Light Measurement Report

Print date: 16-10-2024
Measurement date and time: 16-10-2024 13:29:14 – Measurement no. VFR-241016-1322-MS
Measurement tracking No. and Link: VT241016-000820
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

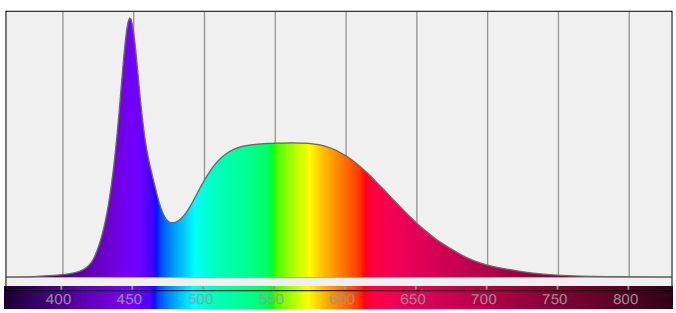
Number of C-planes and Resolution	72 planes – 5°
γ (gamma)-Resolution	5°
Test Distance	2,49 m
Input Power, Power and Displ. Factors	34,8 W – PF 0,97 – DPF 0,97
Input RMS Voltage and Current	230 V – 0,156 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 2 sec – 2,0%

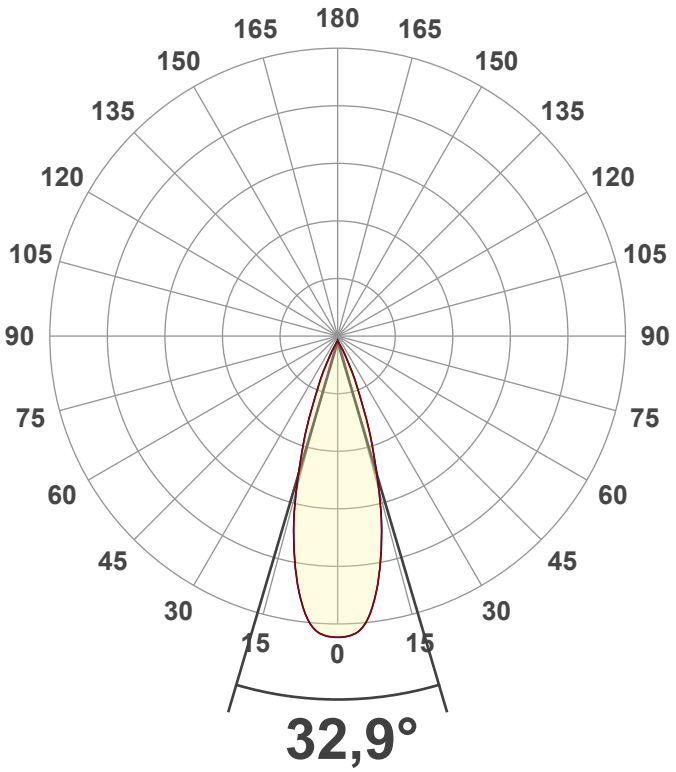
Tested Light Source

Product Name	804312-6000K
Item No. and Manufacturer	804312-6000K – Dutchfulfillment
Product Description (line 1)	KANTELBARE DOWNLIGHT | Ø180 | 40W | CCT-SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	3231 lm – 0,12% / 99,88%
Efficiency	93 lm/W
Peak Intensity and Beam Angle	9561 cd – 32,9°
Correlated Color Temperature, Target/Measured	CCT = 6000 K / 5943 K
Color Rendering Index	CRI 81,0
Color Rendering TM30-18	R_f 82,7 – R_g 96,5
Color Shift, CIE duv and MacAdam Steps	Duv 0,0025 – SDCM 7,7
Flicker	SVM 0,01 – PstLM 0,02





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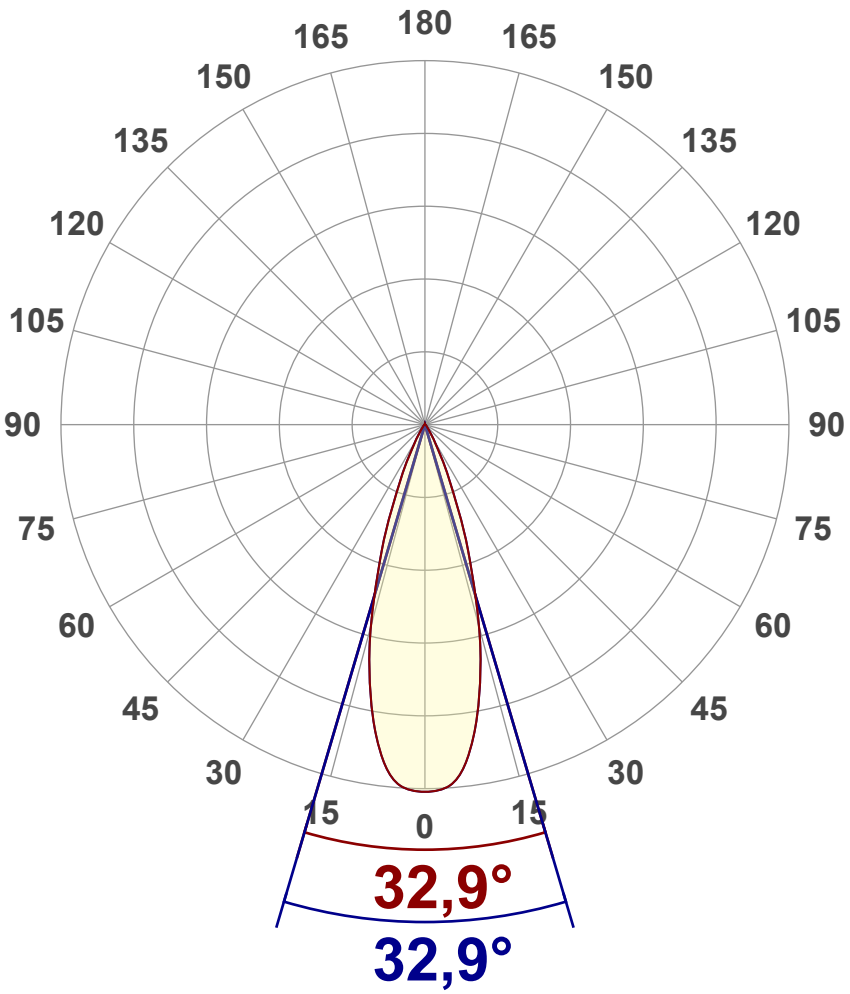
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3231 lm
Lumen Up% / Down%	0,12% / 99,88%
Peak Intensity	9561 cd
Beam Angle (50%)	32,9°
Beam Angle (90%)	32,9°
Beam Angle (10%)	32,9°

