Light Measurement Report

Print date: 14-8-2025
Measurement date and time: 14-8-2025 11:26:02 – Measurement no. VFR-250814-2550-MS
Measurement tracking No. and Link: VT250814-005142
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

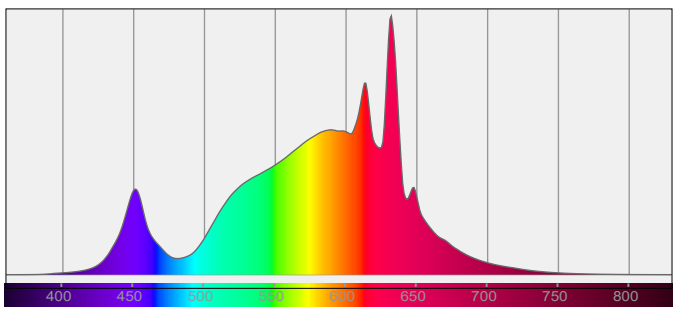
Number of C-planes and Resolution	20 planes – 18°
γ (gamma)-Resolution	5°
Test Distance	1,99 m
Input Power, Power and Displ. Factors	20,1 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,090 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 3 sec – 2,0%

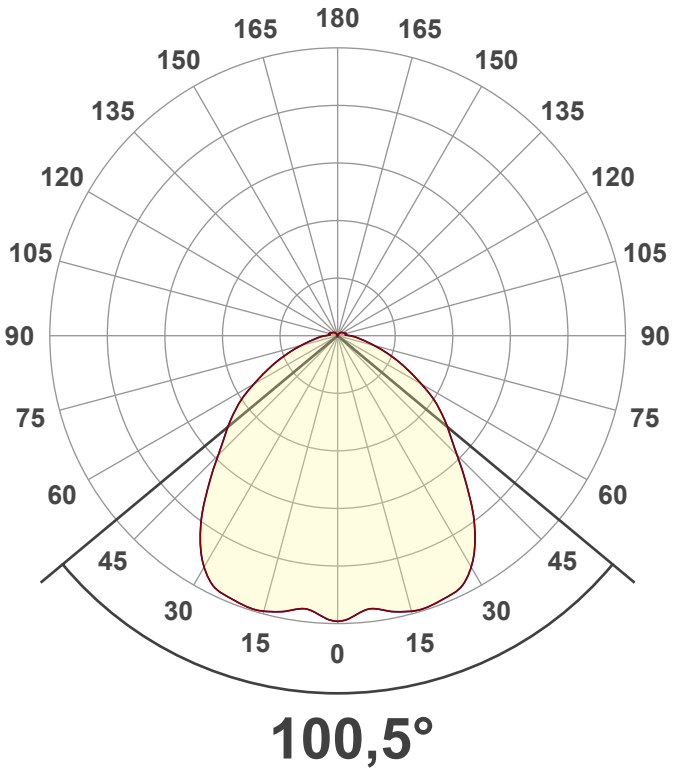
Tested Light Source

Product Name	812959-3000K-20W
Item No. and Manufacturer	812959-3000K-20W – Dutchfulfillment
Product Description (line 1)	3-FASE RAILARMATUUR | TARVOS | 60CM | 12W/16W/20W/24W |
ZWART | CCT SWITCH	

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	2108 lm – 4,53% / 95,47%
Efficiency	105 lm/W
Peak Intensity and Beam Angle	758 cd – 100,5°
Correlated Color Temperature, Target/Measured	CCT = 3000 K / 3003 K
Color Rendering Index	CRI 81,6
Color Rendering TM30-18	R_f 82,7 – R_g 98,1
Color Shift, CIE duv and MacAdam Steps	Duv 0,0032 – SDCM 3,2
Flicker	SVM 0 – PstLM 0,01





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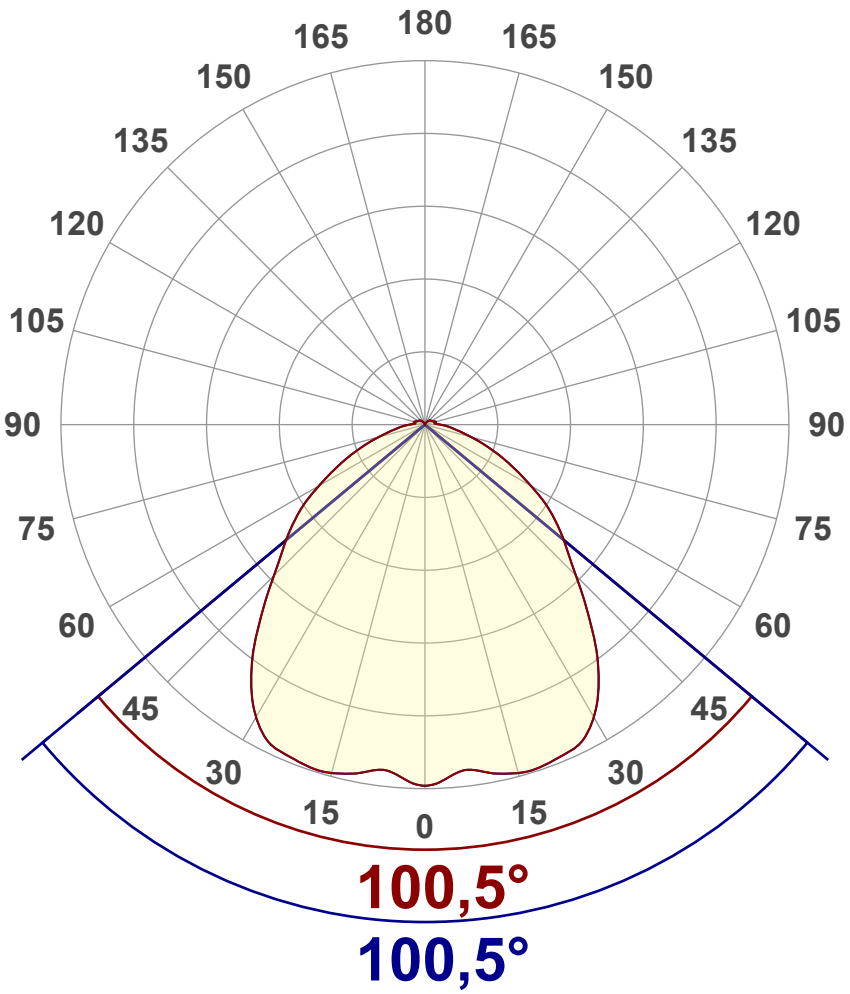
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2108 lm
Lumen Up% / Down%	4,53% / 95,47%
Peak Intensity	758 cd
Beam Angle (50%)	100,5°
Beam Angle (90%)	100,5°
Beam Angle (10%)	100,5°

