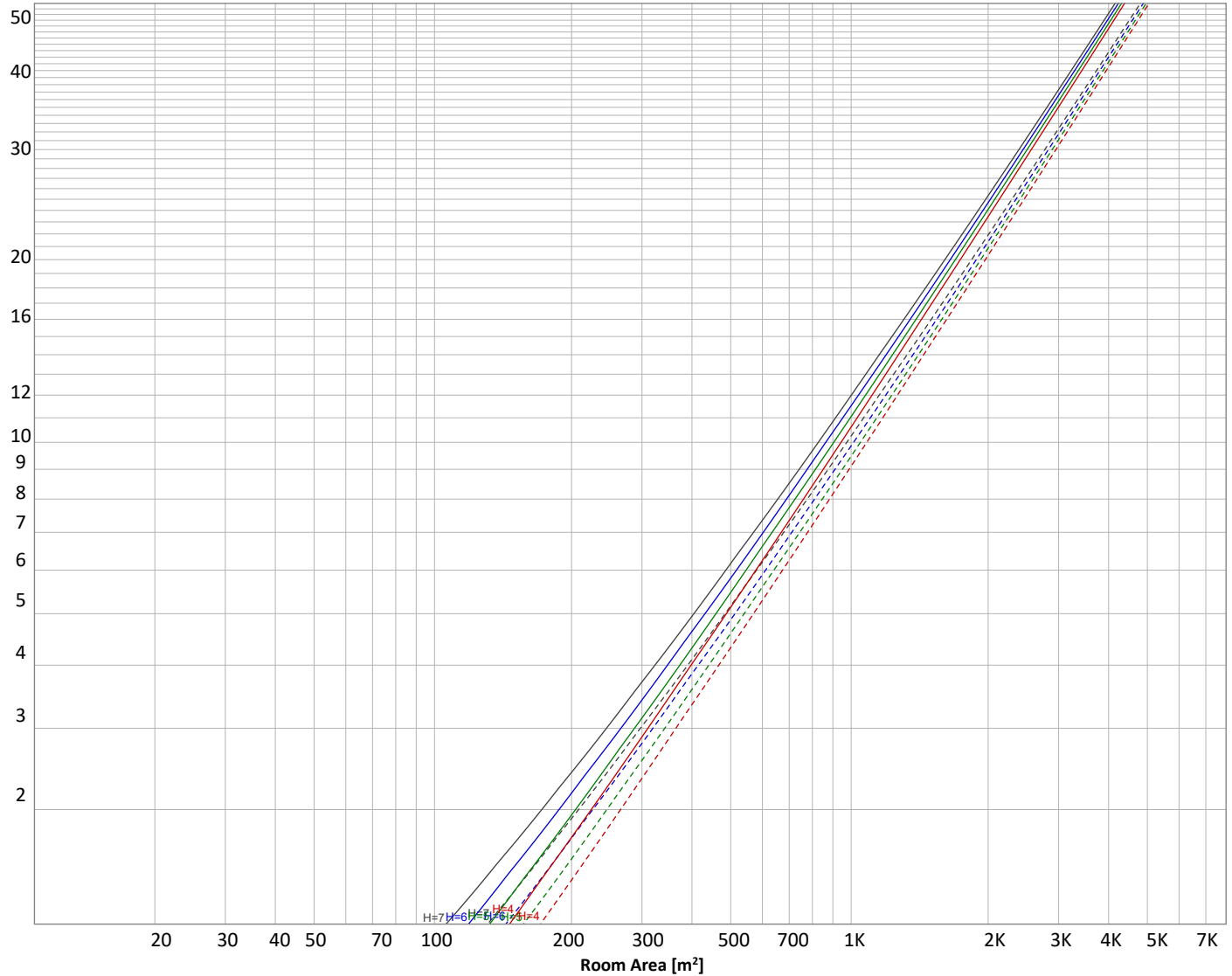
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 10291 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°
545 lm	1565 lm	2227 lm	2250 lm	1754 lm	1031 lm	452 lm	189 lm	73,0 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
39,5 lm	37,4 lm	35,3 lm	30,3 lm	24,5 lm	18,1 lm	11,8 lm	6,41 lm	2,02 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	545 lm	5,3%
10-20°	1565 lm	15,2%
20-30°	2227 lm	21,6%
30-40°	2250 lm	21,9%
40-50°	1754 lm	17,0%
50-60°	1031 lm	10,0%
60-70°	452 lm	4,4%
70-80°	189 lm	1,8%
80-90°	73 lm	0,7%
90-100°	39 lm	0,4%
100-110°	37 lm	0,4%
110-120°	35 lm	0,3%
120-130°	30 lm	0,3%
130-140°	24 lm	0,2%
140-150°	18 lm	0,2%
150-160°	12 lm	0,1%
160-170°	6 lm	0,1%
170-180°	2 lm	0,0%
Total	10291 lm	100,0%

