

Light Measurement Report

Print date: 24-4-2025
Measurement date and time: 24-4-2025 13:04:51 – Measurement no. VFR-250424-0907-MS
Measurement tracking No. and Link: [VT250424-005114](#)
Operator:



Laboratory and Equipment

Laboratory Owner and Location	Viso Systems, Copenhagen V, Denmark
Goniospectrometer System and Type	LabSpion – Type C, horizontal
Sensor Name, Calibr. Date and Serial No.	LabSensor Model2 – 11-1-2024 – 3130191315
Spectrometer Manufacturer and Model	Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

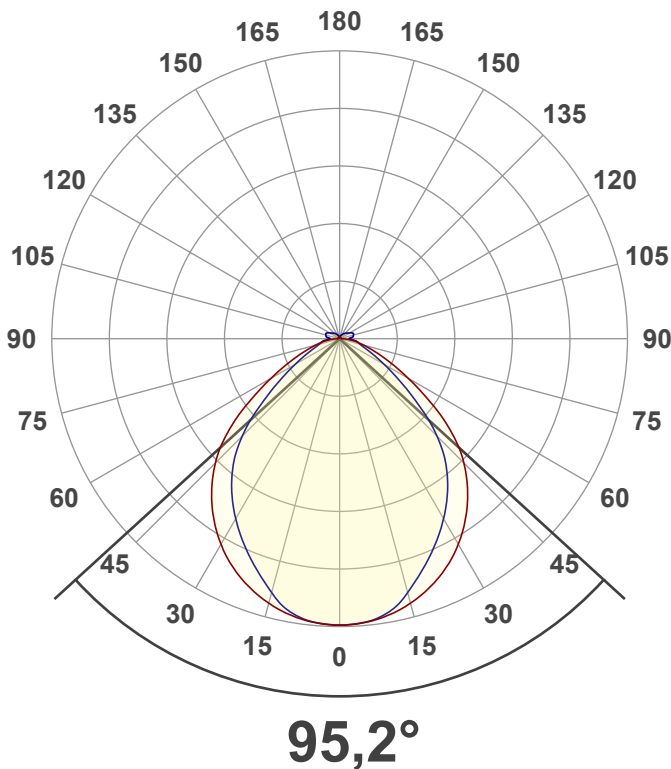
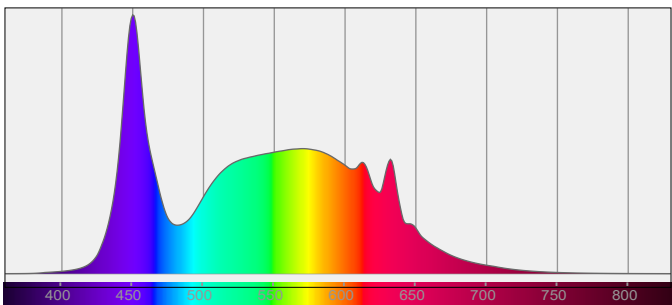
Number of C-planes and Resolution	16 planes – 22,5°
γ (gamma)-Resolution	5°
Test Distance	12,09 m
Input Power, Power and Displ. Factors	73,1 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,328 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

Product Name	810733-5700K
Item No. and Manufacturer	810733-5700K – Dutchfulfillment
Product Description (line 1)	RETROFIT PLUTO LED MODULE 32W/40W/48W/55W MET NOOD
90°	

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	11727 lm – 6,22% / 93,78%
Efficiency	160 lm/W
Peak Intensity and Beam Angle	4978 cd – 95,2°
Correlated Color Temperature, Target/Measured	CCT = 5700 K / 5809 K
Color Rendering Index	CRI 83,0
Color Rendering TM30-18	R _f 82,4 – R _g 96,9
Color Shift, CIE duv and MacAdam Steps	Duv 0,0010 – SDCM 2,2
Flicker	SVM 0,03 – PstLM 0,02



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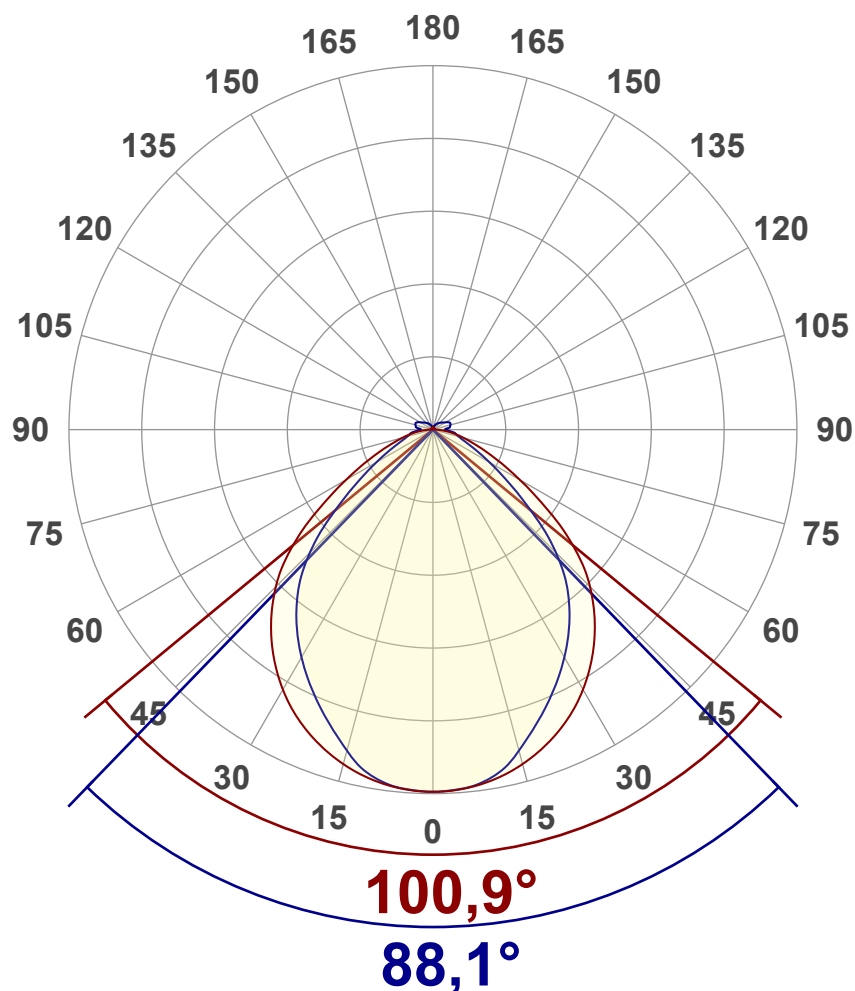
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Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	11727 lm
Lumen Up% / Down%	6,22% / 93,78%
Peak Intensity	4978 cd
Beam Angle (50%)	95,2°
Beam Angle (90%)	88,1°
Beam Angle (10%)	100,9°