Cut-off Angle

Average 2,5%	222,7°

Field Angle

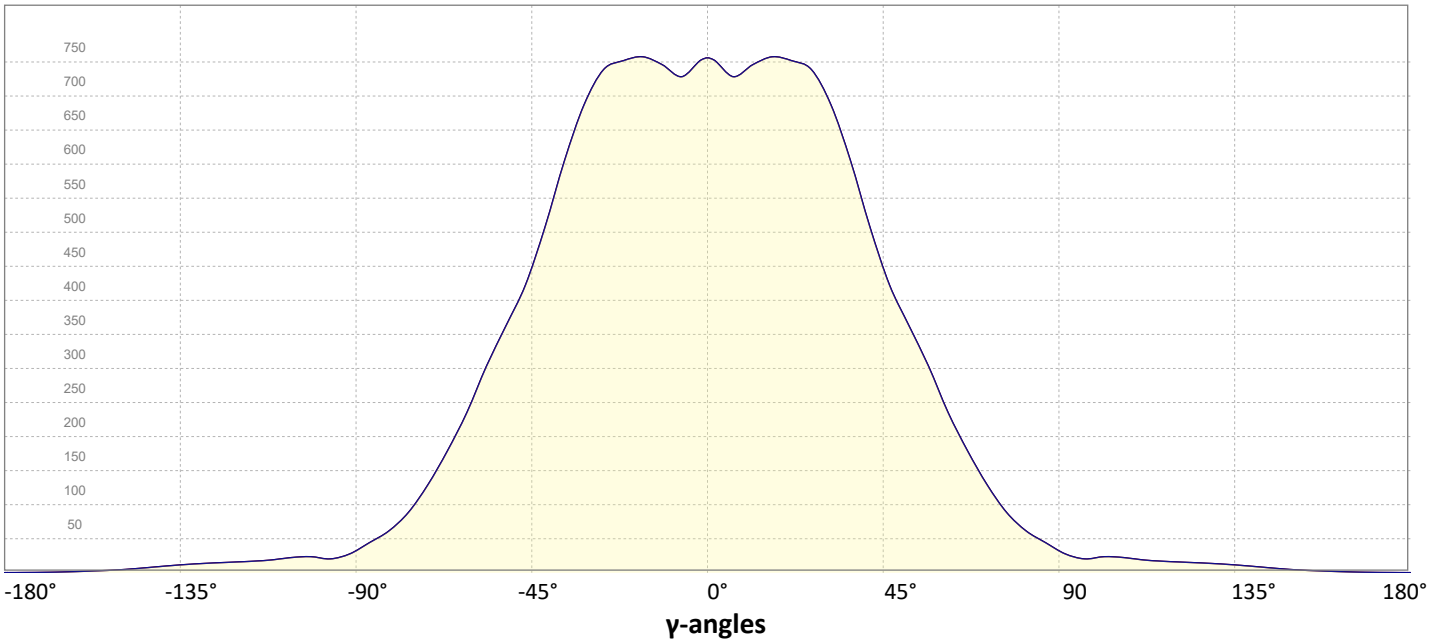
Average 10%	157,9°

Intensity Ratio

In 120° cone	78,5%
In 90° cone	57,0%

C000-C180
C090-C270

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



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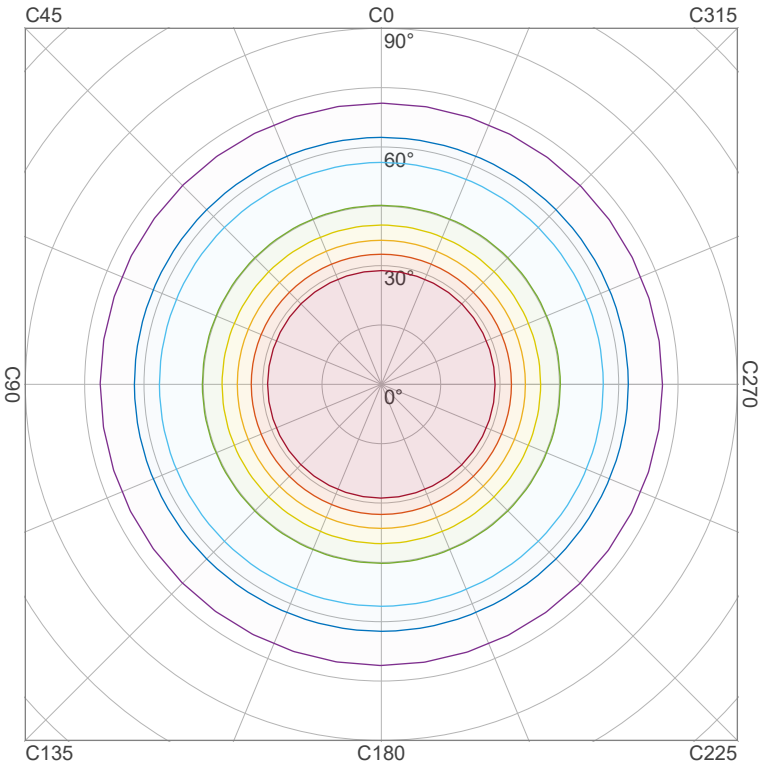
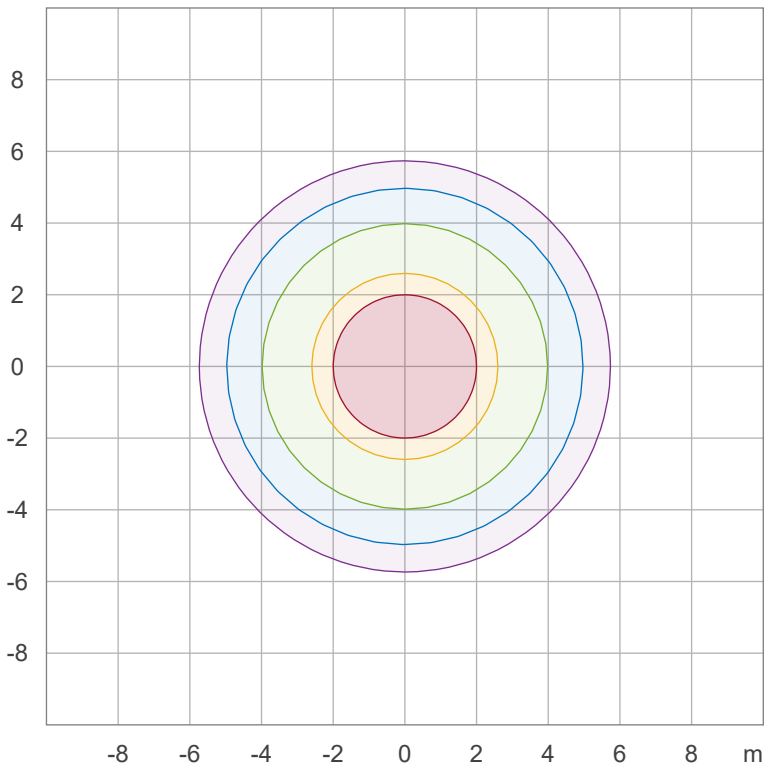
Iso-intensity Diagram (Iso-candela)



90 %	681,4 cd
80 %	605,7 cd
70 %	530,0 cd
