

Light Measurement Report

Print date: 30-10-2025

Measurement date and time: 30-10-2025 08:48:00 – Measurement no. VFR-251030-3822-MS

Measurement tracking No. and Link: [VT251030-006612](#)

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°
12,09 m
45,1 W – PF 0,96 – DPF 0,96
230 V – 0,204 A
50 Hz
Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

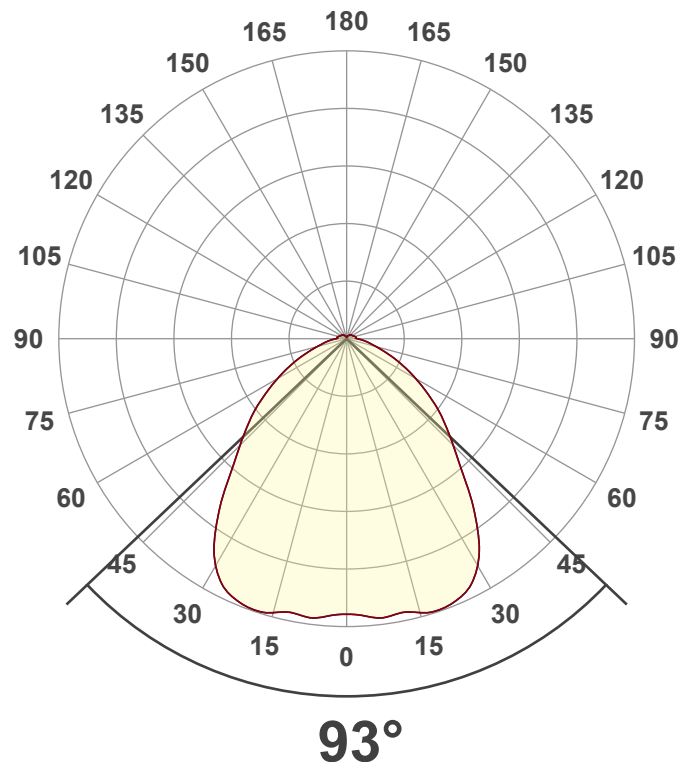
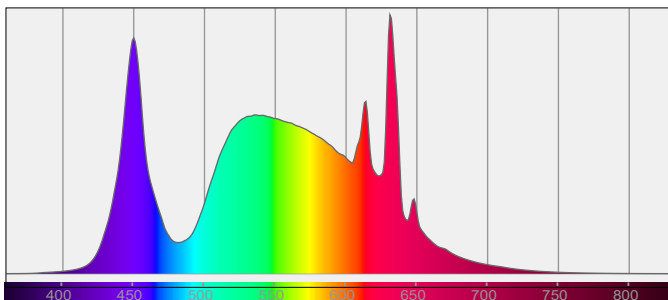
Product Name
Item No. and Manufacturer
Product Description (line 1)
35W/40W/45W/55W | ZWART | CCT SWITCH

812973-5000K-45W
812973-5000K-45W – Dutchfulfillment
3-FASE RAILARMATUUR | TARVOS | KANTELBAAR | 150CM |

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

6582 lm – 5,51% / 94,49%
146 lm/W
2557 cd – 93°
CCT = 5000 K / 4866 K
CRI 81,1
 R_f 82,3 – R_g 99,2
Duv 0,0094 – SDCM 9,7
SVM 0 – PstLM 0,02



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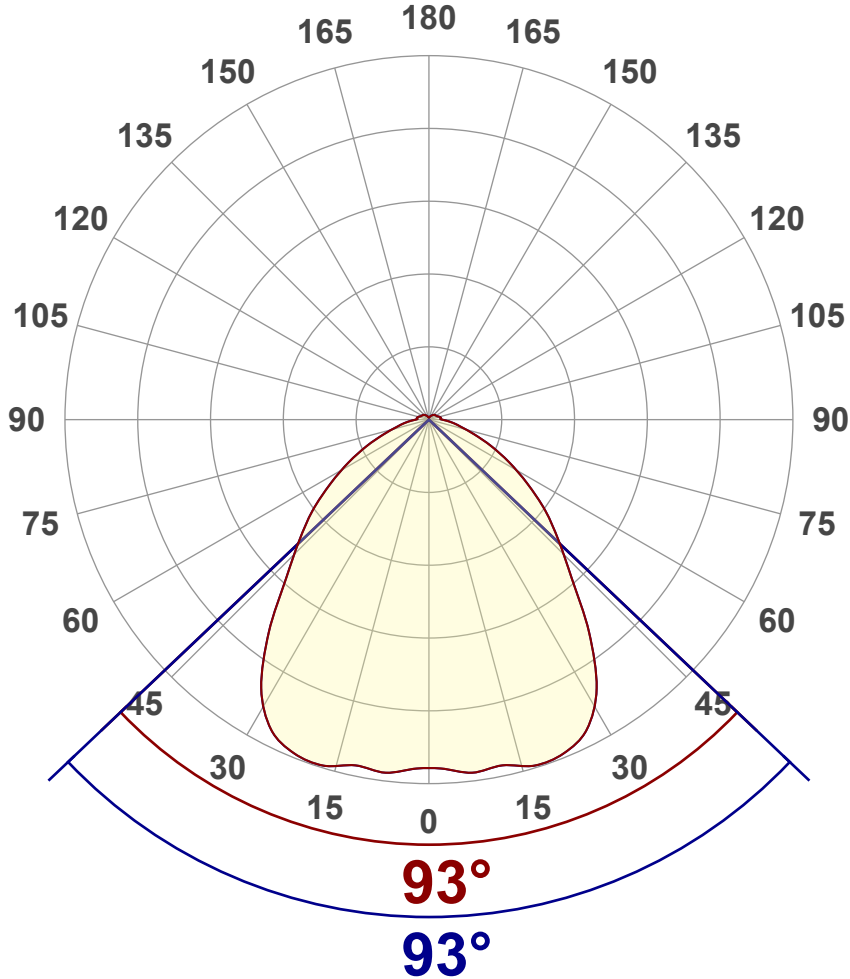
Measurement tracking No. and Link: [VT251030-006612](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	6582 lm
Lumen Up% / Down%	5,51% / 94,49%
Peak Intensity	2557 cd
Beam Angle (50%)	93°
Beam Angle (90%)	93°
Beam Angle (10%)	93°