Cut-off Angle

Average 2,5%	229,5°
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Field Angle

Average 10%	143,1°
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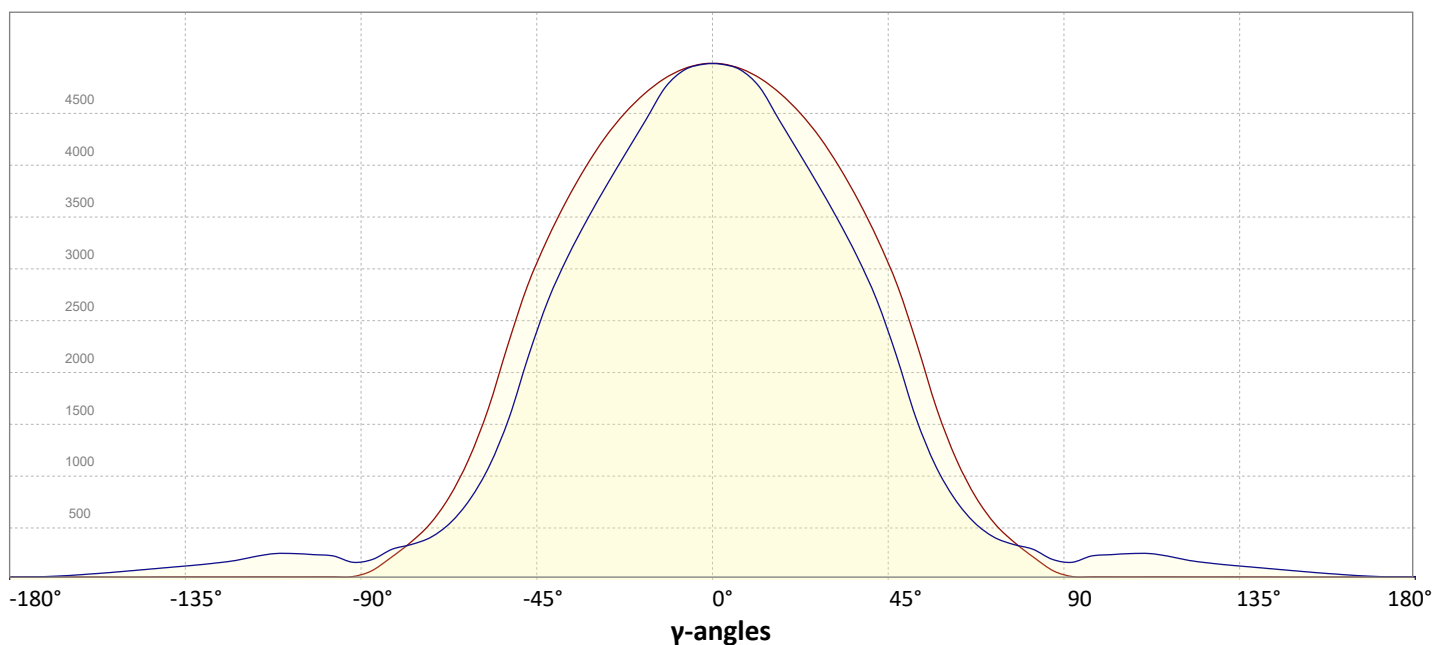
Intensity Ratio