Cut-off Angle

Average 2,5%	67,8°

Field Angle

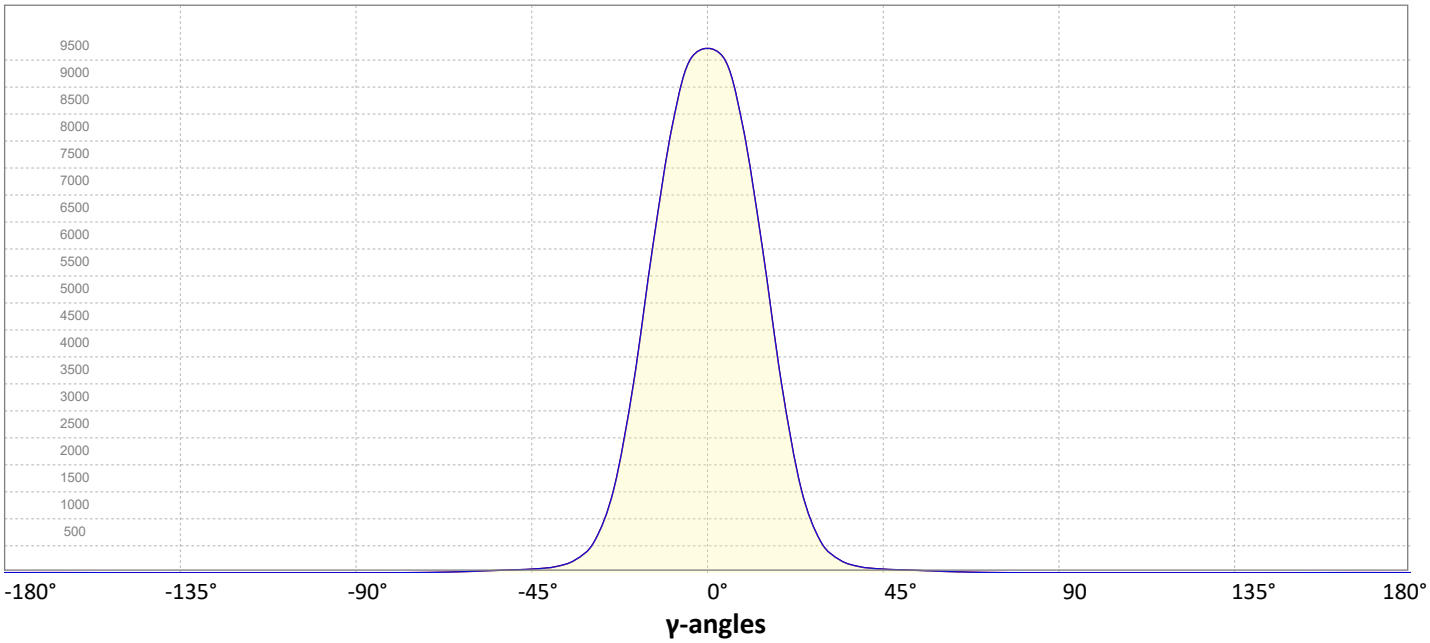
Average 10%	54,1°

Intensity Ratio

In 120° cone	99,2%
In 90° cone	97,4%

C000-C180
C090-C270

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



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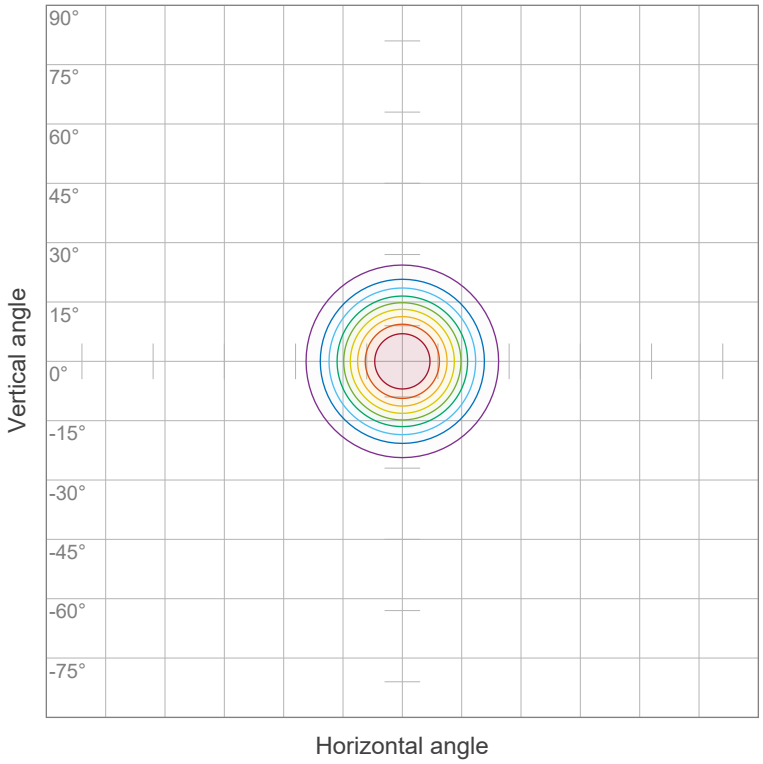
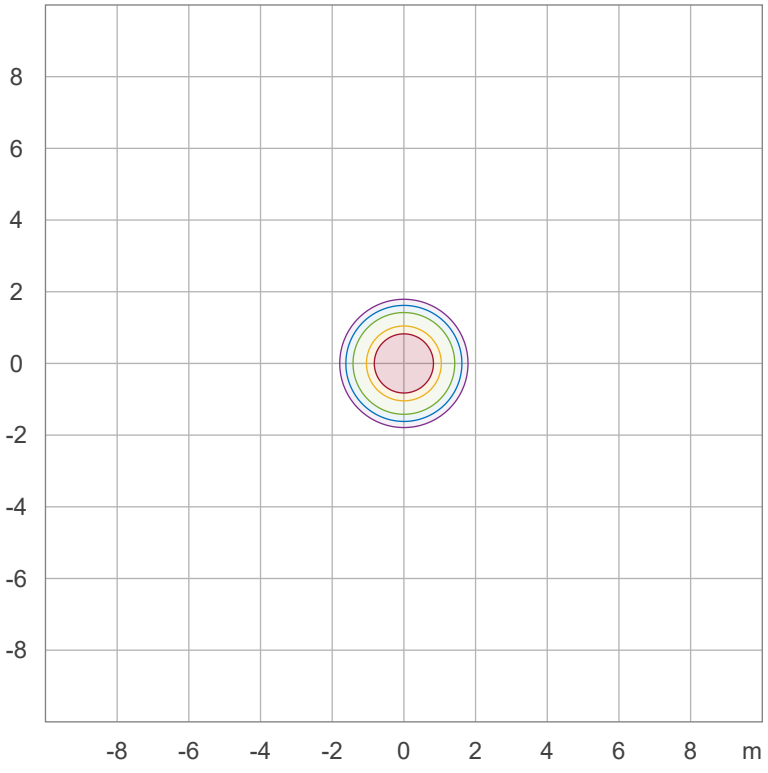
Iso-intensity Diagram (Iso-candela)



90 %	8604,7 cd
80 %	7648,6 cd
70 %	6692,5 cd
60 %	5736,5 cd
