Light Measurement Report

Print date: 18-11-2024
Measurement date and time: 18-11-2024 10:35:40 – Measurement no. VFR-241118-2040-MS
Measurement tracking No. and Link: VT241118-006209
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

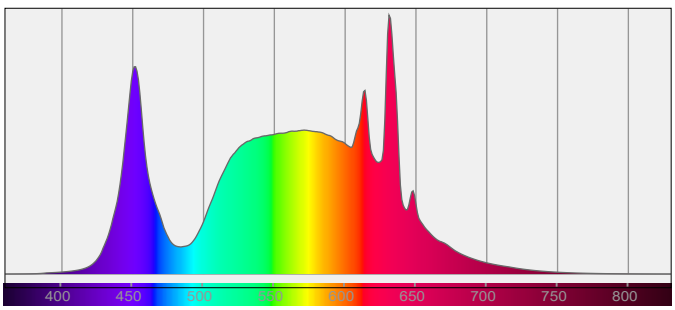
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,13 m
Input Power, Power and Displ. Factors	59,2 W – PF 0,98 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,263 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

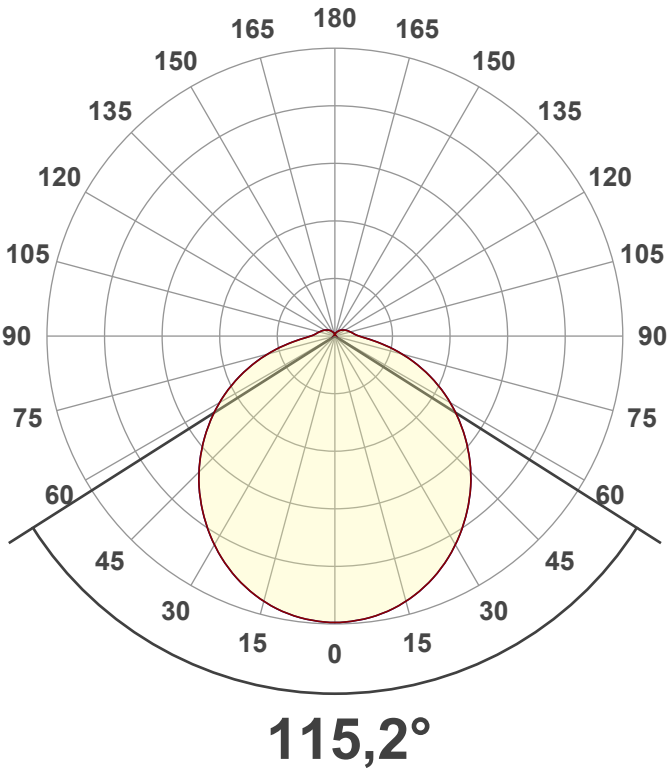
Tested Light Source

Product Name	805852-4000K
Item No. and Manufacturer	805852-4000K – Dutchfulfillment
Product Description (line 1)	RETROFIT PLUTO | LED MODULE | 32W/40W/48W/55W | 120°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	9175 lm – 7,94% / 92,06%
Efficiency	155 lm/W
Peak Intensity and Beam Angle	2772 cd – 115,2°
Correlated Color Temperature, Target/Measured	CCT = 4000 K / 4126 K
Color Rendering Index	CRI 83,3
Color Rendering TM30-18	R_f 82,5 – R_g 99,0
Color Shift, CIE duv and MacAdam Steps	Duv 0,0017 – SDCM 2,9
Flicker	SVM 0 – PstLM 0,01