In 120° cone	81,1%
In 90° cone	59,9%

C000-C180

C090-C270

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

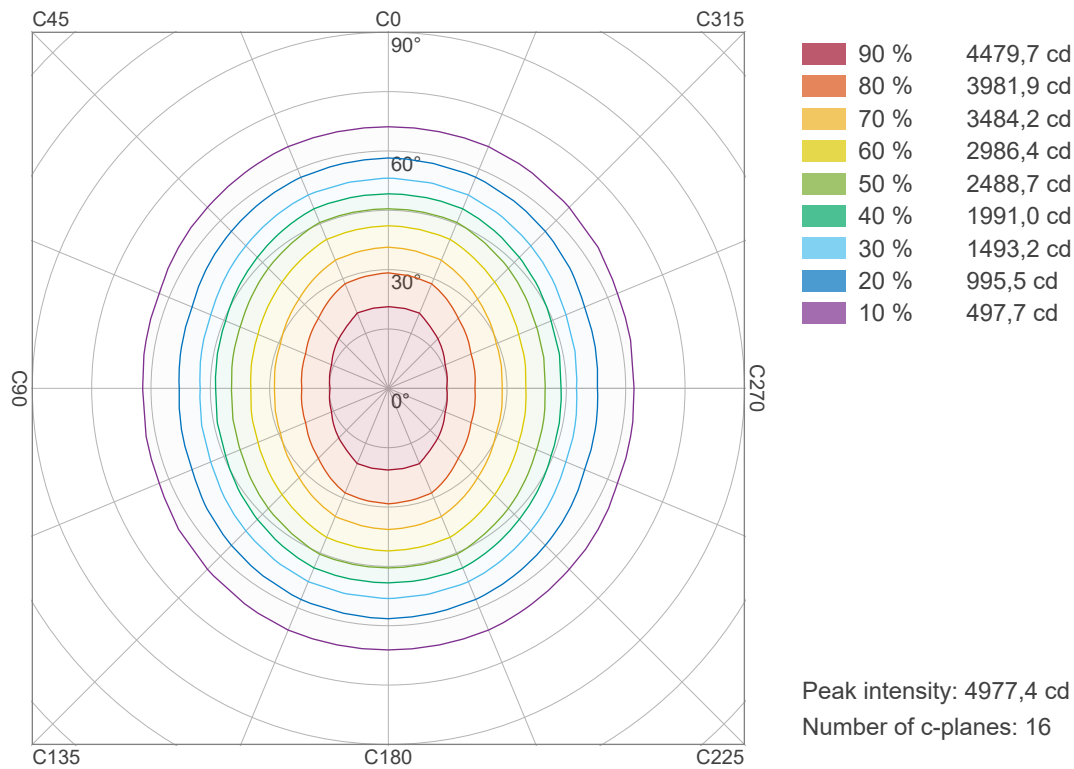


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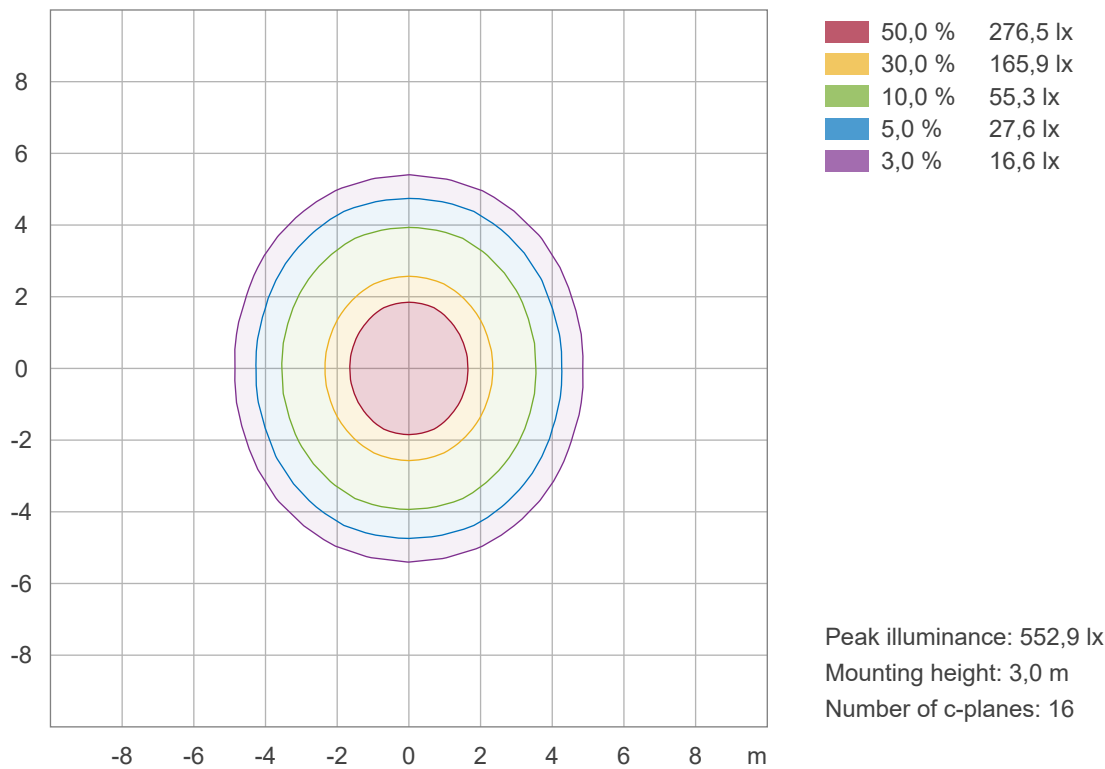
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



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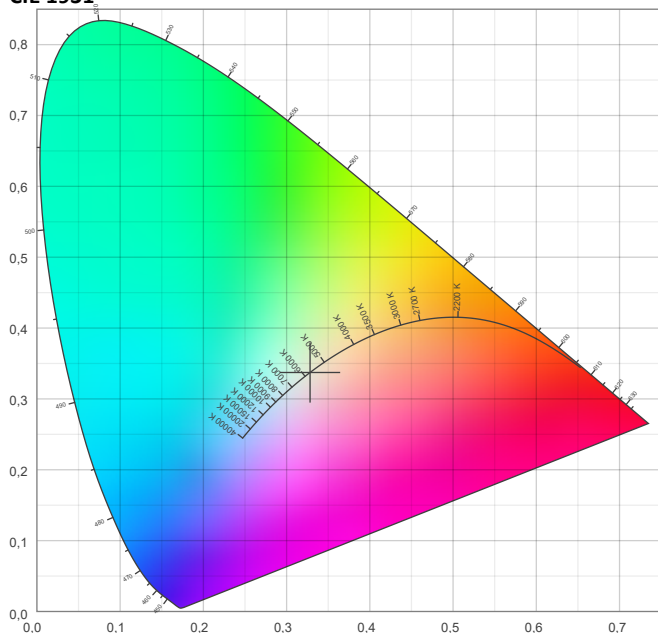