50 %	4780,4 cd
40 %	3824,3 cd
30 %	2868,2 cd
20 %	1912,2 cd
10 %	956,1 cd

Peak intensity: 9560,8 cd
Number of c-planes: 72

Iso-illuminance Diagram (Iso-lux)



50,0 %	531,2 lx
30,0 %	318,7 lx
10,0 %	106,2 lx
5,0 %	53,1 lx
3,0 %	31,9 lx

Peak illuminance: 1062,3 lx
Mounting height: 3,0 m
Number of c-planes: 72

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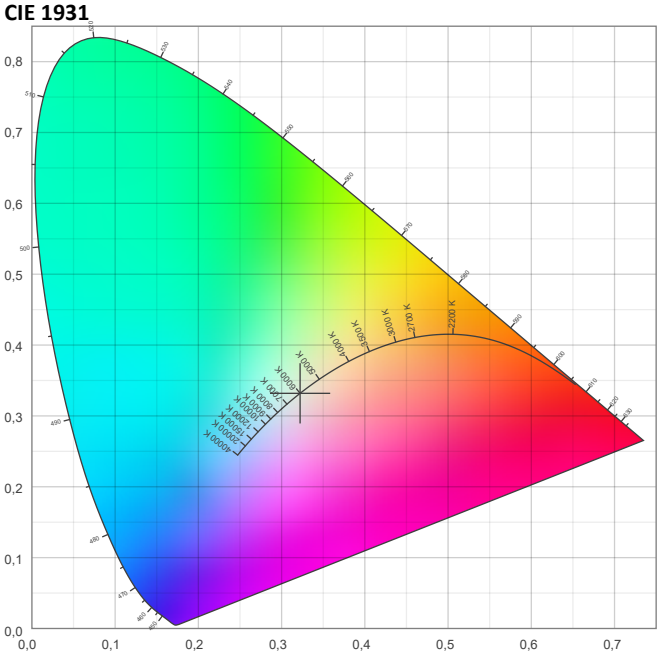
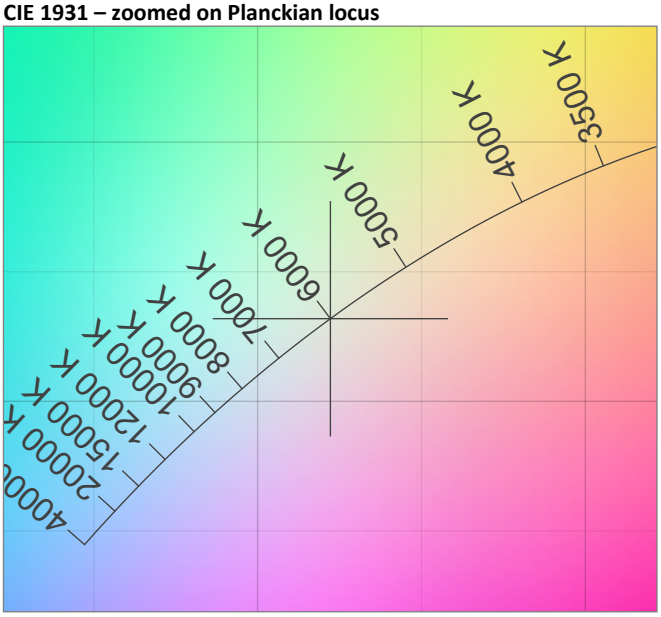
Color details