Intensity peaks

Max intensity	5710 cd
Intensity, 90°	42 cd
Intensity, 0°	5707 cd

Zonal Lumen summary

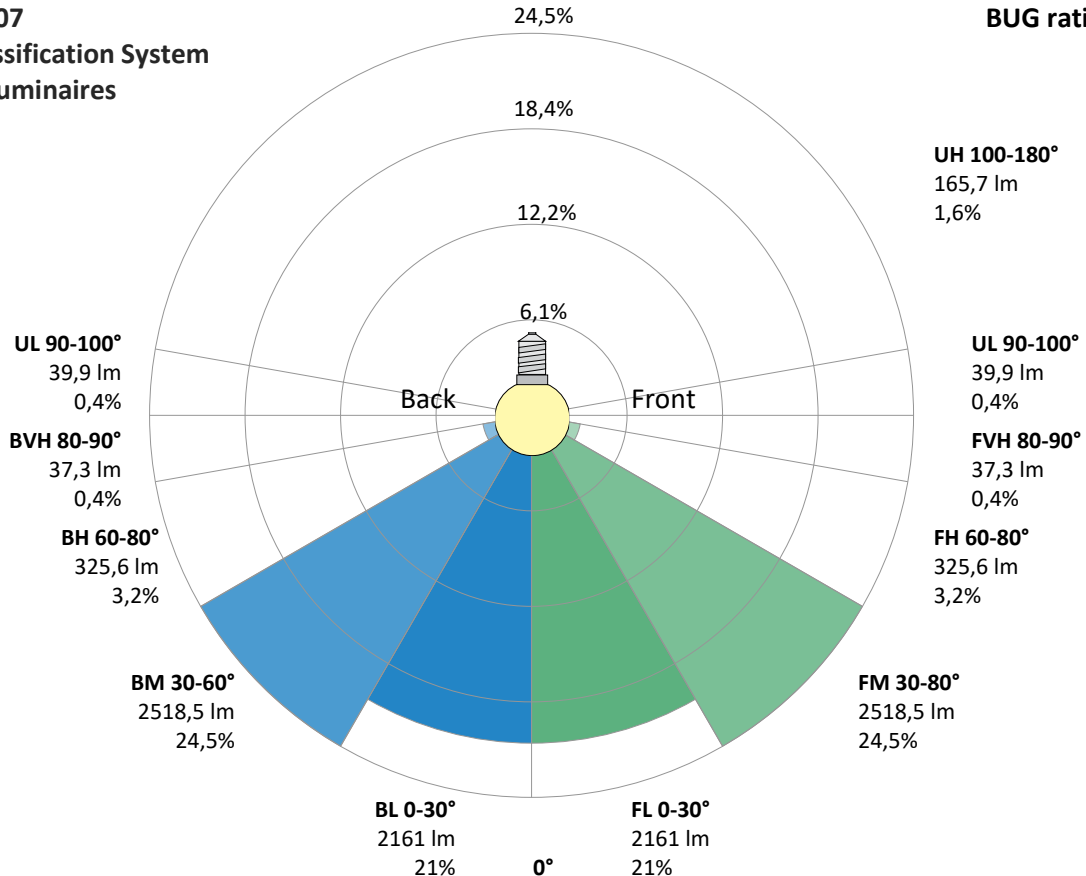
Zone (γ)	Lumen	% Total
0-30°	4337 lm	42,1%
0-40°	6586 lm	64,0%
0-60°	9371 lm	91,1%
60-90°	714 lm	6,9%
70-100°	301 lm	2,9%
90-120°	112 lm	1,1%
0-90°	10085 lm	98,0%
90-180°	205 lm	2,0%
0-180°	10291 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	2161 lm	21,0%
Medium(30-60°)	2518 lm	24,5%
High(60-80°)	326 lm	3,2%
Very high(80-90°)	37 lm	0,4%
Back light		
Low(0-30°)	2161 lm	21,0%
Medium(30-60°)	2518 lm	24,5%
High(60-80°)	326 lm	3,2%
Very high(80-90°)	37 lm	0,4%
Uplight		
Low(90-100°)	40 lm	0,4%
High(100-180°)	166 lm	1,6%