Color details

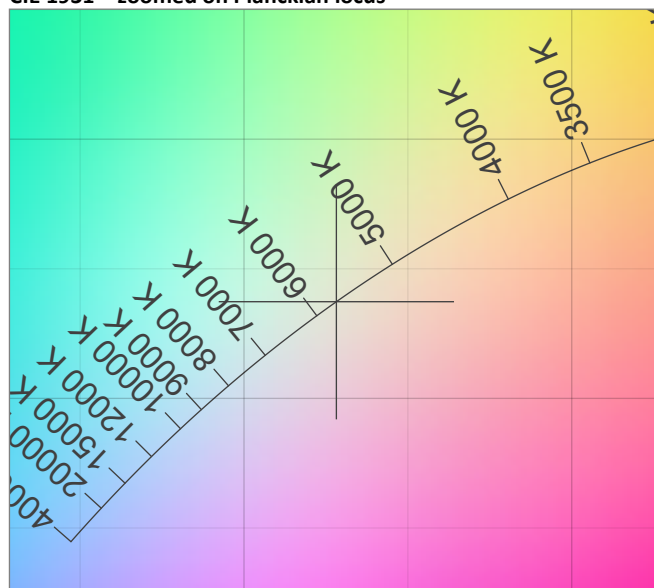
Correlated Color Temperature, Target CCT = 5700 K
Correlated Color Temperature, Measured CCT = 5809 K
Color Rendering Index CRI 83,0
Color Rendering Index, R9 (red component) R9 = 15,4
Color Rendering TM30-18 R_f 82,4 – R_g 96,9
Color Quality Scale CQS = 80,1

MacAdam Steps
Color coordinates CIE 1931 (x;y) = (0,328;0,337)
Color coordinate CIEs 1960 (u;v) = (0,205;0,317)
Color deviation from BBL Duv = 0,0010
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,205;0,475)

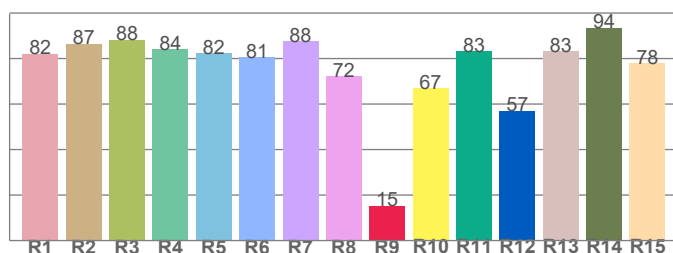
CIE 1931



CIE 1931 – zoomed on Planckian locus



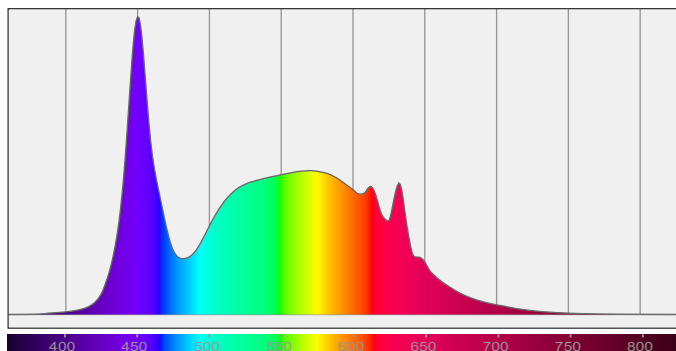
Color Rendering Index per reference color (CIE 1995)



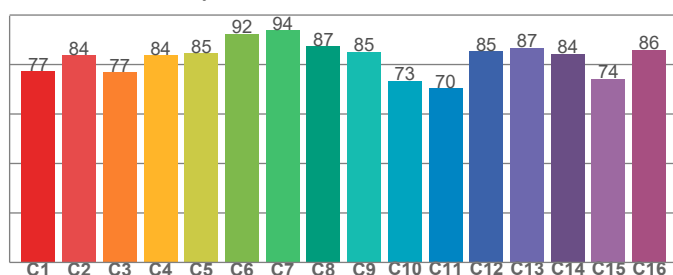
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,2	86,5	88,3	84,0	82,4	80,6	87,7	72,2	15,4	66,9	83,3	57,1	83,2	93,5	77,9

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



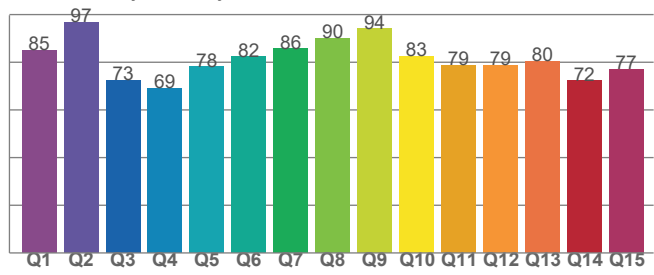
TM30-18 Rf-values per hue bin



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
77,4	83,8	76,9	83,8	84,6	92,5	93,8	87,4	85,1	73,4	70,3	85,4	86,8	84,3	74,2	86,0

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
85,2	96,9	72,5	69,2	78,1	82,2	85,6	90,2	94,1	82,6	78,7	78,8	80,3	72,2	77,0