Correlated Color Temperature, Target	CCT = 6000 K
Correlated Color Temperature, Measured	CCT = 5943 K
Color Rendering Index	CRI 81,0
Color Rendering Index, R9 (red component)	R9 = -1,1
Color Rendering TM30-18	R_f 82,7 – R_g 96,5
Color Quality Scale	CQS = 80,8
MacAdam Steps	SDCM = 7,7
Color coordinates CIE 1931	(x;y) = (0,322;0,332)
Color coordinate CIEs 1960	(u;v) = (0,203;0,314)
Color deviation from BBL	Duv = 0,0025
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,203;0,471)

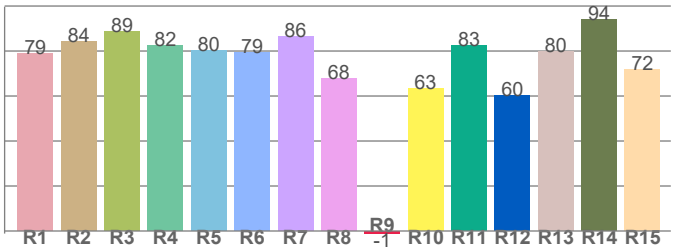
CIE 1931



CIE 1931 – zoomed on Planckian locus



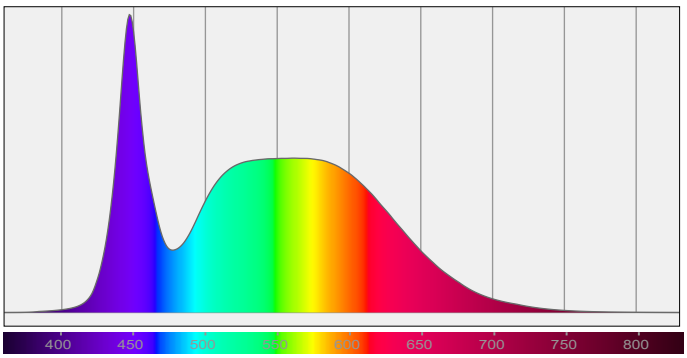
Color Rendering Index per reference color (CIE 1995)



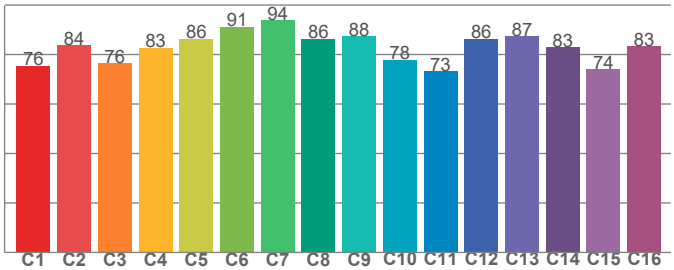
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
78,8	84,1	88,8	82,4	80,3	79,5	86,4	67,7	-1,1	63,3	82,5	60,4	79,9	94,1	71,8

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



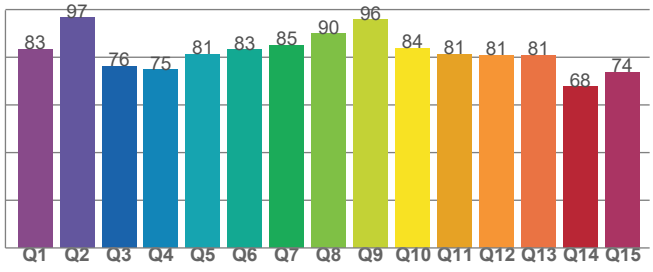
TM30-18 Rf-values per hue bin



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
75,5	83,7	76,4	82,7	86,4	91,2	93,8	86,4	87,5	77,9	73,3	86,3	87,3	83,1	74,0	83,4

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
83,3	96,6	76,3	74,7	81,3	83,1	85,1	89,9	95,7	83,9	81,2	80,7	80,9	67,7	73,7