Cut-off Angle

Average 2,5%	223,5°
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Field Angle

Average 10%	152°
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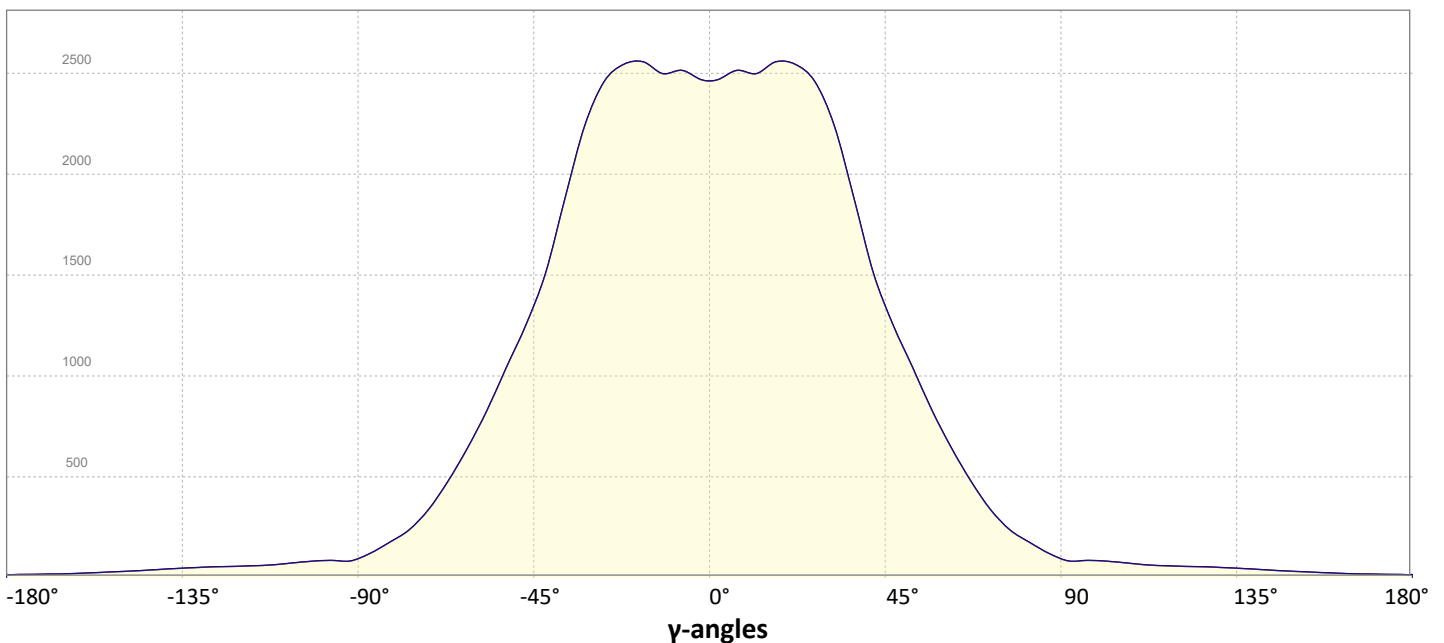
Intensity Ratio