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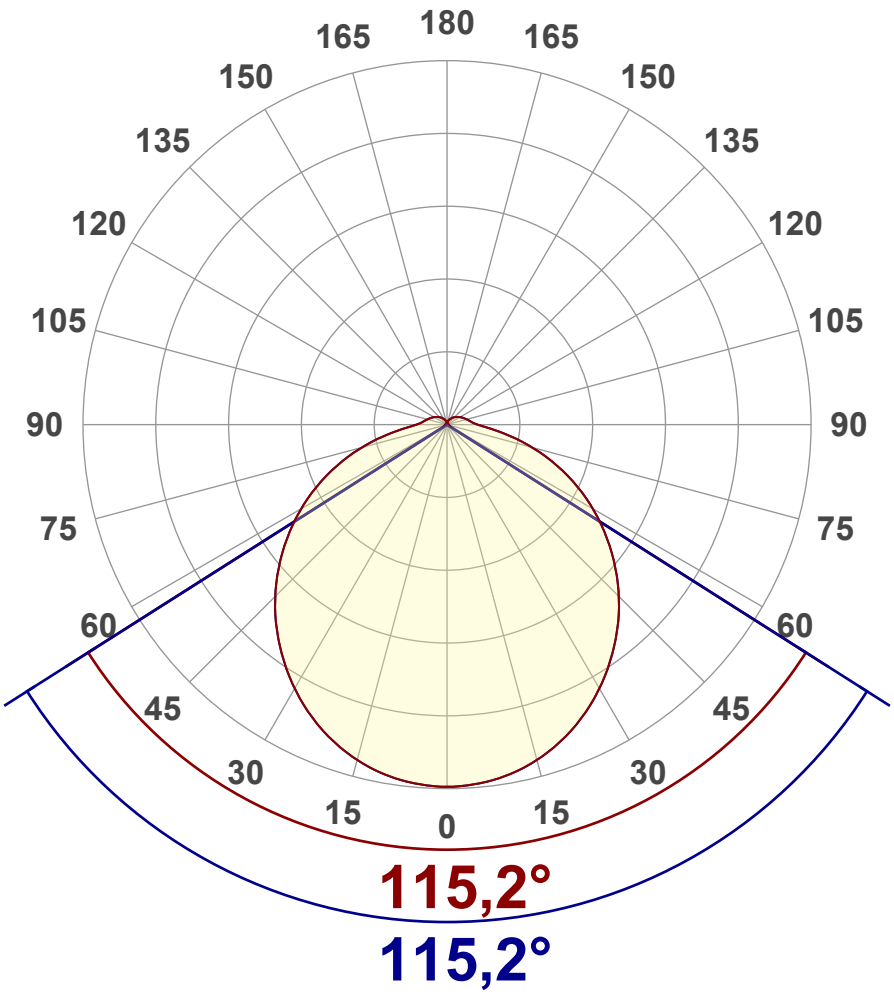
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	9175 lm
Lumen Up% / Down%	7,94% / 92,06%
Peak Intensity	2772 cd
Beam Angle (50%)	115,2°
Beam Angle (90%)	115,2°
Beam Angle (10%)	115,2°