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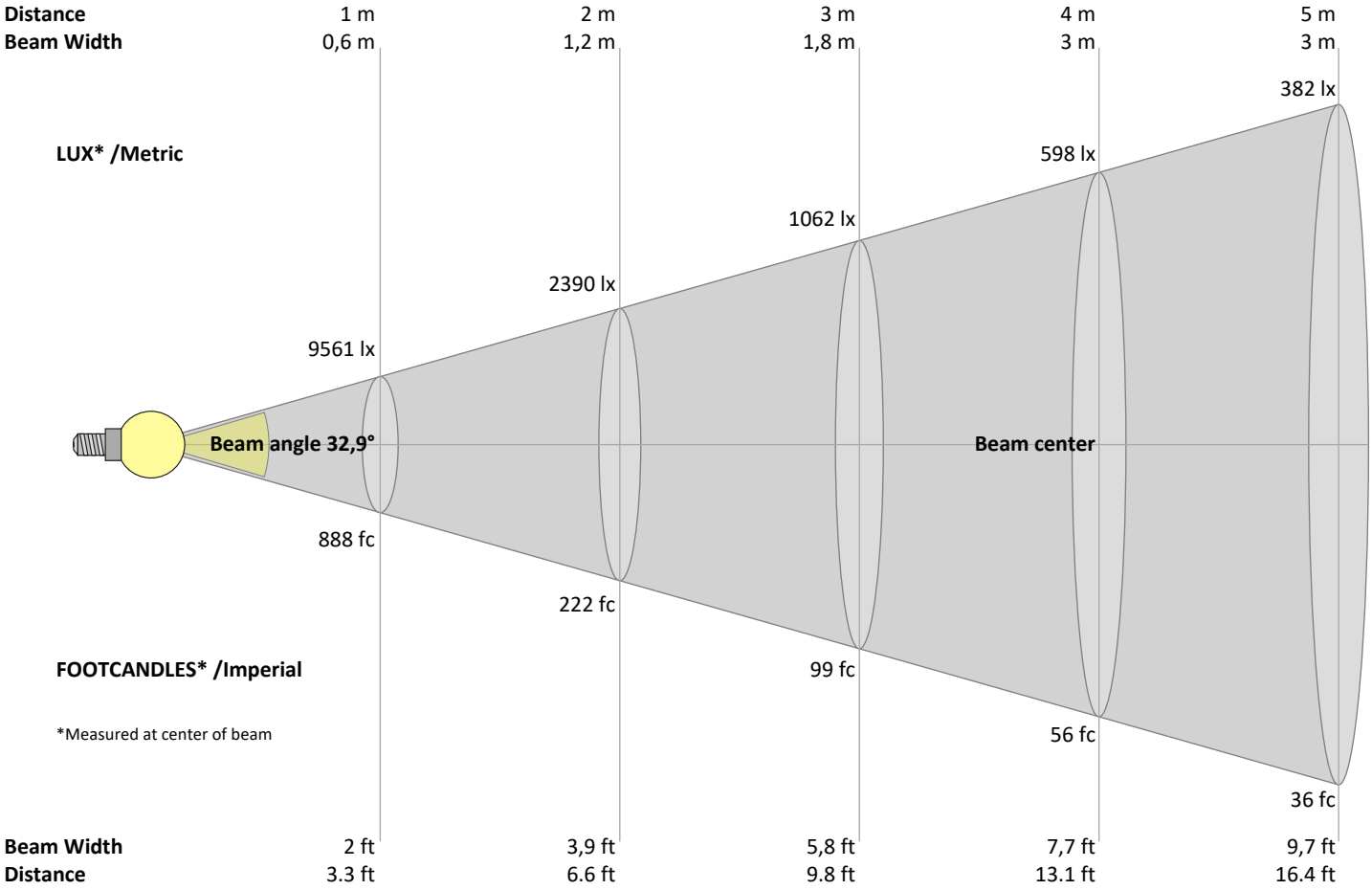
Beam Details



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
9561	2390	1062	598	382	266	195	149	118	96	79	66	57	49	42	37	33	30	26	24	lux
888,2	222,1	98,7	55,5	35,5	24,7	18,1	13,9	11	8,9	7,3	6,2	5,3	4,5	3,9	3,5	3,1	2,7	2,5	2,2	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
9561	9561	9546	9045	8544	7836	6943	6046	5019	3992	3097	2319	1554	1161	768	510	371	234	185	135	cd
100%	100%	100%	95%	89%	82%	73%	63%	52%	42%	32%	24%	16%	12%	8%	5%	4%	2%	2%	1%	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
9561	9561	9546	9045	8544	7836	6943	6046	5019	3992	3097	2319	1554	1161	768	510	371	234	185	135	cd
100%	100%	100%	95%	89%	82%	73%	63%	52%	42%	32%	24%	16%	12%	8%	5%	4%	2%	2%	1%	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
9561	9561	9546	9045	8544	7836	6943	6046	5019	3992	3097	2319	1554	1161	768	510	371	234	185	135	cd
100%	100%	100%	95%	89%	82%	73%	63%	52%	42%	32%	24%	16%	12%	8%	5%	4%	2%	2%	1%	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
9561	9561	9546	9045	8544	7836	6943	6046	5019	3992	3097	2319	1554	1161	768	510	371	234	185	135	cd
100%	100%	100%	95%	89%	82%	73%	63%	52%	42%	32%	24%	16%	12%	8%	5%	4%	2%	2%	1%	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	13,8	14,2	13,8	14,4	14,6	13,8	14,2	13,8	14,4	14,6
	3H	13,7	14,3	14,0	14,5	14,7	13,7	14,3	14,0	14,5	14,7
	4H	13,6	14,2	14,0	14,5	14,7	13,6	14,2	14,0	14,5	14,7
	6H	13,7	14,1	13,9	14,4	14,8	13,7	14,1	13,9	14,4	14,8
	8H	13,6	14,1	13,9	14,4	14,8	13,6	14,1	13,9	14,4	14,8
	12H	13,6	14,0	13,9	14,4	14,8	13,6	14,0	13,9	14,4	14,8
4H	2H	13,6	14,2	14,0	14,5	14,7	13,6	14,2	14,0	14,5	14,7
	3H	13,8	14,2	14,1	14,6	15,0	13,8	14,2	14,1	14,6	15,0
	4H	13,7	14,1	14,1	14,5	15,1	13,7	14,1	14,1	14,5	15,1
	6H	13,6	14,1	14,1	14,4	14,8	13,6	14,1	14,1	14,4	14,8
	8H	13,6	14,0	14,1	14,4	14,7	13,6	14,0	14,1	14,4	14,7
	12H	13,5	13,9	14,0	14,3	14,7	13,5	13,9	14,0	14,3	14,7
8H	4H	13,6	14,0	14,1	14,4	14,7	13,6	14,0	14,1	14,4	14,7
	6H	13,5	13,8	14,0	14,3	14,8	13,5	13,8	14,0	14,3	14,8
	8H	13,5	13,8	14,1	14,3	14,9	13,5	13,8	14,1	14,3	14,9
	12H	13,5	13,7	14,1	14,2	14,8	13,5	13,7	14,1	14,2	14,8
12H	4H	13,5	13,9	14,0	14,3	14,7	13,5	13,9	14,0	14,3	14,7
	6H	13,5	13,8	14,0	14,3	14,9	13,5	13,8	14,0	14,3	14,9
	8H	13,5	13,7	14,1	14,2	14,8	13,5	13,7	14,1	14,2	14,8