In 120° cone	79,5%
In 90° cone	59,5%

C000-C180

C090-C270

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



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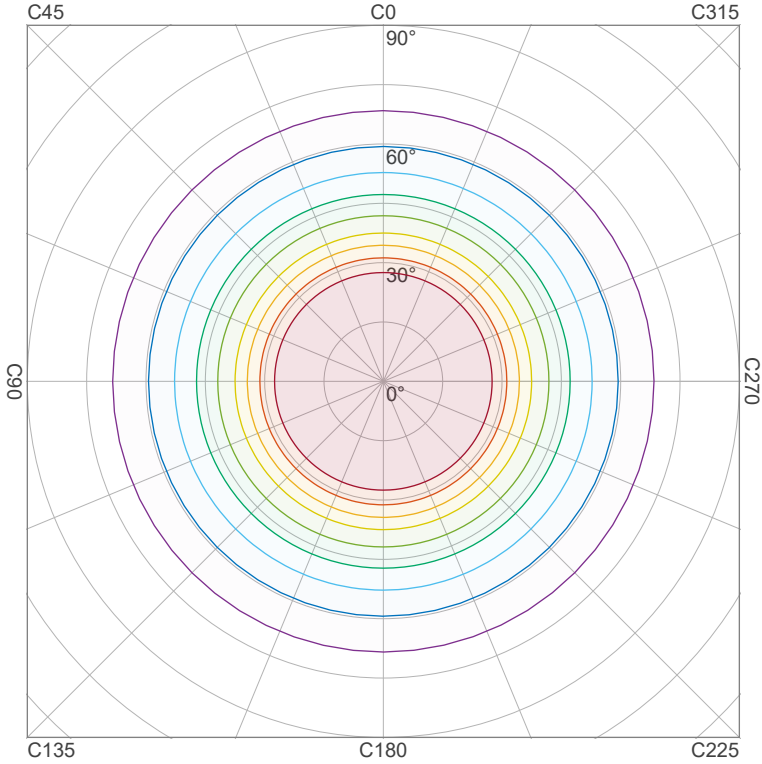
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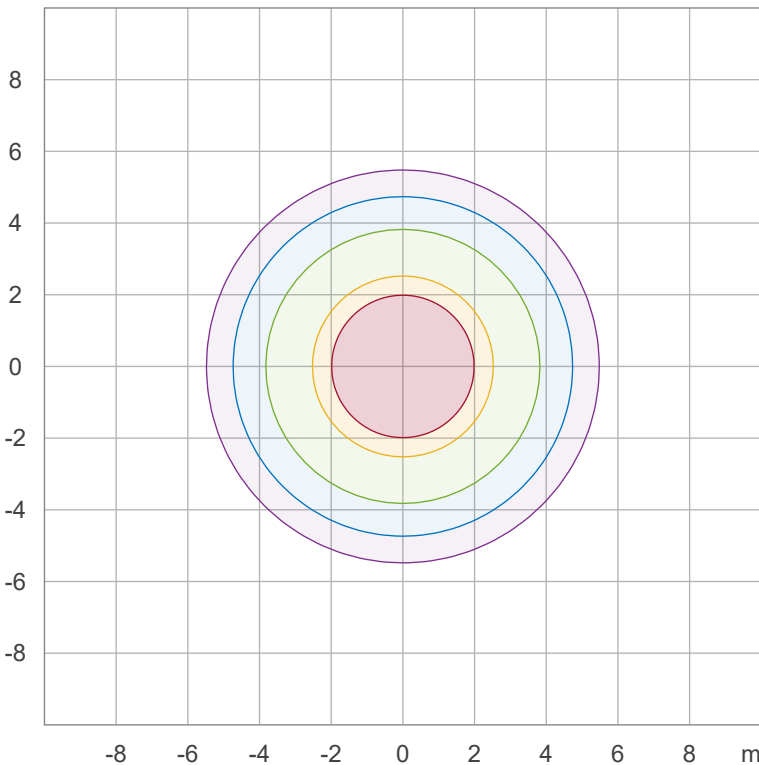
Iso-intensity Diagram (Iso-candela)



90 %	2301,1 cd
80 %	2045,4 cd
70 %	1789,8 cd
60 %	1534,1 cd
50 %	1278,4 cd
40 %	1022,7 cd
30 %	767,0 cd
20 %	511,4 cd
10 %	255,7 cd

Peak intensity: 2556,8 cd
Number of c-planes: 28

Iso-illuminance Diagram (Iso-lux)



50,0 %	137,1 lx
30,0 %	82,3 lx
10,0 %	27,4 lx
5,0 %	13,7 lx
3,0 %	8,2 lx

Peak illuminance: 274,2 lx
Mounting height: 3,0 m
Number of c-planes: 28

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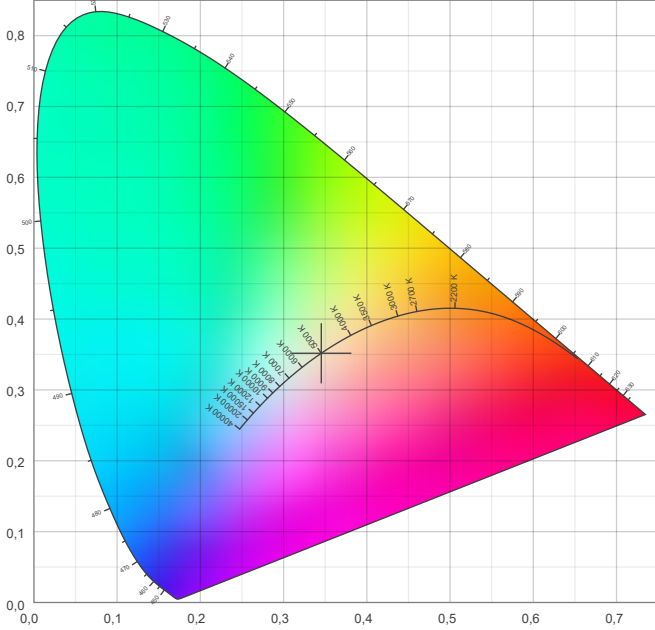


Color details

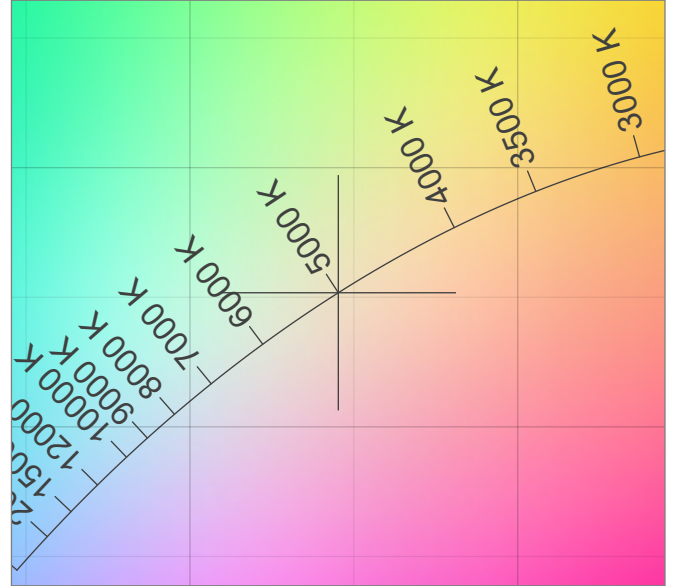
Correlated Color Temperature, Target CCT = 5000 K
 Correlated Color Temperature, Measured CCT = 4866 K
 Color Rendering Index CRI 81,1
 Color Rendering Index, R9 (red component) R9 = 32,3
 Color Rendering TM30-18 R_f 82,3 – R_g 99,2
 Color Quality Scale CQS = 83,6