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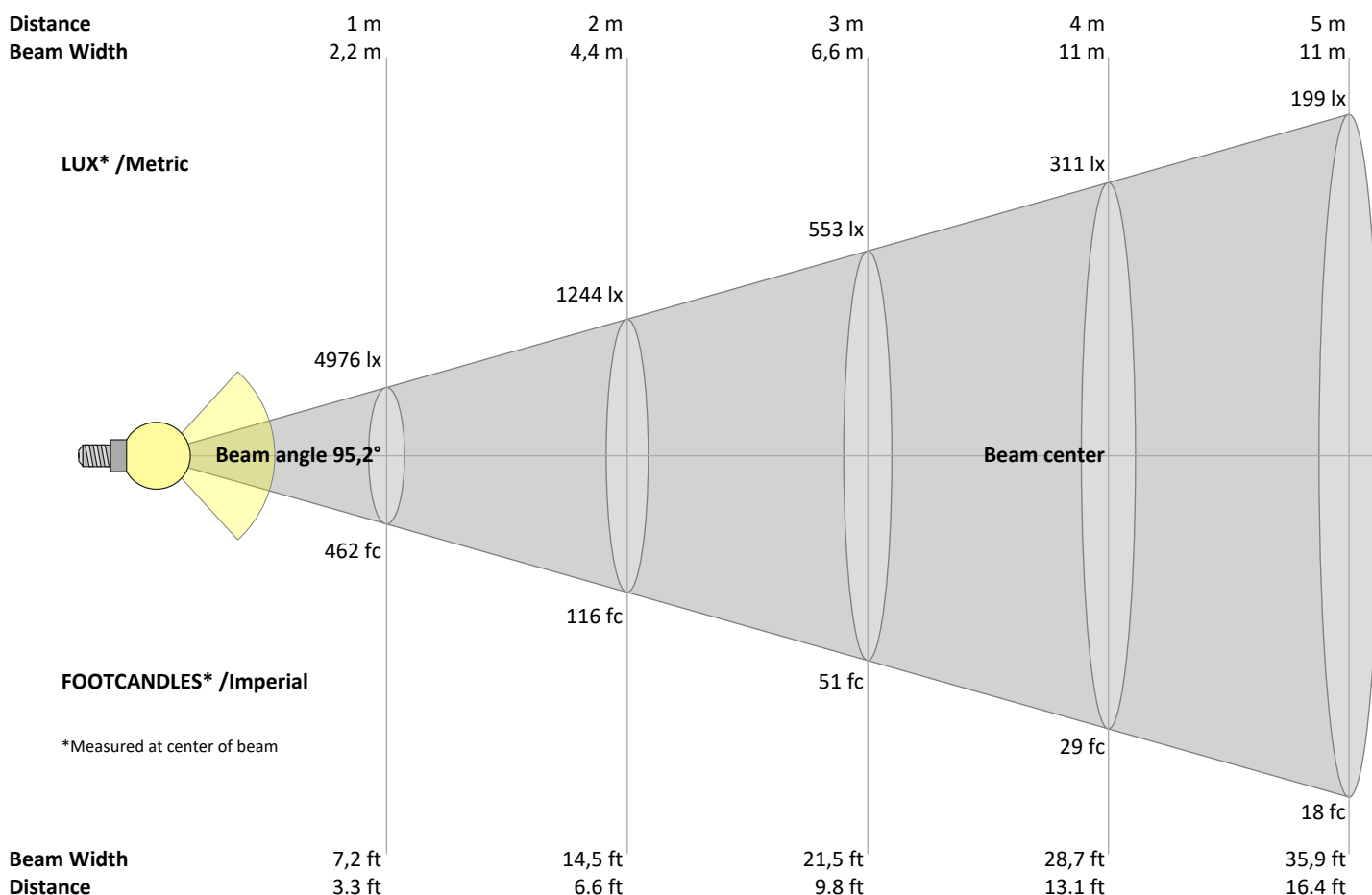
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Beam Details



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
4976	1244	553	311	199	138	102	78	61	50	41	35	29	25	22	19	17	15	14	12	lux
462,3	115,6	51,4	28,9	18,5	12,8	9,4	7,2	5,7	4,6	3,8	3,2	2,7	2,4	2,1	1,8	1,6	1,4	1,3	1,2	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
4976	4952	4879	4759	4593	4384	4124	3814	3458	3045	2538	1947	1398	974	662	443	282	146	55	29	cd
100%	100%	98%	96%	92%	88%	83%	77%	69%	61%	51%	39%	28%	20%	13%	9%	6%	3%	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
4976	4944	4822	4567	4254	3939	3614	3266	2872	2386	1813	1294	913	645	469	370	313	237	180	204	cd
100%	99%	97%	92%	85%	79%	73%	66%	58%	48%	36%	26%	18%	13%	9%	7%	6%	5%	4%	4%	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
4976	4952	4879	4759	4593	4384	4124	3814	3458	3045	2538	1947	1398	974	662	443	282	146	55	29	cd
100%	100%	98%	96%	92%	88%	83%	77%	69%	61%	51%	39%	28%	20%	13%	9%	6%	3%	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
4976	4944	4822	4567	4254	3939	3614	3266	2872	2386	1813	1294	913	645	469	370	313	237	180	204	cd
100%	99%	97%	92%	85%	79%	73%	66%	58%	48%	36%	26%	18%	13%	9%	7%	6%	5%	4%	4%	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	25,9	26,9	26,2	27,3	27,6	25,3	26,4	25,6	26,8	27,1
	3H	26,3	27,4	26,8	27,7	28,1	25,8	26,9	26,3	27,3	27,6
	4H	26,4	27,5	26,9	27,8	28,2	26,2	27,2	26,7	27,6	27,9
	6H	26,6	27,5	27,0	27,9	28,4	26,7	27,5	27,1	27,9	28,4
	8H	26,6	27,5	27,0	27,9	28,4	26,9	27,8	27,3	28,2	28,7
	12H	26,6	27,4	27,0	27,9	28,4	27,2	28,1	27,7	28,5	29,0
4H	2H	26,0	27,0	26,5	27,4	27,8	25,5	26,5	26,0	26,9	27,3
	3H	26,7	27,5	27,1	27,9	28,5	26,3	27,2	26,7	27,6	28,1
	4H	26,8	27,7	27,4	28,1	28,7	26,6	27,5	27,2	27,9	28,5
	6H	27,0	27,8	27,6	28,2	28,7	27,2	27,9	27,8	28,4	28,9
	8H	27,0	27,7	27,6	28,2	28,7	27,5	28,2	28,1	28,6	29,1
	12H	27,1	27,6	27,6	28,1	28,7	27,9	28,4	28,5	29,0	29,5
8H	4H	26,9	27,6	27,5	28,0	28,5	26,7	27,4	27,3	27,8	28,3
	6H	27,2	27,7	27,7	28,2	28,9	27,4	27,9	28,0	28,4	29,1
	8H	27,3	27,7	27,9	28,3	29,0	27,8	28,2	28,4	28,9	29,6
	12H	27,3	27,7	28,0	28,3	29,0	28,3	28,7	29,0	29,3	30,0
12H	4H	26,9	27,4	27,4	27,9	28,5	26,7	27,2	27,2	27,7	28,3
	6H	27,2	27,6	27,8	28,2	29,0	27,4	27,8	28,0	28,5	29,2
	8H	27,3	27,7	28,0	28,3	29,0	27,8	28,2	28,5	28,8	29,5
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H		0,2 / -0,4					0,2 / -0,3				
S = 1.5H		0,8 / -1,2					0,7 / -0,8				
S = 2.0H		1,8 / -2,1					1,4 / -1,3				