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

BUG rating B3 U3 G1



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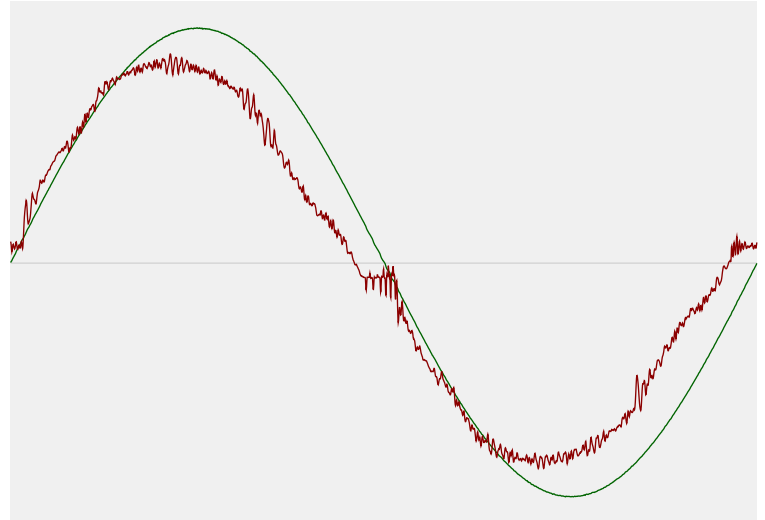


Power Details

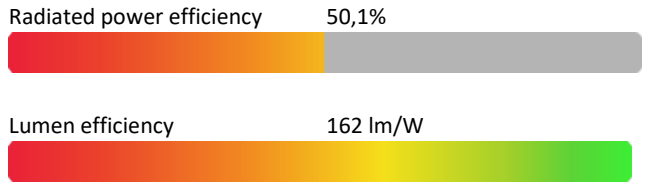
Input Power

Power feed to light source	63,4 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,283 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	65,05 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	7,7%
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	6498 K
CCT shift	+2 K
CCT end	6500 K