MacAdam Steps SDCM = 9,7
 Color coordinates CIE 1931 (x;y) = (0,345;0,352)
 Color coordinate CIEs 1960 (u;v) = (0,211;0,323)
 Color deviation from BBL Duv = 0,0094
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,211;0,485)

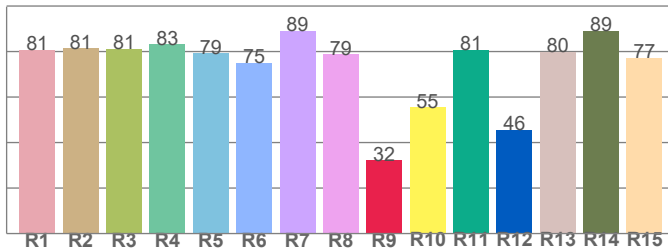
CIE 1931



CIE 1931 – zoomed on Planckian locus



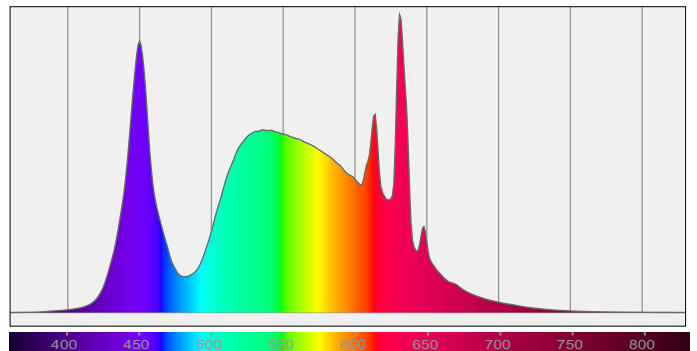
Color Rendering Index per reference color (CIE 1995)



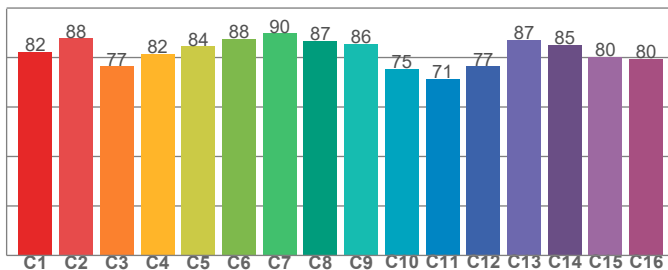
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,9	81,5	81,3	83,3	79,2	75,0	89,2	78,9	32,3	55,4	80,8	45,7	79,8	89,1	77,3

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



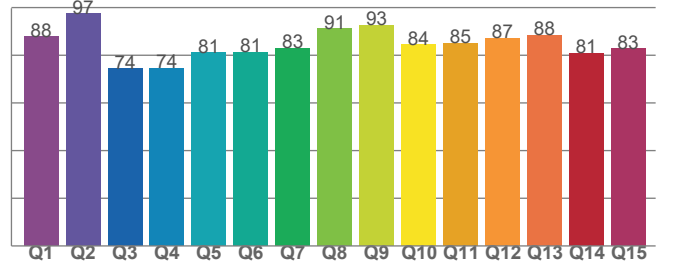
TM30-18 R_f-values per hue bin



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
82,4	87,8	76,5	81,5	84,5	87,7	89,9	86,8	85,6	75,5	71,5	76,6	87,2	85,1	80,3	79,5

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	97,5	74,4	74,5	81,1	81,2	83,0	91,1	92,7	84,5	85,1	87,3	88,5	80,9	82,8