60 %	454,3 cd
50 %	378,6 cd
40 %	302,9 cd
30 %	227,1 cd
20 %	151,4 cd
10 %	75,7 cd

Peak intensity: 757,1 cd
Number of c-planes: 20

Iso-illuminance Diagram (Iso-lux)



50,0 %	41,8 lx
30,0 %	25,1 lx
10,0 %	8,4 lx
5,0 %	4,2 lx
3,0 %	2,5 lx

Peak illuminance: 83,7 lx
Mounting height: 3,0 m
Number of c-planes: 20

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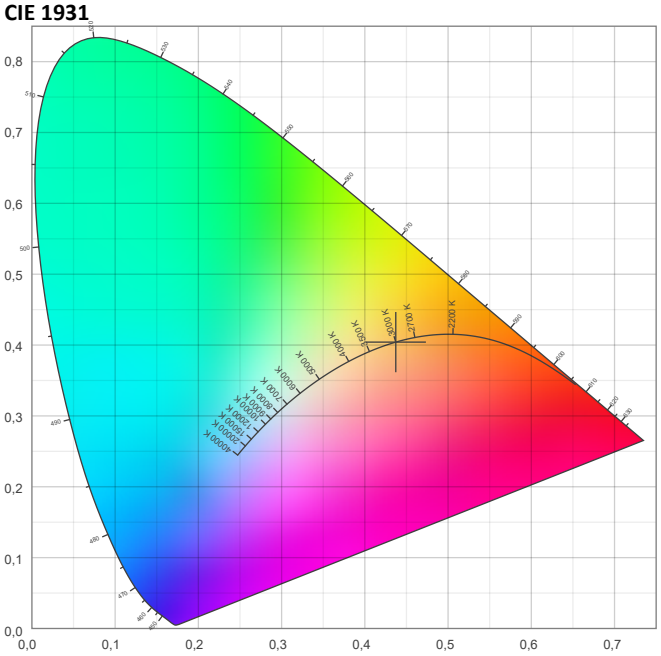
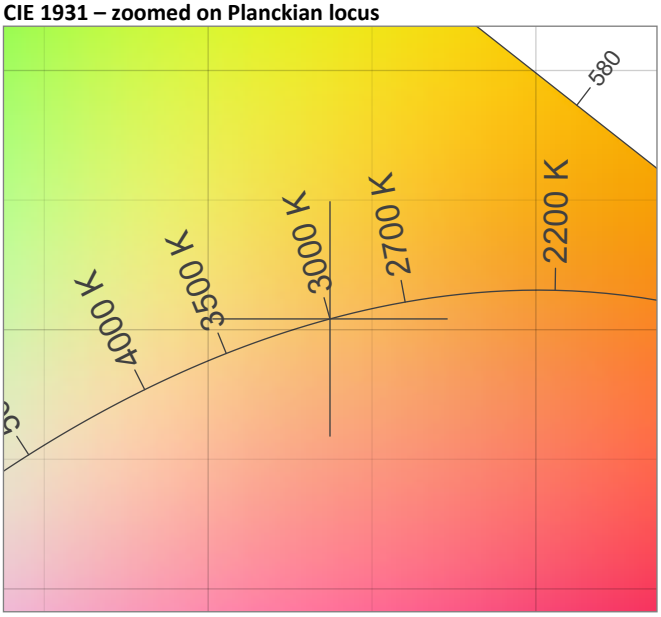
Color details