Cut-off Angle

Average 2,5%	281°

Field Angle

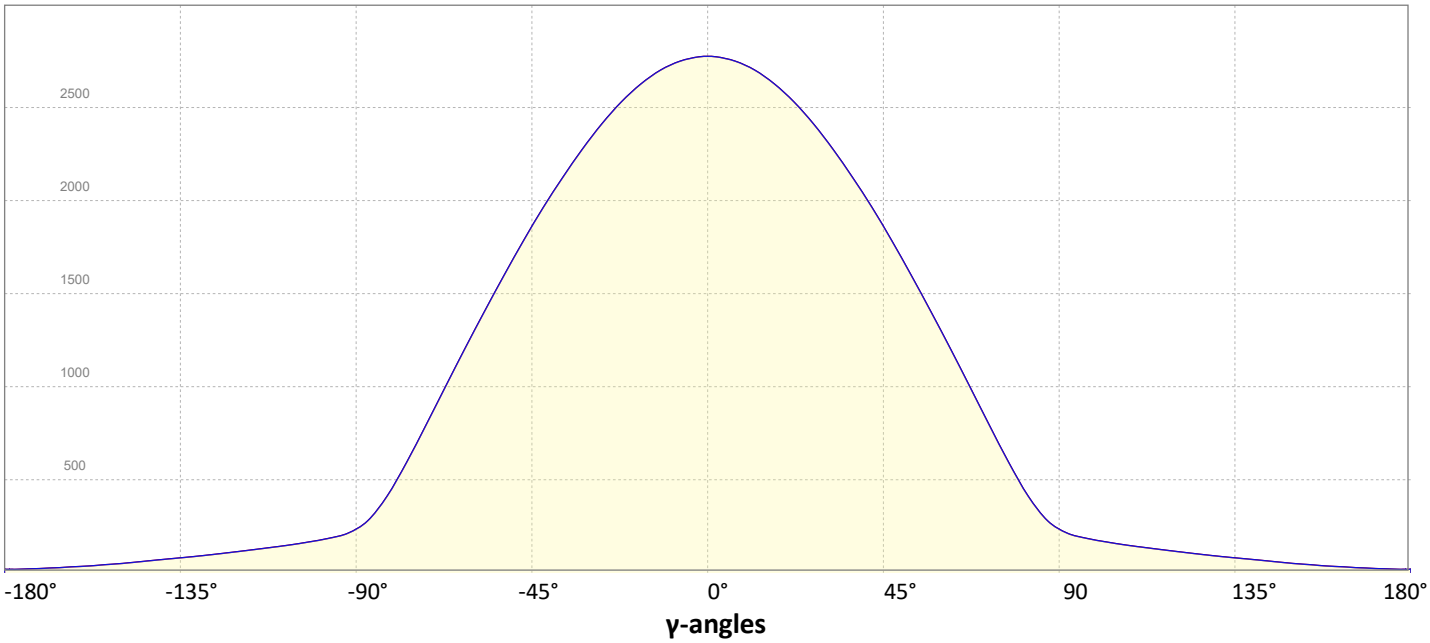
Average 10%	174,3°

Intensity Ratio

In 120° cone	68,5%
In 90° cone	46,2%

C000-C180
C090-C270

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



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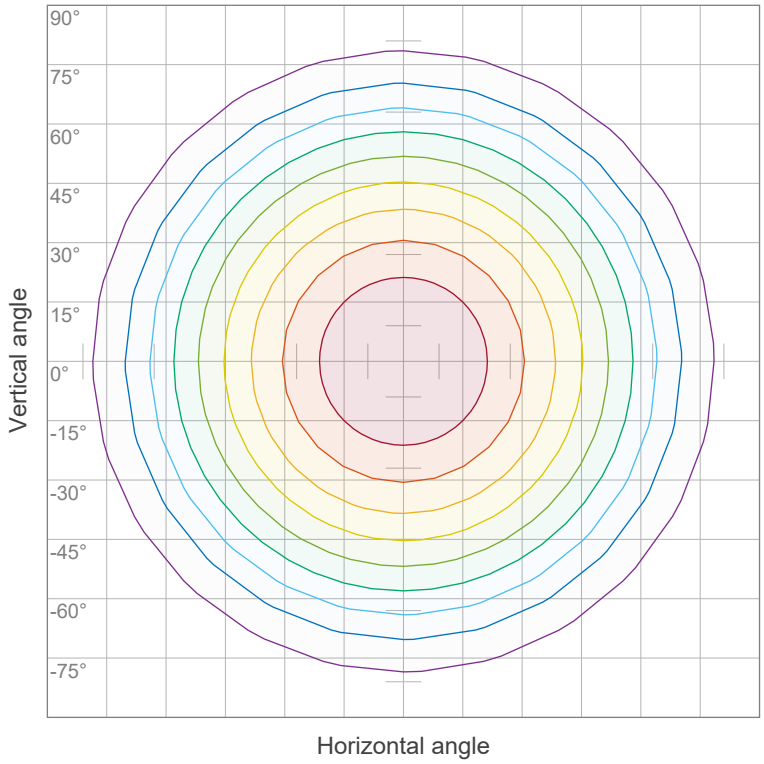
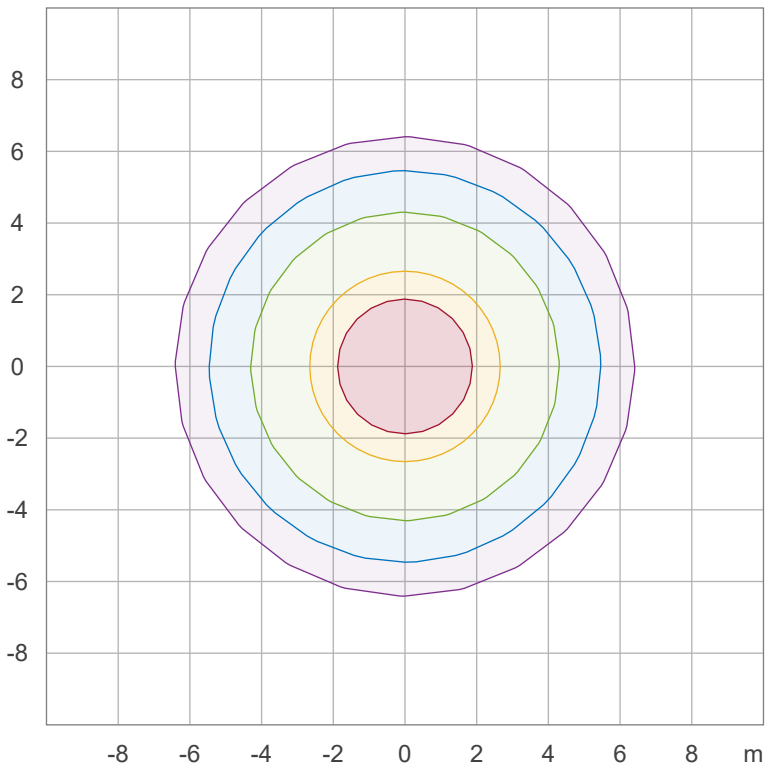
Iso-intensity Diagram (Iso-candela)