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	118	118	118	118	114	114	114	114	108	108	108	102	102	102	96	96	96	94
1	108	104	100	97	105	101	98	95	96	93	90	91	89	87	86	85	83	81
2	100	92	86	81	97	90	84	79	85	81	77	81	77	74	77	74	72	69
3	92	82	75	69	89	80	73	68	76	71	66	73	68	64	70	66	62	60
4	84	74	65	59	82	72	64	59	69	62	57	66	60	56	63	58	54	52
5	78	66	58	52	76	65	57	51	62	55	50	60	54	49	57	52	48	46
6	72	60	52	46	70	59	51	45	56	50	44	54	48	44	52	47	43	41
7	67	55	47	41	65	54	46	40	52	45	40	50	44	39	48	43	38	36
8	63	50	42	37	61	49	42	36	47	41	36	46	40	35	44	39	35	33
9	59	46	38	33	57	45	38	33	44	37	32	42	36	32	41	36	32	30
10	55	43	35	30	54	42	35	30	41	34	30	39	33	29	38	33	29	27

Light Measurement Report

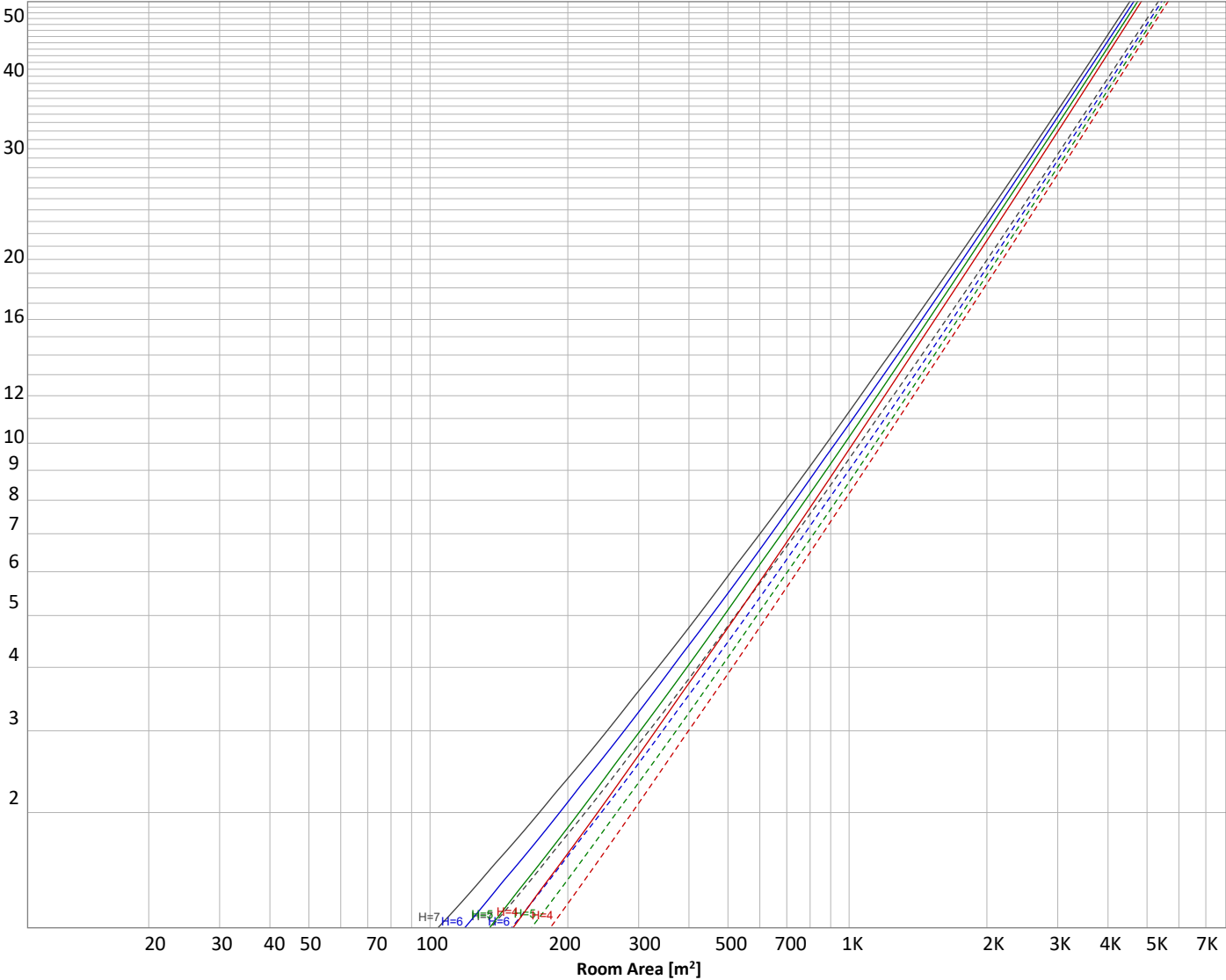
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 11727 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Floor reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	30
E _{work} = Average lux on work area =	100 lx	-----	50	20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
470 lm	1322 lm	1922 lm	2212 lm	2103 lm	1482 lm	815 lm	436 lm	234 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
167 lm	177 lm	144 lm	98,9 lm	66,9 lm	40,7 lm	21,8 lm	9,70 lm	2,66 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	470 lm	4,0%
10-20°	1322 lm	11,3%
20-30°	1922 lm	16,4%
30-40°	2212 lm	18,9%
40-50°	2103 lm	17,9%
50-60°	1482 lm	12,6%
60-70°	815 lm	7,0%
70-80°	436 lm	3,7%
80-90°	234 lm	2,0%
90-100°	167 lm	1,4%
100-110°	177 lm	1,5%
110-120°	144 lm	1,2%
120-130°	99 lm	0,8%
130-140°	67 lm	0,6%
140-150°	41 lm	0,3%
150-160°	22 lm	0,2%
160-170°	10 lm	0,1%
170-180°	3 lm	0,0%
Total	11727 lm	100,0%