Correlated Color Temperature, Target	CCT = 3000 K
Correlated Color Temperature, Measured	CCT = 3003 K
Color Rendering Index	CRI 81,6
Color Rendering Index, R9 (red component)	R9 = 17,1
Color Rendering TM30-18	R_f 82,7 – R_g 98,1
Color Quality Scale	CQS = 81,0
MacAdam Steps	SDCM = 3,2
Color coordinates CIE 1931	(x;y) = (0,437;0,404)
Color coordinate CIEs 1960	(u;v) = (0,251;0,348)
Color deviation from BBL	Duv = 0,0032
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,251;0,521)

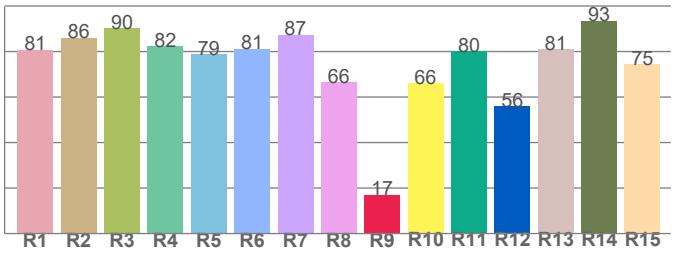
CIE 1931



CIE 1931 – zoomed on Planckian locus



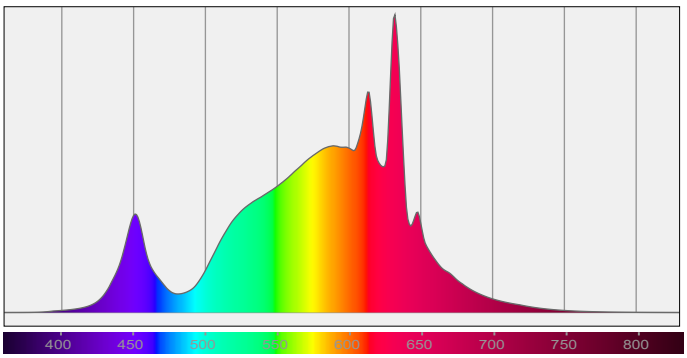
Color Rendering Index per reference color (CIE 1995)



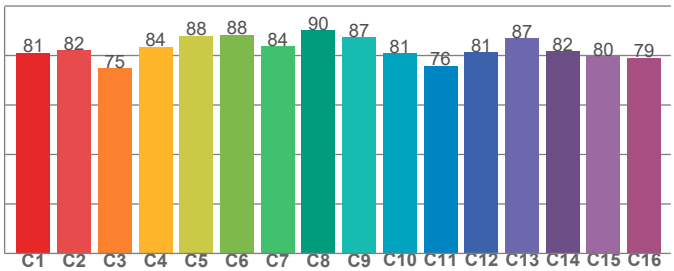
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,7	86,0	90,2	82,3	78,7	81,3	87,3	66,4	17,1	66,0	80,1	55,9	81,1	93,5	74,5

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



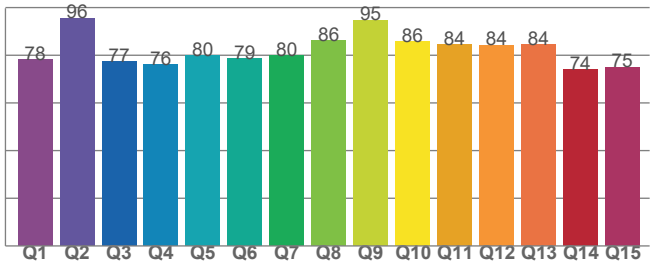
TM30-18 Rf-values per hue bin



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
81,2	82,2	74,9	83,6	88,1	88,3	83,8	90,2	87,4	80,8	75,8	81,4	87,0	81,8	79,8	79,1

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
78,1	95,5	77,2	76,1	79,8	78,6	79,8	86,0	94,8	85,8	84,4	84,2	84,5	73,9	74,9