90 %	2495,2 cd
80 %	2218,0 cd
70 %	1940,7 cd
60 %	1663,5 cd
50 %	1386,2 cd
40 %	1109,0 cd
30 %	831,7 cd
20 %	554,5 cd
10 %	277,2 cd

Peak intensity: 2772,5 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	154,0 lx
30,0 %	92,4 lx
10,0 %	30,8 lx
5,0 %	15,4 lx
3,0 %	9,2 lx

Peak illuminance: 308,1 lx
Mounting height: 3,0 m
Number of c-planes: 12

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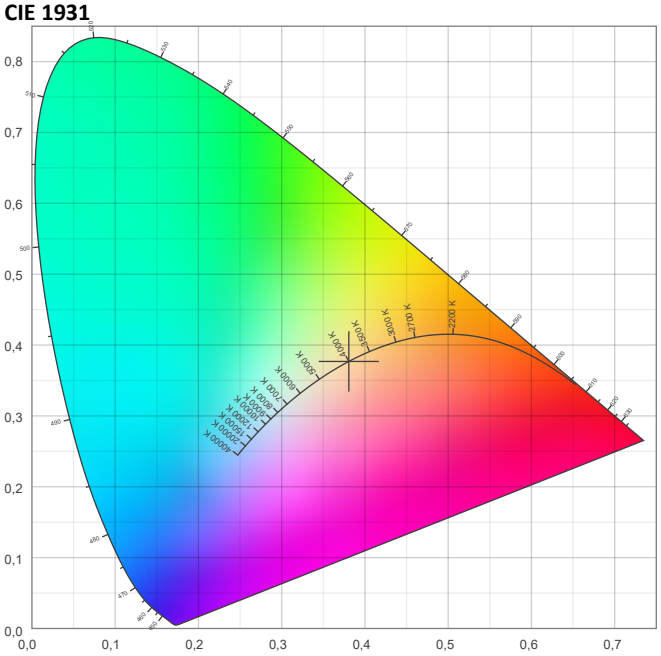
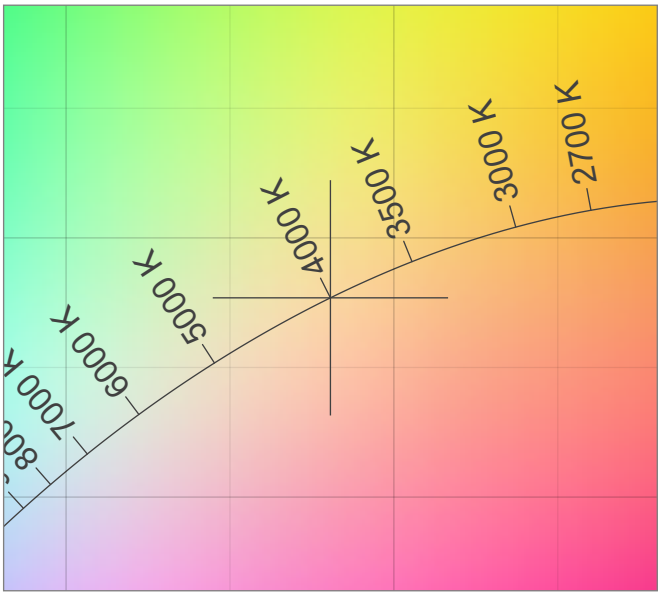
Color details