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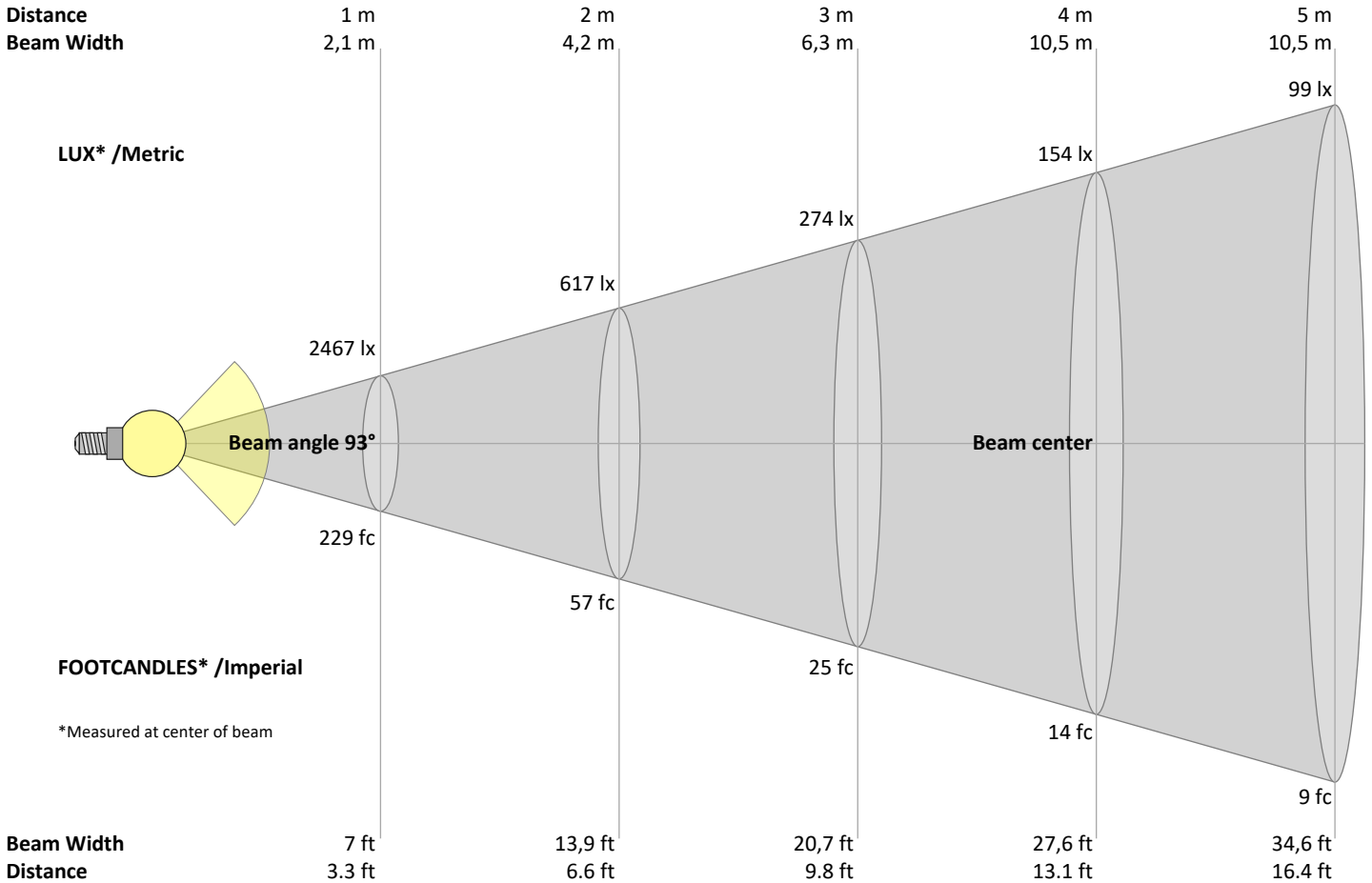
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Operator:



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
2467	617	274	154	99	69	50	39	30	25	20	17	15	13	11	10	9	8	7	6	lux
229,2	57,3	25,5	14,3	9,2	6,4	4,7	3,6	2,8	2,3	1,9	1,6	1,4	1,2	1	0,9	0,8	0,7	0,6	0,6	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
2467	2496	2505	2533	2549	2492	2326	2023	1657	1355	1127	914	716	543	393	276	199	142	98	85	cd
100%	101%	102%	103%	103%	101%	94%	82%	67%	55%	46%	37%	29%	22%	16%	11%	8%	6%	4%	3%	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
2467	2496	2505	2533	2549	2492	2326	2023	1657	1355	1127	914	716	543	393	276	199	142	98	85	cd
100%	101%	102%	103%	103%	101%	94%	82%	67%	55%	46%	37%	29%	22%	16%	11%	8%	6%	4%	3%	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
2467	2496	2505	2533	2549	2492	2326	2023	1657	1355	1127	914	716	543	393	276	199	142	98	85	cd
100%	101%	102%	103%	103%	101%	94%	82%	67%	55%	46%	37%	29%	22%	16%	11%	8%	6%	4%	3%	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
2467	2496	2505	2533	2549	2492	2326	2023	1657	1355	1127	914	716	543	393	276	199	142	98	85	cd
100%	101%	102%	103%	103%	101%	94%	82%	67%	55%	46%	37%	29%	22%	16%	11%	8%	6%	4%	3%	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	22,4	23,5	22,7	23,9	24,2	22,7	23,8	23,0	24,2	24,5
	3H	23,3	24,4	23,8	24,7	25,1	23,7	24,8	24,2	25,1	25,5
	4H	23,7	24,7	24,1	25,1	25,4	24,1	25,2	24,6	25,5	25,9
	6H	24,1	25,0	24,4	25,3	25,8	24,6	25,5	25,0	25,9	26,4
	8H	24,2	25,1	24,6	25,5	26,0	24,8	25,7	25,3	26,1	26,6
	12H	24,3	25,2	24,8	25,6	26,1	25,1	26,0	25,5	26,4	26,9
4H	2H	22,8	23,8	23,3	24,2	24,6	23,0	24,1	23,5	24,4	24,8
	3H	24,0	24,9	24,4	25,3	25,8	24,3	25,2	24,8	25,6	26,1
	4H	24,4	25,3	24,9	25,7	26,3	24,8	25,7	25,3	26,1	26,7
	6H	24,8	25,6	25,4	26,1	26,5	25,4	26,2	25,9	26,6	27,1
	8H	25,1	25,8	25,6	26,2	26,7	25,7	26,4	26,3	26,8	27,3
	12H	25,3	25,8	25,8	26,3	26,9	26,0	26,6	26,6	27,1	27,7
8H	4H	24,6	25,3	25,2	25,8	26,2	25,0	25,7	25,6	26,1	26,6
	6H	25,2	25,7	25,8	26,3	26,9	25,7	26,2	26,3	26,8	27,4
	8H	25,6	26,0	26,1	26,6	27,3	26,2	26,6	26,7	27,2	27,9
	12H	25,9	26,3	26,5	26,8	27,5	26,6	27,0	27,3	27,6	28,3
12H	4H	24,6	25,2	25,2	25,7	26,3	25,0	25,5	25,5	26,1	26,6
	6H	25,3	25,8	25,9	26,4	27,1	25,8	26,2	26,4	26,8	27,6
	8H	25,7	26,1	26,3	26,6	27,3	26,2	26,6	26,9	27,2	27,9