Intensity peaks

Max intensity	4978 cd
Intensity, 90°	55 cd
Intensity, 0°	4976 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	3714 lm	31,7%
0-40°	5926 lm	50,5%
0-60°	9512 lm	81,1%
60-90°	1486 lm	12,7%
70-100°	838 lm	7,1%
90-120°	489 lm	4,2%
0-90°	10997 lm	93,8%
90-180°	730 lm	6,2%
0-180°	11727 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1855 lm	15,8%
Medium(30-60°)	2895 lm	24,7%
High(60-80°)	630 lm	5,4%
Very high(80-90°)	118 lm	1,0%
Back light		
Low(0-30°)	1855 lm	15,8%
Medium(30-60°)	2895 lm	24,7%
High(60-80°)	630 lm	5,4%
Very high(80-90°)	118 lm	1,0%

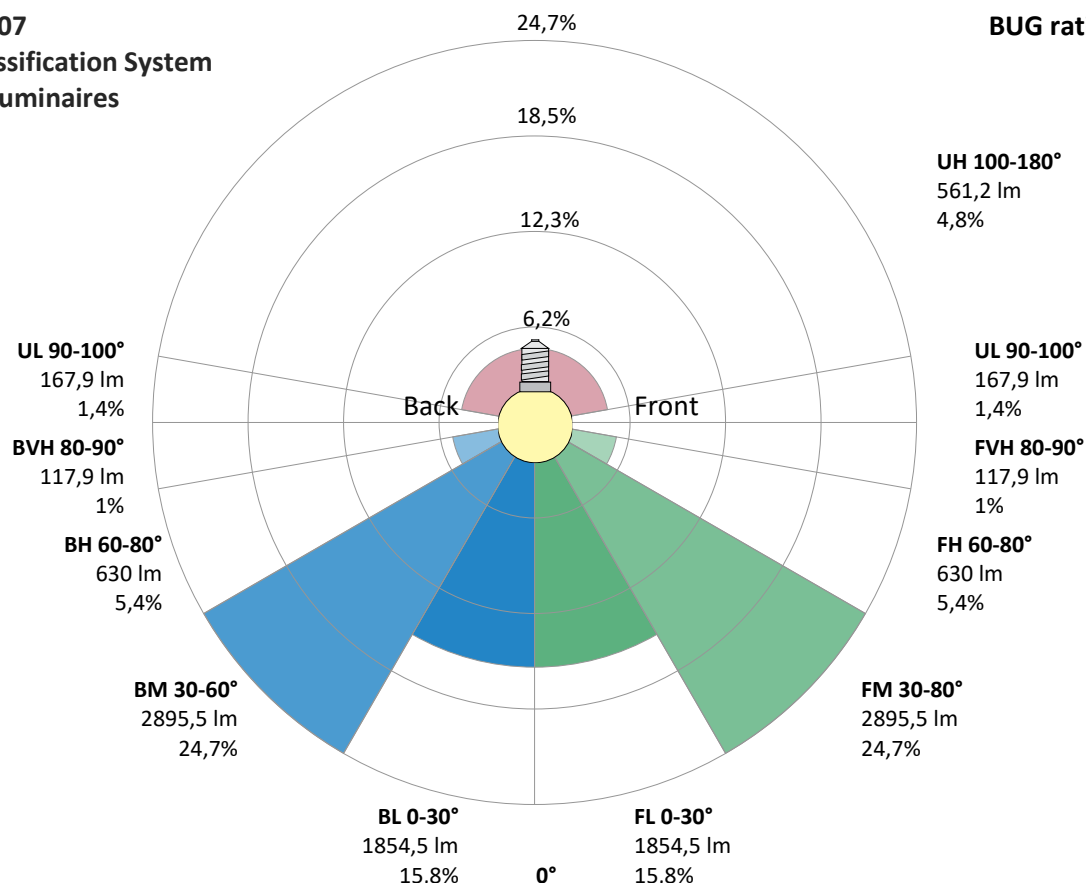
Uplight

Low(90-100°)	168 lm	1,4%
High(100-180°)	561 lm	4,8%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B3 U4 G2



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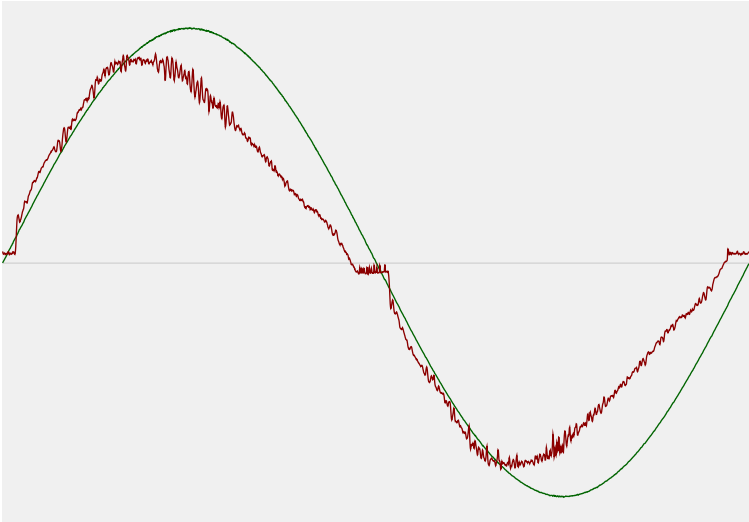