Variations with the observer position for the luminaire spacings, S:		
S = 1.0H	3,9 / -2,5	3,9 / -2,5
S = 1.5H	6,2 / -4,1	6,2 / -4,1
S = 2.0H	8,0 / -6,4	8,0 / -6,4

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	115	112	110	108	112	110	108	107	106	105	103	102	101	100	99	98	97	96
2	110	106	103	100	108	105	102	99	101	99	97	99	97	95	96	94	93	91
3	106	101	97	94	104	100	96	93	97	94	92	95	92	90	93	91	89	88
4	102	97	92	89	101	95	91	88	93	90	87	92	89	86	90	87	85	84
5	99	92	88	85	97	92	87	84	90	86	83	88	85	83	87	84	82	81
6	96	89	84	81	94	88	84	80	87	83	80	85	82	79	84	81	79	78
7	92	85	81	77	91	85	80	77	84	80	77	82	79	76	81	78	76	75
8	89	82	78	74	88	82	77	74	81	77	74	80	76	74	79	76	73	72
9	87	79	75	72	86	79	75	72	78	74	71	77	74	71	76	73	71	70
10	84	77	72	69	83	76	72	69	76	72	69	75	71	69	74	71	69	68

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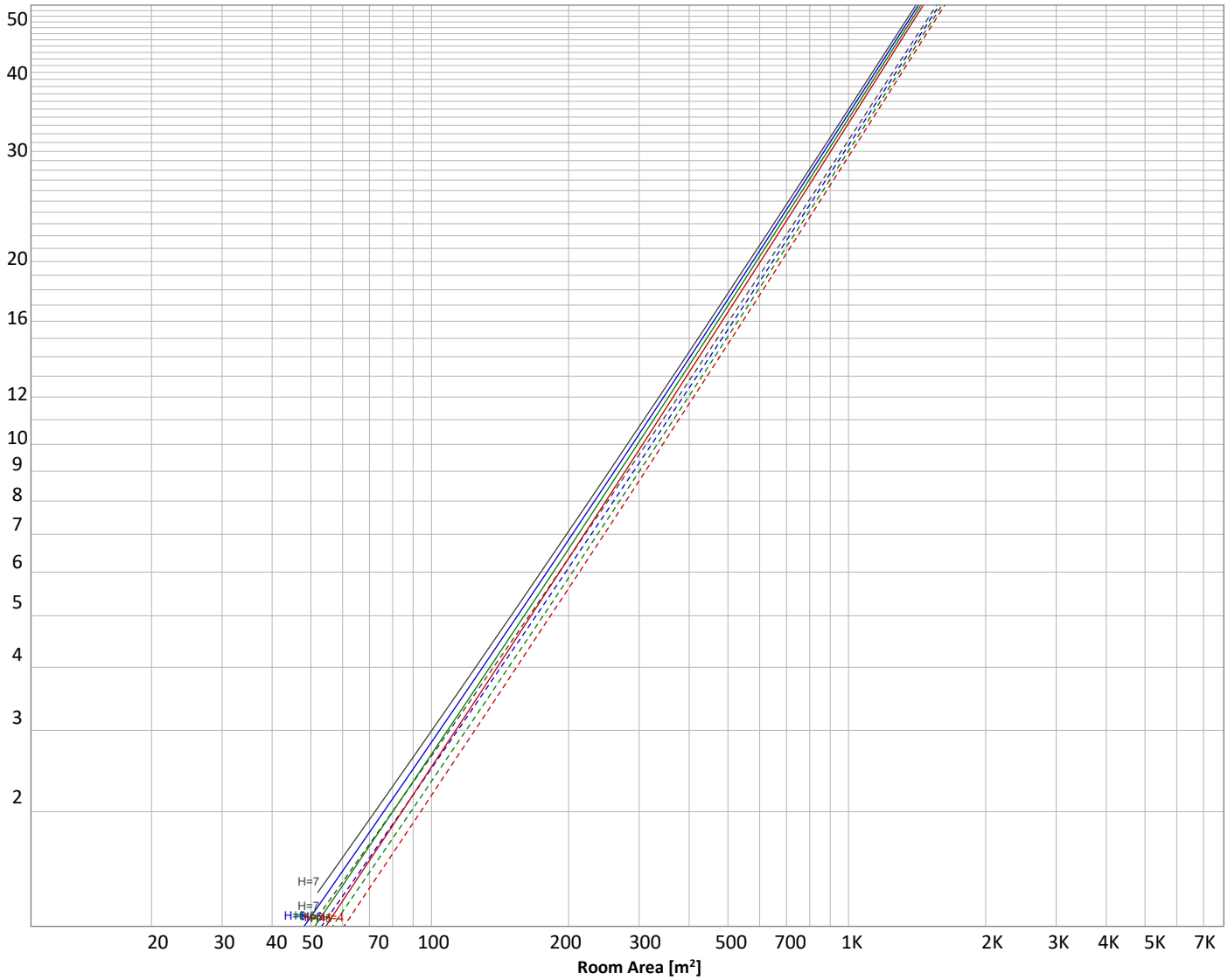
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3231 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°
843 lm	1475 lm	652 lm	146 lm	55,5 lm	35,7 lm	15,7 lm	4,16 lm	0,731 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,300 lm	0,249 lm	0,218 lm	0,254 lm	0,277 lm	0,502 lm	0,877 lm	0,828 lm	0,283 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	843 lm	26,1%
10-20°	1475 lm	45,6%
20-30°	652 lm	20,2%
30-40°	146 lm	4,5%
40-50°	56 lm	1,7%
50-60°	36 lm	1,1%
60-70°	16 lm	0,5%
70-80°	4 lm	0,1%
80-90°	1 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°	1 lm	0,0%
150-160°	1 lm	0,0%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
Total	3231 lm	100,0%