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

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

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	118	118	118	118	114	114	114	114	108	108	108	102	102	102	97	97	97	94
1	108	104	100	96	105	101	97	94	96	93	90	91	89	86	86	85	83	80
2	99	92	85	80	96	89	84	79	85	80	76	81	77	74	77	74	71	69
3	91	81	74	68	88	79	73	67	76	70	65	72	67	63	69	65	62	59
4	84	73	65	59	81	71	64	58	68	62	56	65	60	55	62	58	54	52
5	78	66	57	51	75	64	56	51	62	55	50	59	53	49	57	52	48	45
6	72	60	51	45	70	58	50	45	56	49	44	54	48	43	52	46	42	40
7	67	54	46	40	65	53	45	40	51	44	39	49	43	39	48	42	38	36
8	63	50	42	36	61	49	41	36	47	40	35	45	39	35	44	38	34	32
9	59	46	38	33	57	45	38	32	43	37	32	42	36	32	41	35	31	29
10	55	42	35	30	53	42	34	30	40	34	29	39	33	29	38	32	28	27

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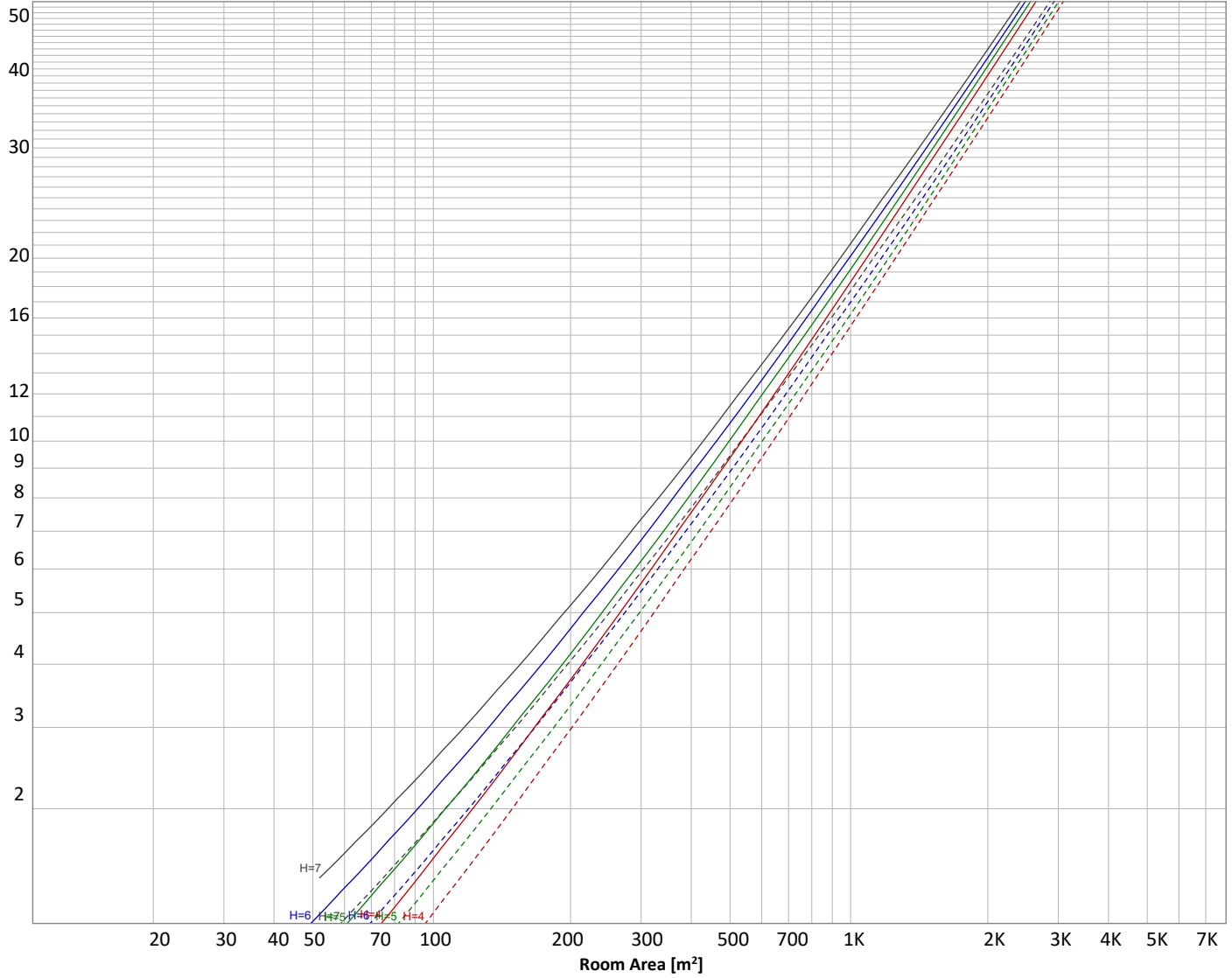
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 6582 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°
239 lm	718 lm	1148 lm	1262 lm	1046 lm	818 lm	538 lm	294 lm	156 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
92,3 lm	80,9 lm	60,6 lm	49,2 lm	36,6 lm	22,9 lm	12,7 lm	5,74 lm	1,62 lm