Correlated Color Temperature, Target	CCT = 4000 K
Correlated Color Temperature, Measured	CCT = 4126 K
Color Rendering Index	CRI 83,3
Color Rendering Index, R9 (red component)	R9 = 35,7
Color Rendering TM30-18	R_f 82,5 – R_g 99,0
Color Quality Scale	CQS = 82,4
MacAdam Steps	SDCM = 2,9
Color coordinates CIE 1931	(x;y) = (0,381;0,377)
Color coordinate CIEs 1960	(u;v) = (0,225;0,334)
Color deviation from BBL	Duv = 0,0017
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,225;0,502)

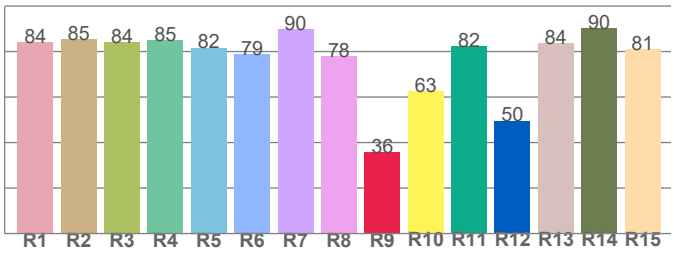
CIE 1931



CIE 1931 – zoomed on Planckian locus



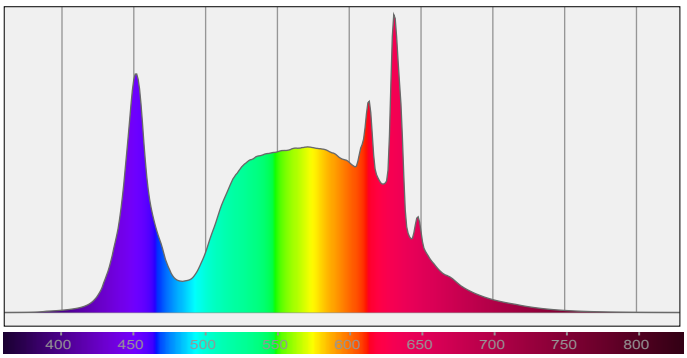
Color Rendering Index per reference color (CIE 1995)



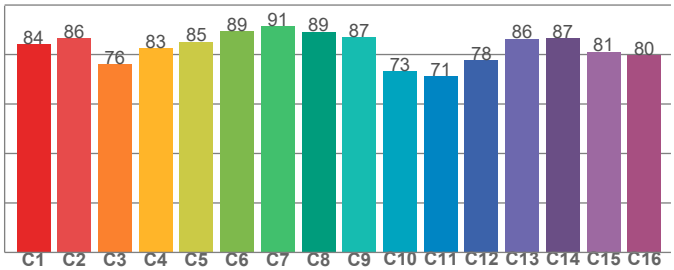
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84,1	85,4	84,0	84,9	81,7	78,8	89,9	77,8	35,7	62,6	82,4	49,5	83,6	90,2	81,1

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



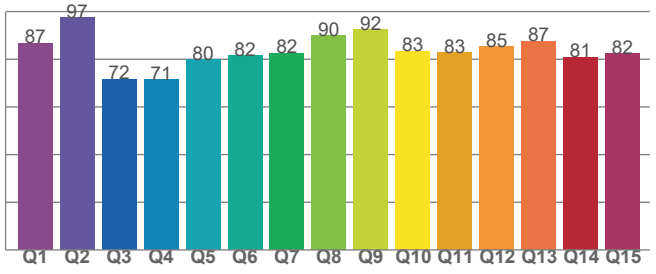
TM30-18 Rf-values per hue bin



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
84,2	86,5	76,2	82,6	85,1	89,4	91,5	89,2	87,1	73,2	71,2	77,7	86,4	86,5	81,2	79,7

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
86,7	97,5	71,7	71,3	79,7	81,5	82,5	89,9	92,5	83,4	82,7	85,2	87,5	80,8	82,3