Intensity peaks

Max intensity	9561 cd
Intensity, 90°	0 cd
Intensity, 0°	9561 cd

Zonal Lumen summary

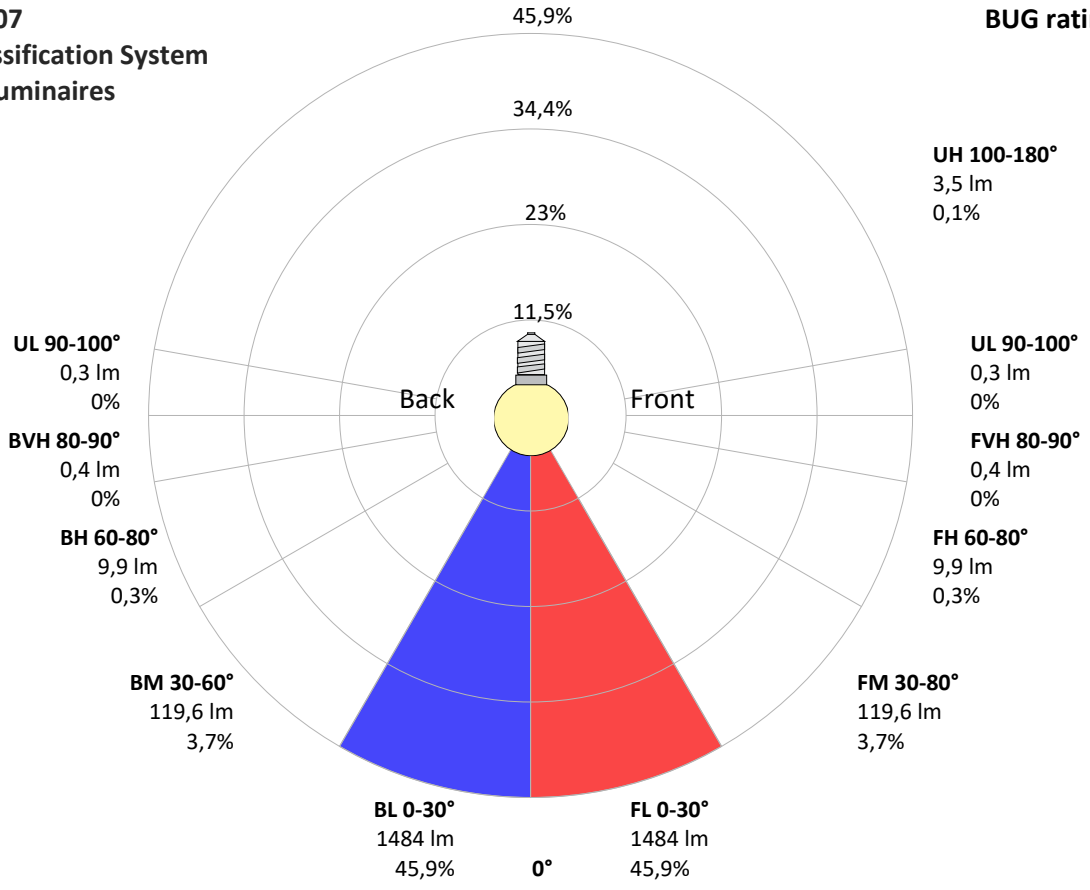
Zone (γ)	Lumen	% Total
0-30°	2970 lm	91,9%
0-40°	3116 lm	96,4%
0-60°	3207 lm	99,2%
60-90°	21 lm	0,6%
70-100°	5 lm	0,2%
90-120°	1 lm	0,0%
0-90°	3228 lm	99,9%
90-180°	4 lm	0,1%
0-180°	3231 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1484 lm	45,9%
Medium(30-60°)	120 lm	3,7%
High(60-80°)	10 lm	0,3%
Very high(80-90°)	0 lm	0,0%
Back light		
Low(0-30°)	1484 lm	45,9%
Medium(30-60°)	120 lm	3,7%
High(60-80°)	10 lm	0,3%
Very high(80-90°)	0 lm	0,0%
Uplight		
Low(90-100°)	0 lm	0,0%
High(100-180°)	3 lm	0,1%

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

BUG rating B3 U1 G0



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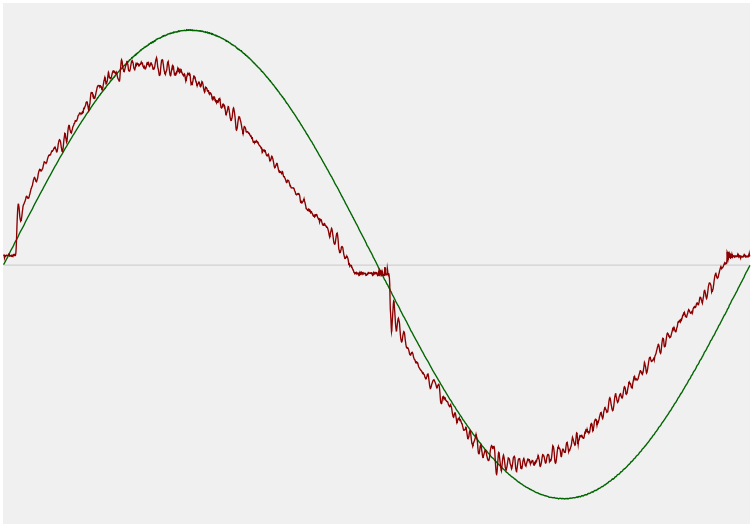
Power Details

Input Power

Power feed to light source	34,8 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,156 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	35,86 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	9,65%
Total harmonic distortion of the voltage	0,07%