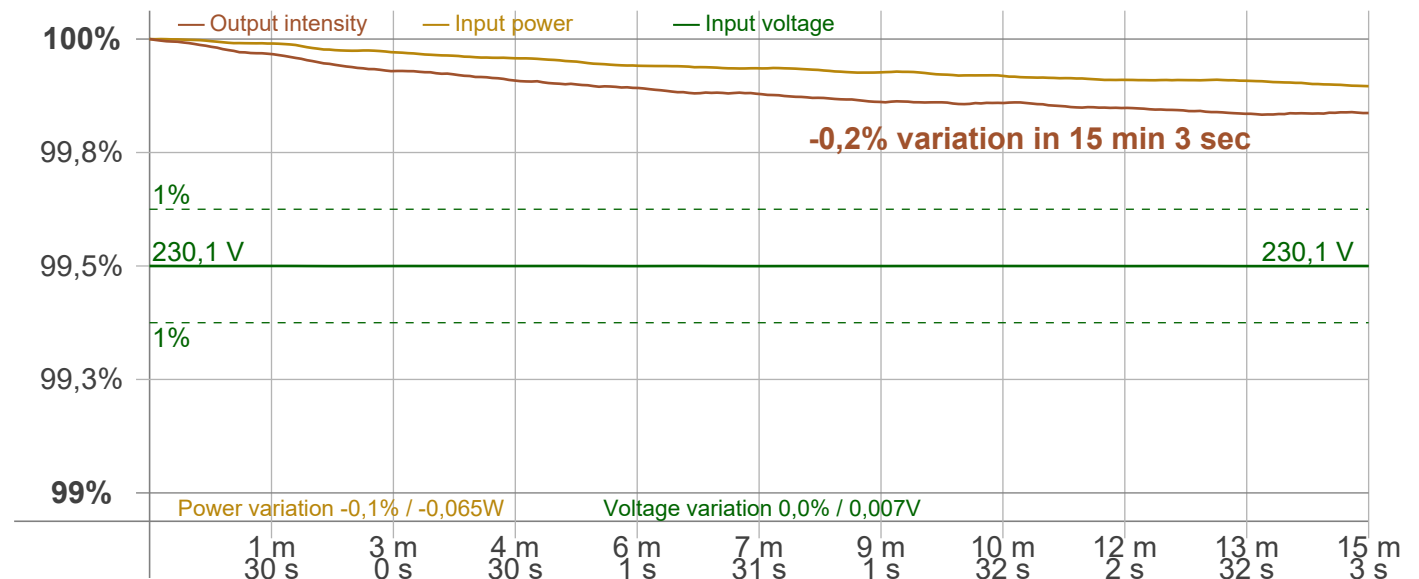
Warmup Result

Total warmup time	Lamp stabilized in 15 min 3 sec
Warmup variation	-0,2%

Output Change

Output start	10309 lm
Output change	-18 lm
Output end	10291 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 99,5 Hz
 Percent Flicker 0,18 %
 Flicker index 0

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

JA8/10 40 Hz 0,01 %
 JA8/10 90 Hz 0,02 %
 JA8/10 200 Hz 0,16 %
 JA8/10 400 Hz 0,16 %
 JA8/10 1000 Hz 0,16 %

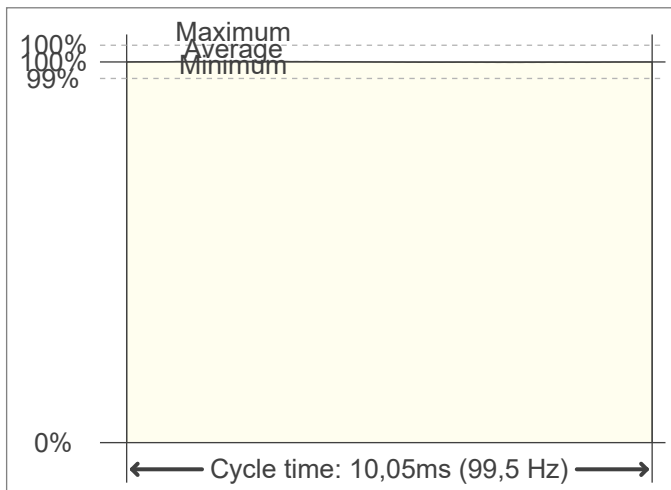
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,01
 SVM value (80 < F < 2000 Hz) 0,01

Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