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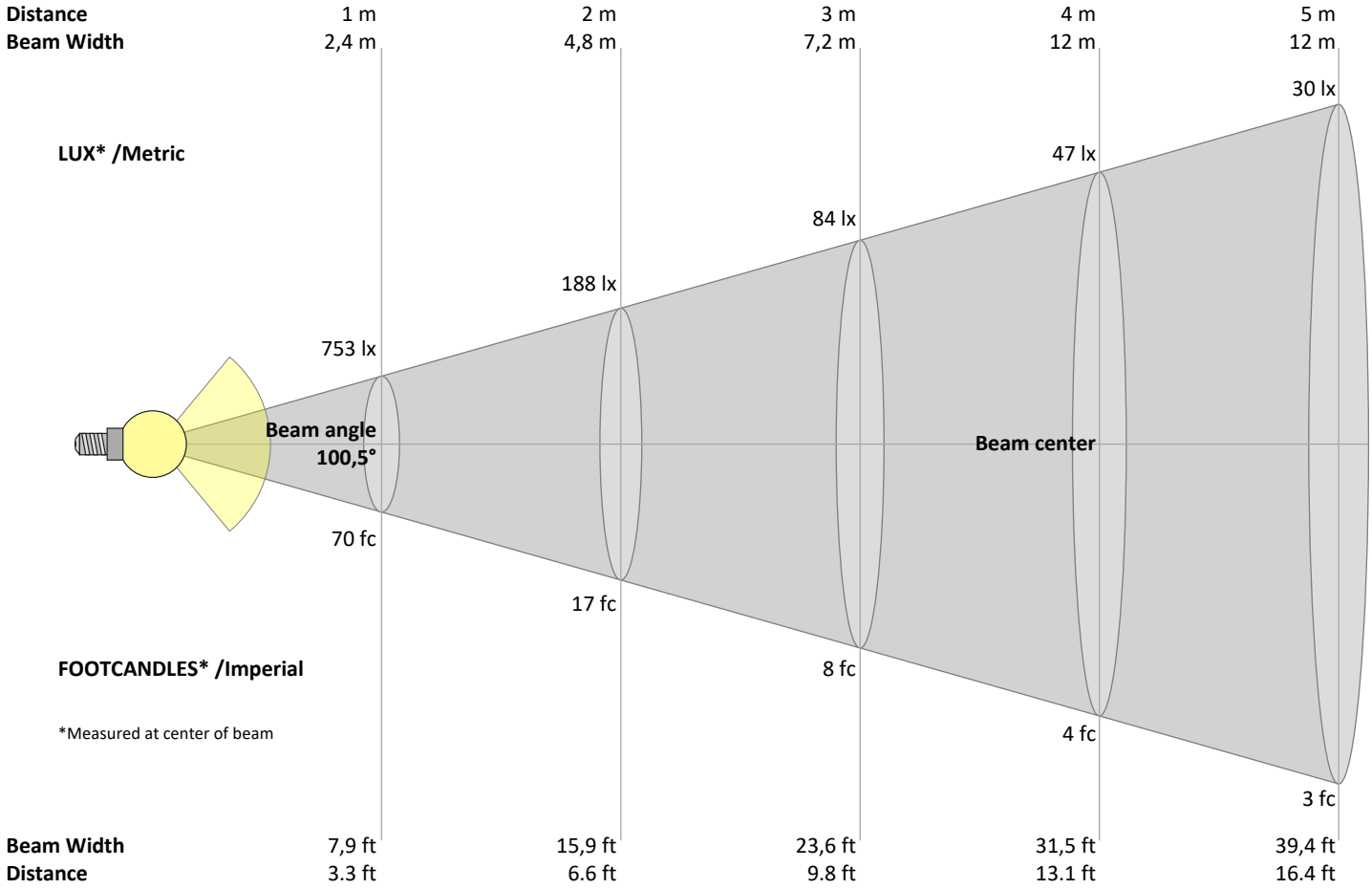
Beam Details



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
753	188	84	47	30	21	15	12	9	8	6	5	4	4	3	3	3	2	2	2	lux
70	17,5	7,8	4,4	2,8	1,9	1,4	1,1	0,9	0,7	0,6	0,5	0,4	0,4	0,3	0,3	0,2	0,2	0,2	0,2	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
753	736	740	754	754	743	704	632	539	450	382	322	257	197	145	102	70	50	33	23	cd
100%	98%	98%	100%	100%	99%	93%	84%	72%	60%	51%	43%	34%	26%	19%	13%	9%	7%	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
753	736	740	754	754	743	704	632	539	450	382	322	257	197	145	102	70	50	33	23	cd
100%	98%	98%	100%	100%	99%	93%	84%	72%	60%	51%	43%	34%	26%	19%	13%	9%	7%	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
753	736	740	754	754	743	704	632	539	450	382	322	257	197	145	102	70	50	33	23	cd
100%	98%	98%	100%	100%	99%	93%	84%	72%	60%	51%	43%	34%	26%	19%	13%	9%	7%	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
753	736	740	754	754	743	704	632	539	450	382	322	257	197	145	102	70	50	33	23	cd
100%	98%	98%	100%	100%	99%	93%	84%	72%	60%	51%	43%	34%	26%	19%	13%	9%	7%	4%	3%	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 H = mounting height above eye level		**Viewed Crosswise** (Viewing direction orthogonal to lamp length axis)					**Viewed Endwise** (Viewing direction parallel to lamp length axis)				
X	**Y**										
2H	2H	22,5	23,7	22,8	24,0	24,3	22,9	24,0	23,2	24,3	24,7
	3H	23,5	24,7	24,0	25,0	25,3	24,0	25,1	24,4	25,5	25,7
	4H	23,9	25,0	24,4	25,4	25,7	24,4	25,5	24,9	25,9	26,2
	6H	24,3	25,3	24,7	25,6	26,1	24,9	25,9	25,3	26,3	26,7
	8H	24,5	25,4	24,9	25,8	26,3	25,1	26,1	25,6	26,5	27,0
	12H	24,6	25,5	25,0	25,9	26,4	25,4	26,3	25,8	26,7	27,2
4H	2H	23,0	24,1	23,4	24,4	24,8	23,2	24,3	23,7	24,7	25,0
	3H	24,3	25,2	24,7	25,6	26,1	24,6	25,6	25,1	26,0	26,5
	4H	24,7	25,6	25,2	26,0	26,7	25,2	26,1	25,7	26,5	27,1
	6H	25,2	26,0	25,7	26,4	26,8	25,7	26,5	26,3	27,0	27,4
	8H	25,4	26,1	25,9	26,5	27,0	26,0	26,7	26,6	27,2	27,7
	12H	25,5	26,2	26,1	26,6	27,2	26,3	26,9	26,9	27,4	28,0
8H	4H	24,9	25,7	25,5	26,1	26,6	25,3	26,1	25,9	26,5	27,0
	6H	25,5	26,1	26,1	26,6	27,2	26,1	26,6	26,6	27,2	27,8
	8H	25,9	26,3	26,4	26,9	27,6	26,5	27,0	27,1	27,6	28,3
	12H	26,2	26,6	26,8	27,1	27,8	26,9	27,3	27,6	27,9	28,6
12H	4H	24,9	25,5	25,5	26,0	26,6	25,3	25,9	25,9	26,4	27,0
	6H	25,6	26,1	26,2	26,7	27,4	26,1	26,6	26,7	27,2	27,9
	8H	26,0	26,4	26,6	27,0	27,6	26,6	27,0	27,2	27,6	28,2