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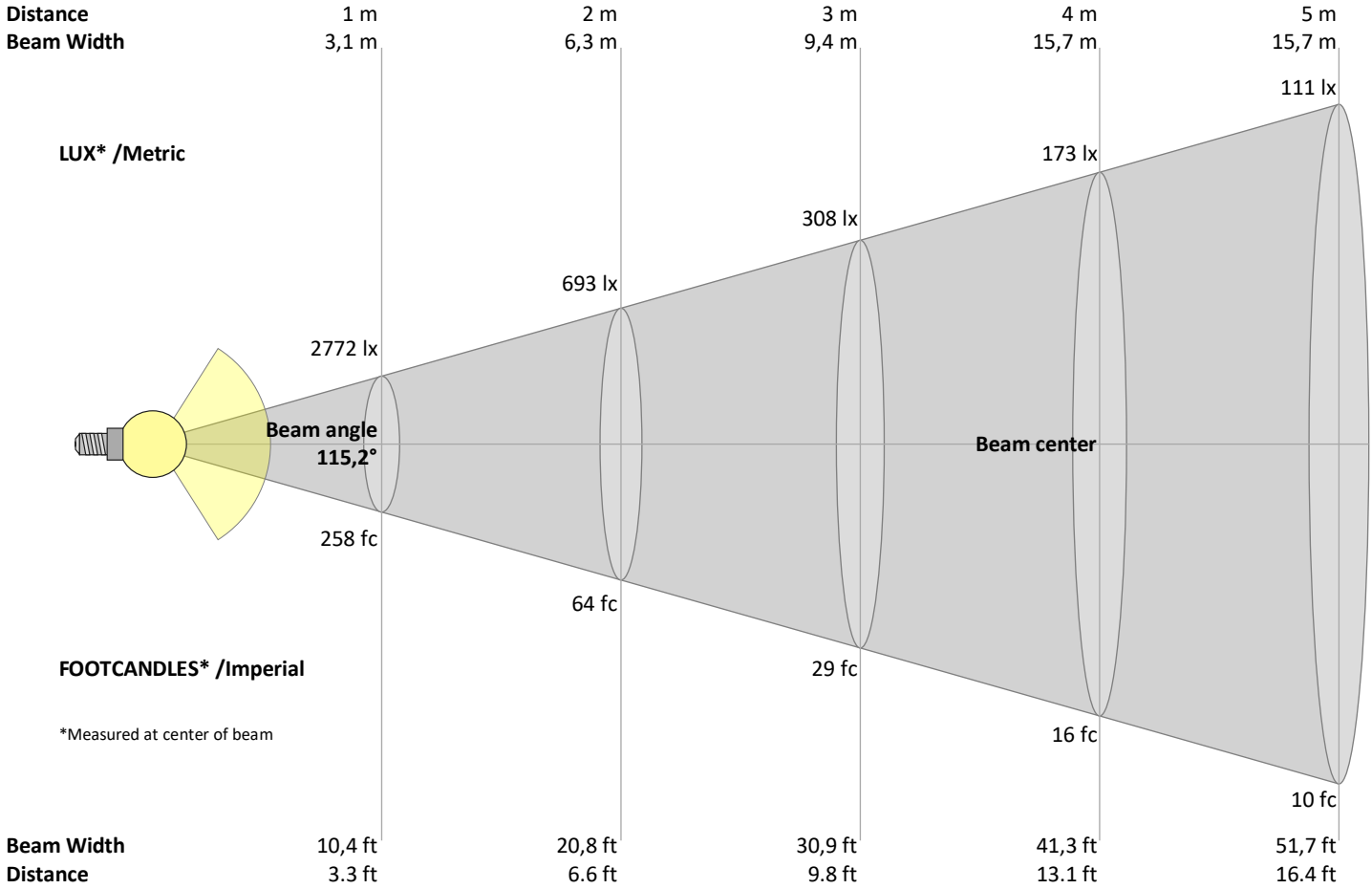
Beam Details