Power Details

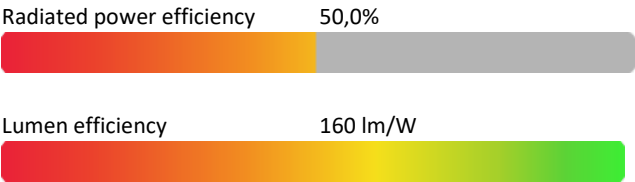
Input Power

Power feed to light source	73,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,328 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	75,38 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	11,86%
Total harmonic distortion of the voltage	0,08%

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	5688 K
CCT shift	+12 K
CCT end	5700 K

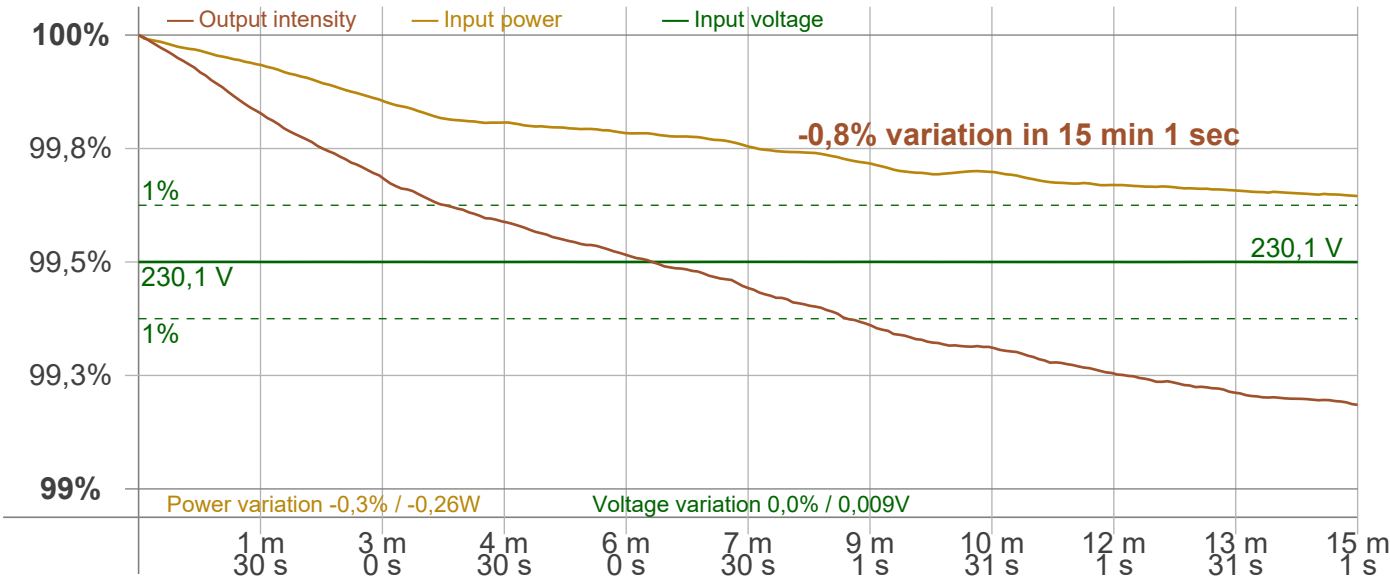
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,8%

Output Change

Output start	11825 lm
Output change	-98 lm
Output end	11727 lm

Stabilization Curve



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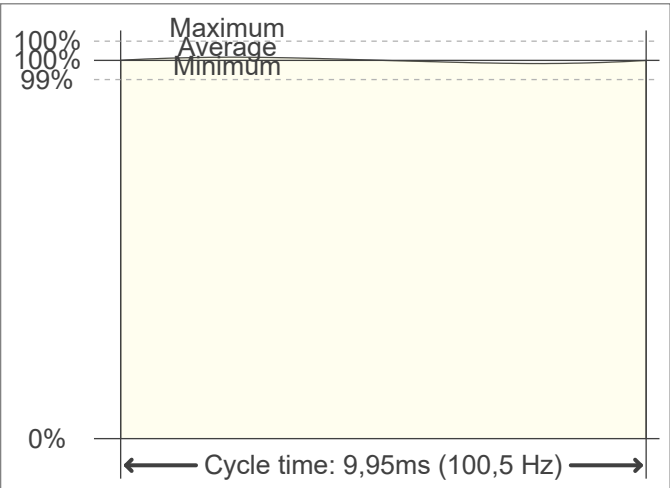
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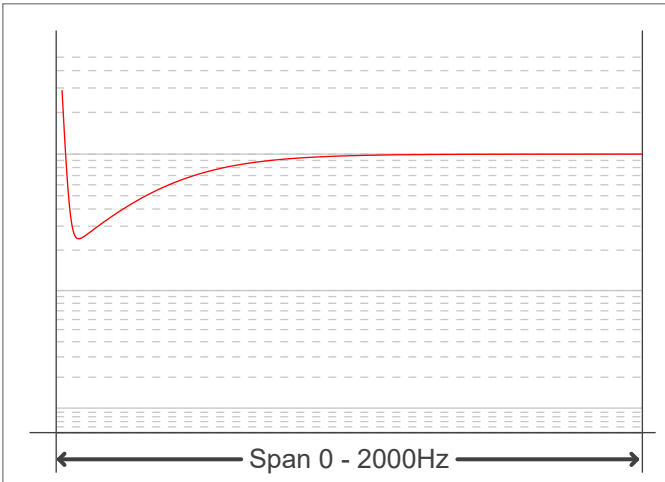
Flicker /TLA details

Flicker Meter Type	Viso Systems LabFlicker	Measurement time	
Frequency of input power	50 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	100,5 Hz	JA8/10 40 Hz	0,02 %
Percent Flicker	0,87 %	JA8/10 90 Hz	0,03 %
Flicker index	0	JA8/10 200 Hz	0,85 %
		JA8/10 400 Hz	0,86 %
		JA8/10 1000 Hz	0,86 %
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)	0,02	Perception metric, Assist Mp	0,01
SVM value (80 < F < 2000 Hz)	0,03		

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