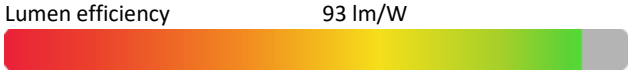
Input Power Curve



Efficiency

Radiated power efficiency 29,0%

Lumen efficiency 93 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5972 K
CCT shift	+28 K
CCT end	6000 K

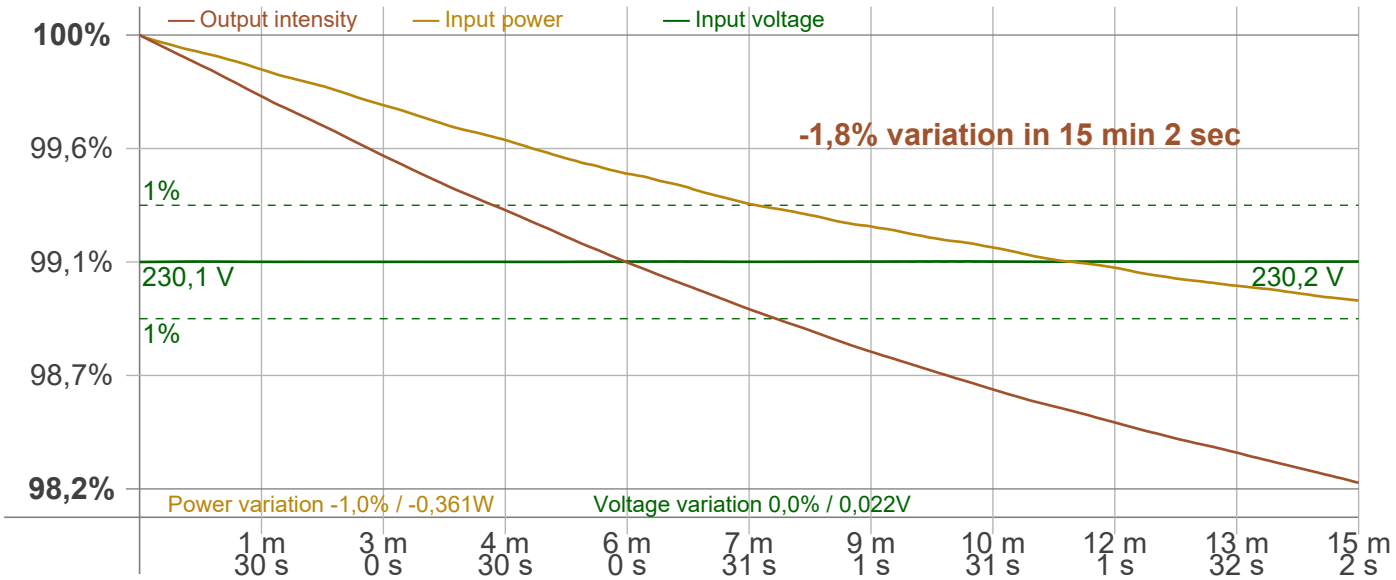
Warmup Result

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	-1,8%

Output Change

Output start	3288 lm
Output change	-57 lm
Output end	3231 lm

Stabilization Curve



Light Measurement Report

Print date: 16-10-2024
Measurement date and time: 16-10-2024 13:29:14 – Measurement no. VFR-241016-1322-MS
Measurement tracking No. and Link: VT241016-000820
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	100,5 Hz
Percent Flicker	0,34 %
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	0,34 %
JA8/10 400 Hz	0,34 %
JA8/10 1000 Hz	0,34 %

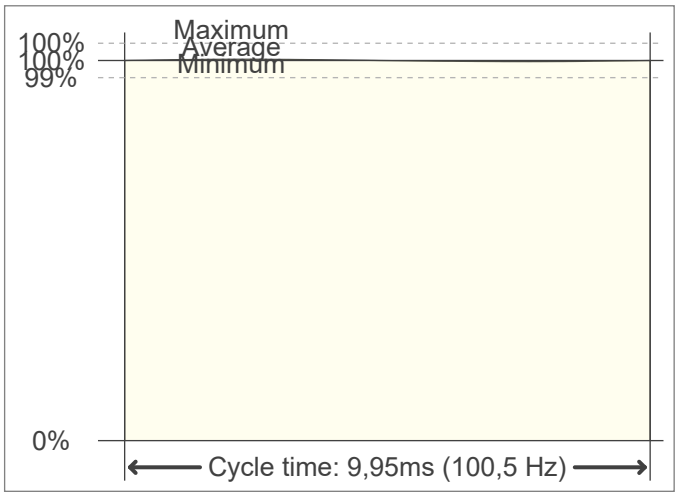
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz)	0,02
SVM value (80 < F < 2000 Hz)	0,01

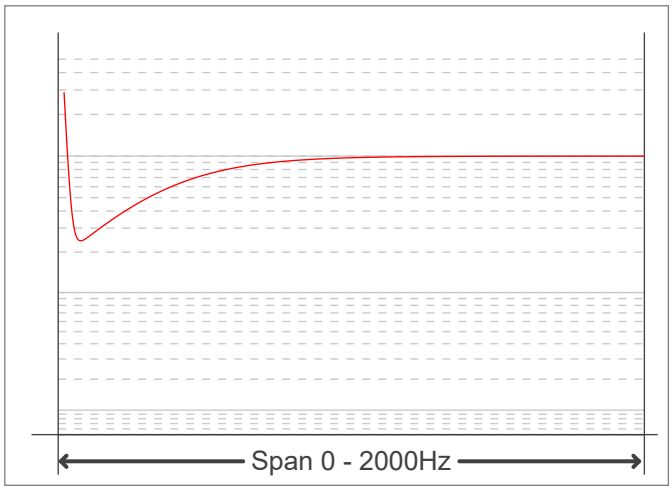
Flicker indices according to Lighting Research Center (2015)

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