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Operator:



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	239 lm	3,6%
10-20°	718 lm	10,9%
20-30°	1148 lm	17,4%
30-40°	1262 lm	19,2%
40-50°	1046 lm	15,9%
50-60°	818 lm	12,4%
60-70°	538 lm	8,2%
70-80°	294 lm	4,5%
80-90°	156 lm	2,4%
90-100°	92 lm	1,4%
100-110°	81 lm	1,2%
110-120°	61 lm	0,9%
120-130°	49 lm	0,7%
130-140°	37 lm	0,6%
140-150°	23 lm	0,3%
150-160°	13 lm	0,2%
160-170°	6 lm	0,1%
170-180°	2 lm	0,0%
Total	6582 lm	100,0%

Intensity peaks

Max intensity	2557 cd
Intensity, 90°	98 cd
Intensity, 0°	2467 cd

Zonal Lumen summary

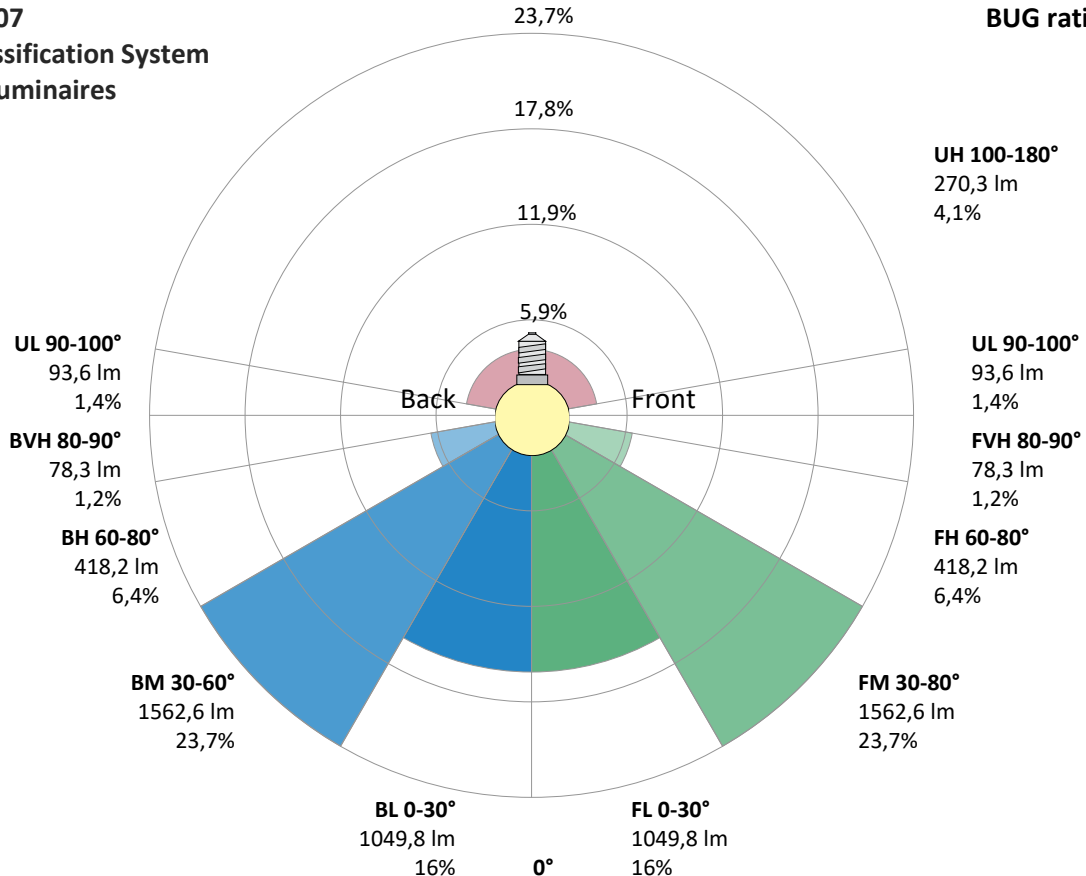
Zone (γ)	Lumen	% Total
0-30°	2105 lm	32,0%
0-40°	3367 lm	51,2%
0-60°	5231 lm	79,5%
60-90°	988 lm	15,0%
70-100°	542 lm	8,2%
90-120°	234 lm	3,6%
0-90°	6219 lm	94,5%
90-180°	363 lm	5,5%
0-180°	6582 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1050 lm	16,0%
Medium(30-60°)	1563 lm	23,7%
High(60-80°)	418 lm	6,4%
Very high(80-90°)	78 lm	1,2%
Back light		
Low(0-30°)	1050 lm	16,0%
Medium(30-60°)	1563 lm	23,7%
High(60-80°)	418 lm	6,4%
Very high(80-90°)	78 lm	1,2%
Uplight		
Low(90-100°)	94 lm	1,4%
High(100-180°)	270 lm	4,1%