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
2772	693	308	173	111	77	57	43	34	28	23	19	16	14	12	11	10	9	8	7	lux
257,6	64,4	28,6	16,1	10,3	7,2	5,3	4	3,2	2,6	2,1	1,8	1,5	1,3	1,1	1	0,9	0,8	0,7	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
2772	2759	2721	2657	2570	2461	2333	2188	2030	1860	1678	1487	1290	1087	881	677	487	334	240	196	cd
100%	100%	98%	96%	93%	89%	84%	79%	73%	67%	61%	54%	47%	39%	32%	24%	18%	12%	9%	7%	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
2772	2759	2721	2657	2570	2461	2333	2188	2030	1860	1678	1487	1290	1087	881	677	487	334	240	196	cd
100%	100%	98%	96%	93%	89%	84%	79%	73%	67%	61%	54%	47%	39%	32%	24%	18%	12%	9%	7%	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
2772	2759	2721	2657	2570	2461	2333	2188	2030	1860	1678	1487	1290	1087	881	677	487	334	240	196	cd
100%	100%	98%	96%	93%	89%	84%	79%	73%	67%	61%	54%	47%	39%	32%	24%	18%	12%	9%	7%	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
2772	2759	2721	2657	2570	2461	2333	2188	2030	1860	1678	1487	1290	1087	881	677	487	334	240	196	cd
100%	100%	98%	96%	93%	89%	84%	79%	73%	67%	61%	54%	47%	39%	32%	24%	18%	12%	9%	7%	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	23,1	24,3	23,5	24,7	25,1	22,4	23,6	22,7	24,0	24,4
	3H	24,8	26,0	25,3	26,4	26,8	23,8	25,0	24,3	25,4	25,8
	4H	25,6	26,8	26,1	27,2	27,6	24,4	25,6	24,9	26,0	26,4
	6H	26,4	27,4	26,8	27,8	28,3	25,0	26,0	25,4	26,4	26,9
	8H	26,7	27,7	27,2	28,1	28,7	25,1	26,1	25,6	26,6	27,1
	12H	27,0	28,0	27,5	28,5	29,1	25,3	26,3	25,8	26,7	27,3
4H	2H	23,6	24,7	24,1	25,1	25,6	23,0	24,2	23,5	24,6	25,0
	3H	25,6	26,6	26,0	27,0	27,6	24,7	25,7	25,2	26,2	26,7
	4H	26,4	27,4	27,0	27,8	28,5	25,4	26,4	25,9	26,8	27,5
	6H	27,3	28,1	27,9	28,6	29,1	26,0	26,9	26,6	27,3	27,9
	8H	27,7	28,4	28,3	28,9	29,5	26,2	27,0	26,8	27,5	28,0
	12H	28,1	28,7	28,7	29,3	29,9	26,4	27,1	27,0	27,6	28,3
8H	4H	26,6	27,4	27,2	27,9	28,4	25,7	26,5	26,3	27,0	27,5
	6H	27,7	28,2	28,3	28,8	29,5	26,5	27,1	27,1	27,7	28,4
	8H	28,2	28,7	28,8	29,3	30,1	26,9	27,4	27,5	28,0	28,8
	12H	28,7	29,2	29,4	29,8	30,5	27,2	27,6	27,9	28,2	29,0
12H	4H	26,6	27,3	27,2	27,8	28,4	25,8	26,4	26,4	27,0	27,6
	6H	27,7	28,2	28,3	28,9	29,6	26,6	27,1	27,2	27,8	28,5
	8H	28,3	28,7	28,9	29,3	30,1	27,0	27,5	27,7	28,1	28,8

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

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	117	117	117	117	114	114	114	114	107	107	107	100	100	100	95	95	95	92
1	106	101	96	92	102	97	93	89	92	88	85	86	84	81	82	79	77	75
2	96	87	80	74	92	84	78	72	80	74	69	75	71	67	71	67	64	61
3	87	76	68	61	84	74	66	60	70	63	58	66	60	56	62	58	54	51
4	80	67	58	51	77	65	57	50	62	55	49	58	52	47	55	50	46	43
5	73	60	51	44	70	58	50	43	55	48	42	52	46	41	50	44	40	37
6	67	54	45	38	65	52	44	38	50	42	37	47	41	36	45	39	35	33
7	62	49	40	34	60	48	39	33	45	38	32	43	37	32	41	35	31	29
8	58	44	36	30	56	43	35	30	41	34	29	39	33	28	38	32	28	26
9	54	41	32	27	52	40	32	27	38	31	26	36	30	25	35	29	25	23
10	51	37	30	24	49	37	29	24	35	28	24	34	27	23	32	27	23	21