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	0,1 / -0,2	0,1 / -0,1
S = 1.5H	0,2 / -0,4	0,2 / -0,3
S = 2.0H	0,5 / -0,7	0,5 / -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	115	115	115	115	109	109	109	103	103	103	98	98	98	95
1	108	103	99	96	105	101	97	94	96	93	90	91	89	86	87	85	83	81
2	99	91	84	79	96	89	83	78	84	79	75	80	76	73	77	74	71	68
3	91	80	73	66	88	79	71	66	75	69	64	72	66	62	69	64	61	58
4	83	72	63	57	81	70	62	56	67	60	55	64	58	54	62	57	53	50
5	77	64	56	49	74	63	55	49	60	53	48	58	52	47	56	50	46	44
6	71	58	50	43	69	57	49	43	55	48	42	53	46	42	51	45	41	39
7	66	53	44	38	64	52	44	38	50	43	38	48	42	37	46	41	36	35
8	61	48	40	34	60	47	40	34	46	39	34	44	38	33	43	37	33	31
9	57	44	36	31	56	44	36	31	42	35	31	41	35	30	40	34	30	28
10	54	41	33	28	52	40	33	28	39	32	28	38	32	27	37	31	27	25

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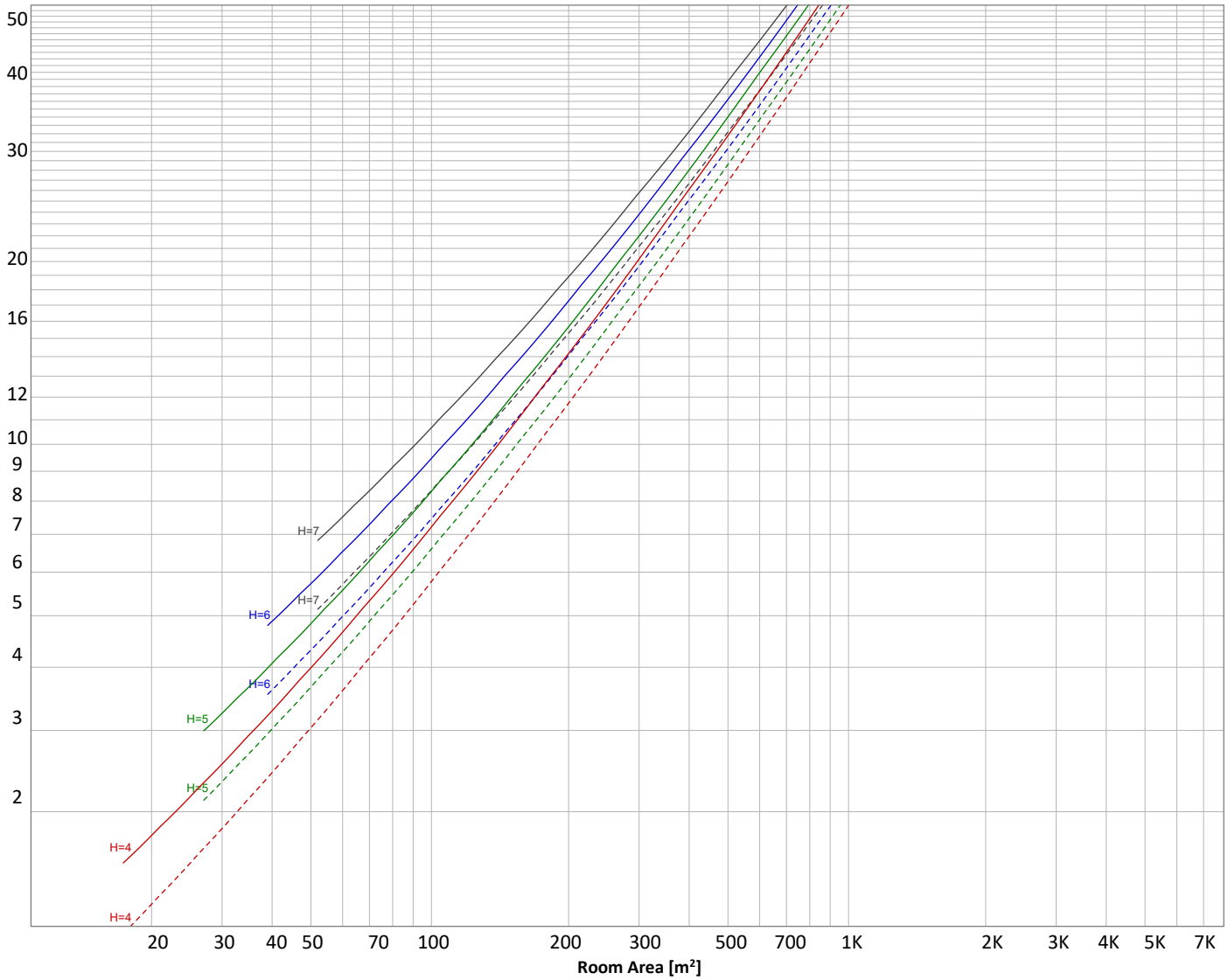
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 2108 lm		ρ(%)		
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°
70,2 lm	213 lm	342 lm	394 lm	348 lm	287 lm	195 lm	108 lm	54,2 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
25,8 lm	23,8 lm	17,4 lm	13,2 lm	8,91 lm	4,33 lm	1,50 lm	0,376 lm	0,046 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	70 lm	3,3%
10-20°	213 lm	10,1%
20-30°	342 lm	16,2%
30-40°	394 lm	18,7%
40-50°	348 lm	16,5%
50-60°	287 lm	13,6%
60-70°	195 lm	9,3%
70-80°	108 lm	5,1%
80-90°	54 lm	2,6%
90-100°	26 lm	1,2%
100-110°	24 lm	1,1%
110-120°	17 lm	0,8%
120-130°	13 lm	0,6%
130-140°	9 lm	0,4%
140-150°	4 lm	0,2%
150-160°	2 lm	0,1%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	2108 lm	100,0%