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

BUG rating B3 U3 G1



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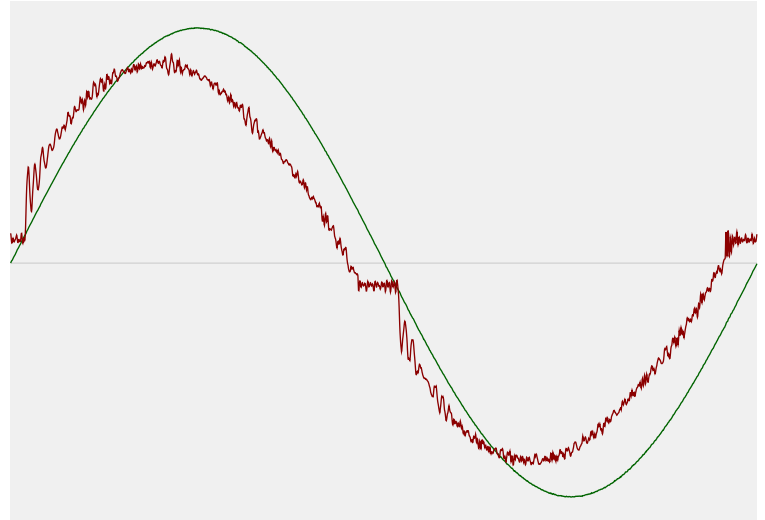


Power Details

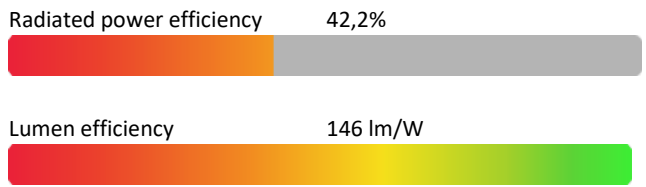
Input Power

Power feed to light source	45,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,204 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	47,02 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,96
Total harmonic distortion of the current	7,21%
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	5014 K
CCT shift	-14 K
CCT end	5000 K

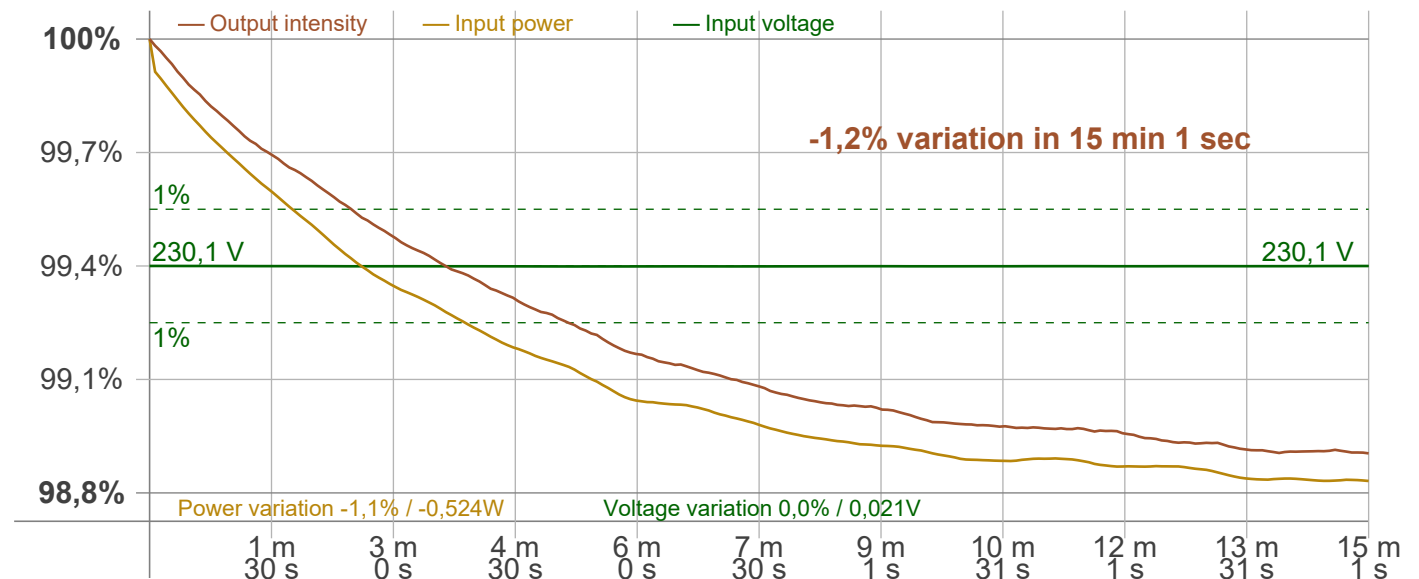
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-1,2%

Output Change

Output start	6656 lm
Output change	-74 lm
Output end	6582 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: 96,62 Hz
 Percent Flicker: 0,2 %
 Flicker index: 0

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

JA8/10 40 Hz: 0,02 %
 JA8/10 90 Hz: 0,03 %
 JA8/10 200 Hz: 0,16 %
 JA8/10 400 Hz: 0,16 %
 JA8/10 1000 Hz: 0,18 %

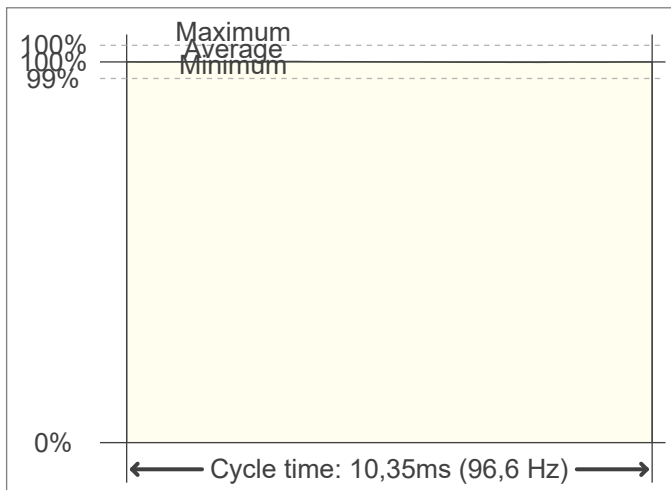
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,01

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