Intensity peaks

Max intensity	758 cd
Intensity, 90°	33 cd
Intensity, 0°	753 cd

Zonal Lumen summary

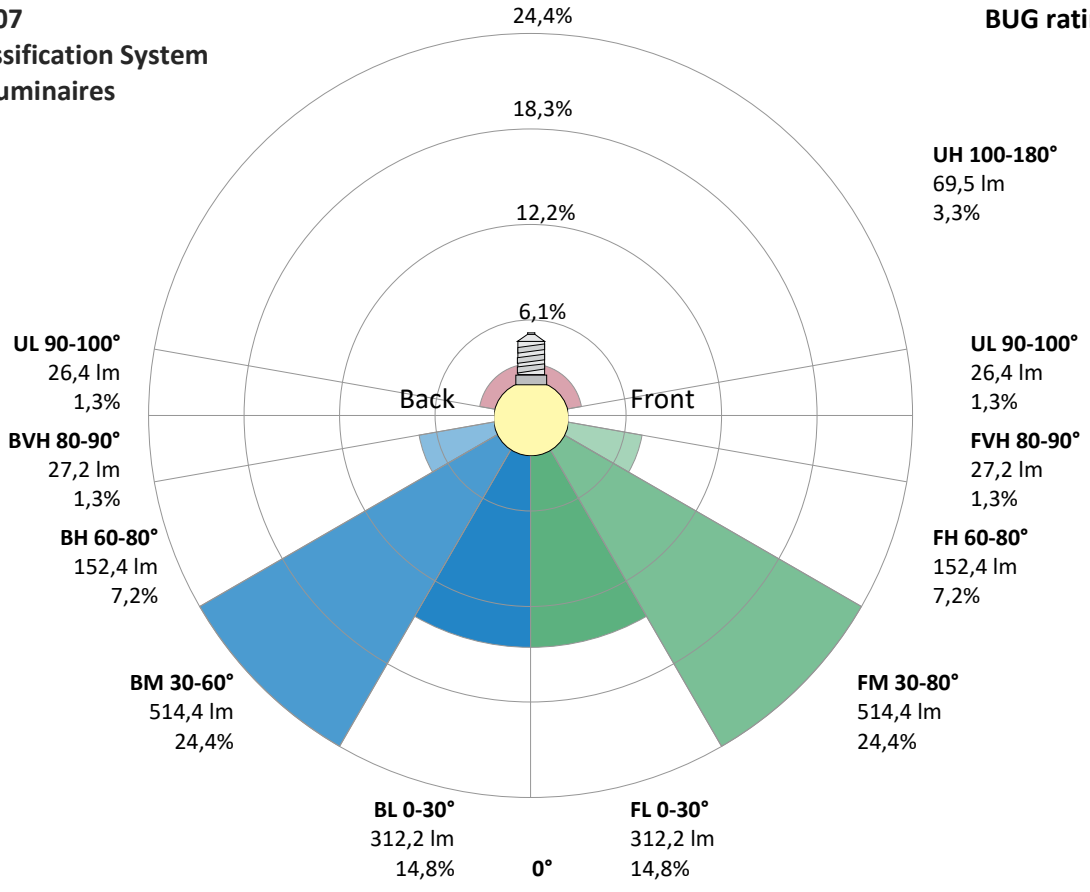
Zone (γ)	Lumen	% Total
0-30°	625 lm	29,7%
0-40°	1019 lm	48,3%
0-60°	1655 lm	78,5%
60-90°	358 lm	17,0%
70-100°	188 lm	8,9%
90-120°	67 lm	3,2%
0-90°	2013 lm	95,5%
90-180°	95 lm	4,5%
0-180°	2108 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	312 lm	14,8%
Medium(30-60°)	514 lm	24,4%
High(60-80°)	152 lm	7,2%
Very high(80-90°)	27 lm	1,3%
Back light		
Low(0-30°)	312 lm	14,8%
Medium(30-60°)	514 lm	24,4%
High(60-80°)	152 lm	7,2%
Very high(80-90°)	27 lm	1,3%
Uplight		
Low(90-100°)	26 lm	1,3%
High(100-180°)	70 lm	3,3%

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

BUG rating B1 U3 G1



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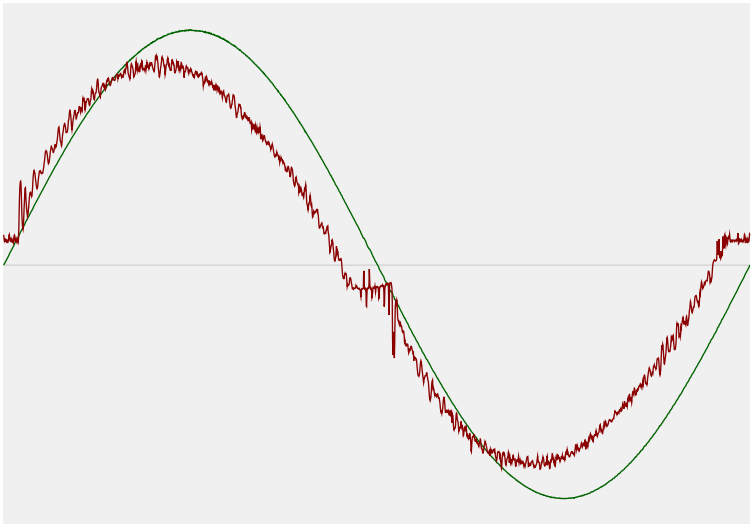
Power Details

Input Power

Power feed to light source	20,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,090 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	20,77 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	6,76%
Total harmonic distortion of the voltage	0,06%

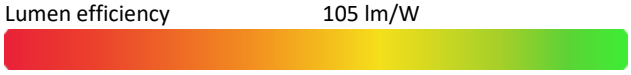
Input Power Curve



Efficiency

Radiated power efficiency 29,4%

Lumen efficiency 105 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	3001 K
CCT shift	-1 K
CCT end	3000 K

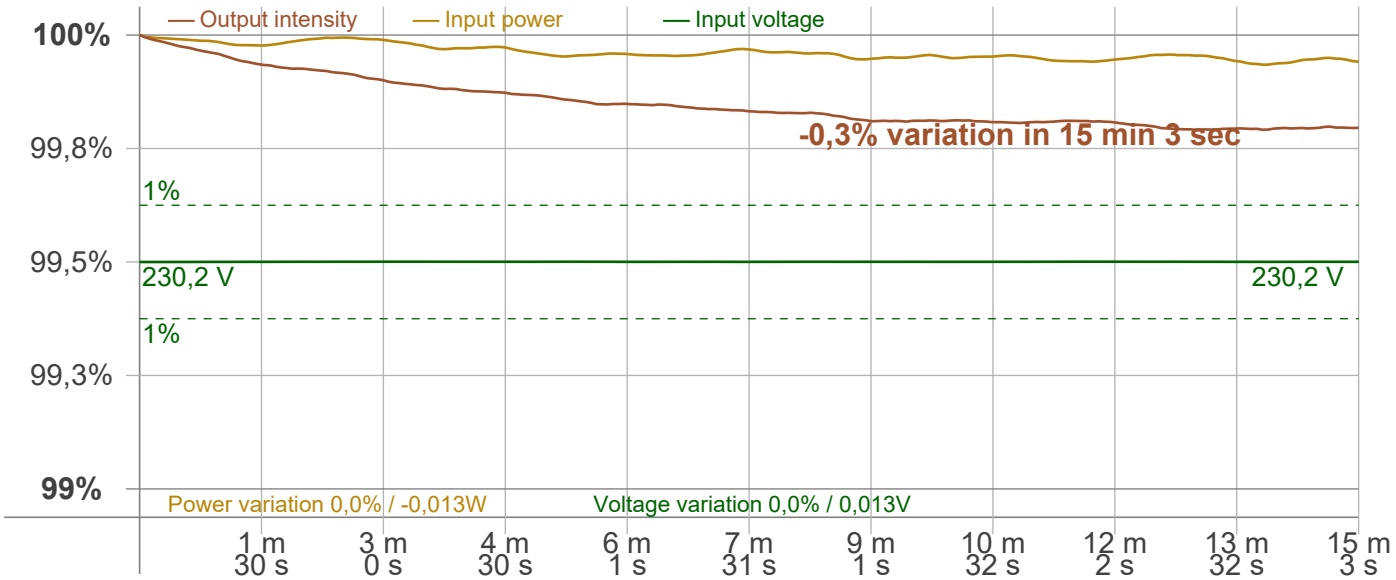
Warmup Result

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

Output Change

Output start	2113 lm
Output change	-5 lm
Output end	2108 lm

Stabilization Curve



Light Measurement Report

Print date: 14-8-2025
Measurement date and time: 14-8-2025 11:26:02 – Measurement no. VFR-250814-2550-MS
Measurement tracking No. and Link: VT250814-005142
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	101,52 Hz
Percent Flicker	0,1 %
Flicker index	0

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

JA8/10 40 Hz	0,02 %
JA8/10 90 Hz	0,02 %
JA8/10 200 Hz	0,08 %
JA8/10 400 Hz	0,08 %
JA8/10 1000 Hz	0,09 %

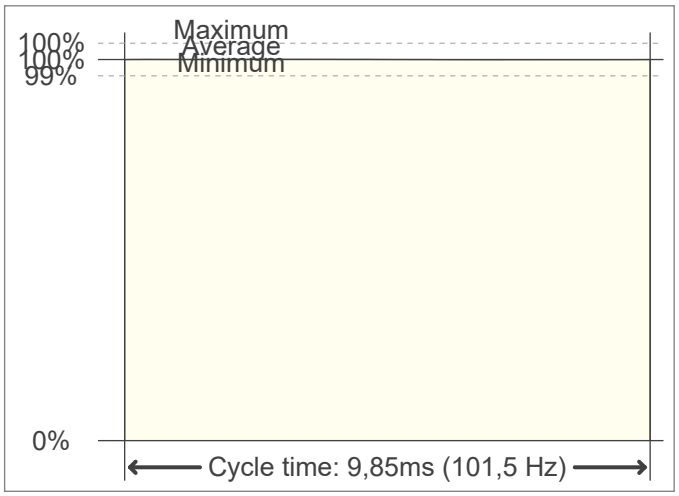
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

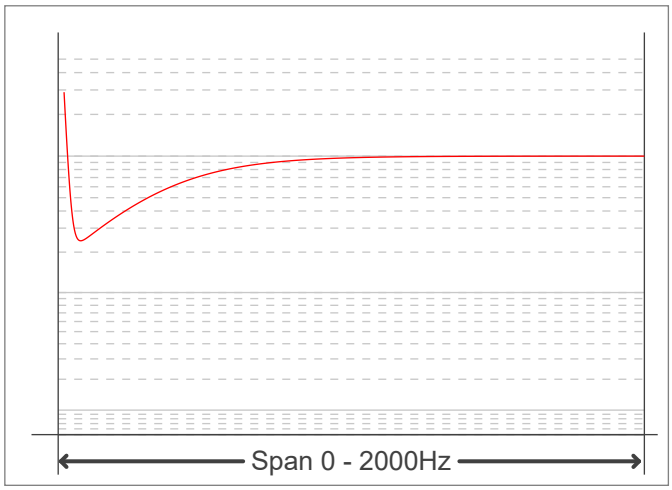
Flicker indices according to Lighting Research Center (2015)

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