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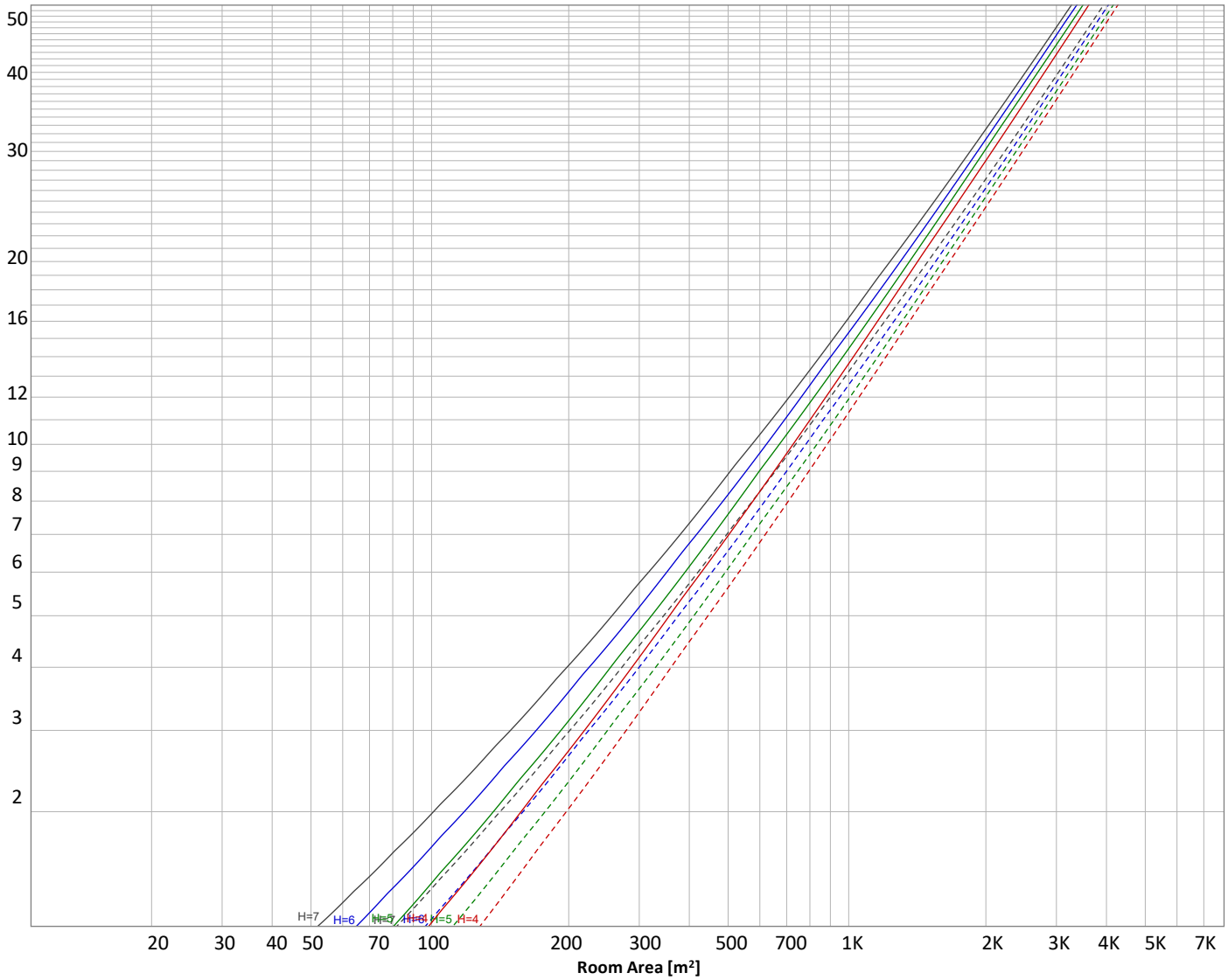
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 9175 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°
262 lm	751 lm	1136 lm	1371 lm	1437 lm	1331 lm	1077 lm	715 lm	367 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
215 lm	165 lm	127 lm	91,9 lm	62,3 lm	37,8 lm	19,8 lm	8,36 lm	2,01 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	262 lm	2,9%
10-20°	751 lm	8,2%
20-30°	1136 lm	12,4%
30-40°	1371 lm	14,9%
40-50°	1437 lm	15,7%
50-60°	1331 lm	14,5%
60-70°	1077 lm	11,7%
70-80°	715 lm	7,8%
80-90°	367 lm	4,0%
90-100°	215 lm	2,3%
100-110°	165 lm	1,8%
110-120°	127 lm	1,4%
120-130°	92 lm	1,0%
130-140°	62 lm	0,7%
140-150°	38 lm	0,4%
150-160°	20 lm	0,2%
160-170°	8 lm	0,1%
170-180°	2 lm	0,0%
Total	9175 lm	100,0%

Intensity peaks

Max intensity	2772 cd
Intensity, 90°	240 cd
Intensity, 0°	2772 cd

Zonal Lumen summary

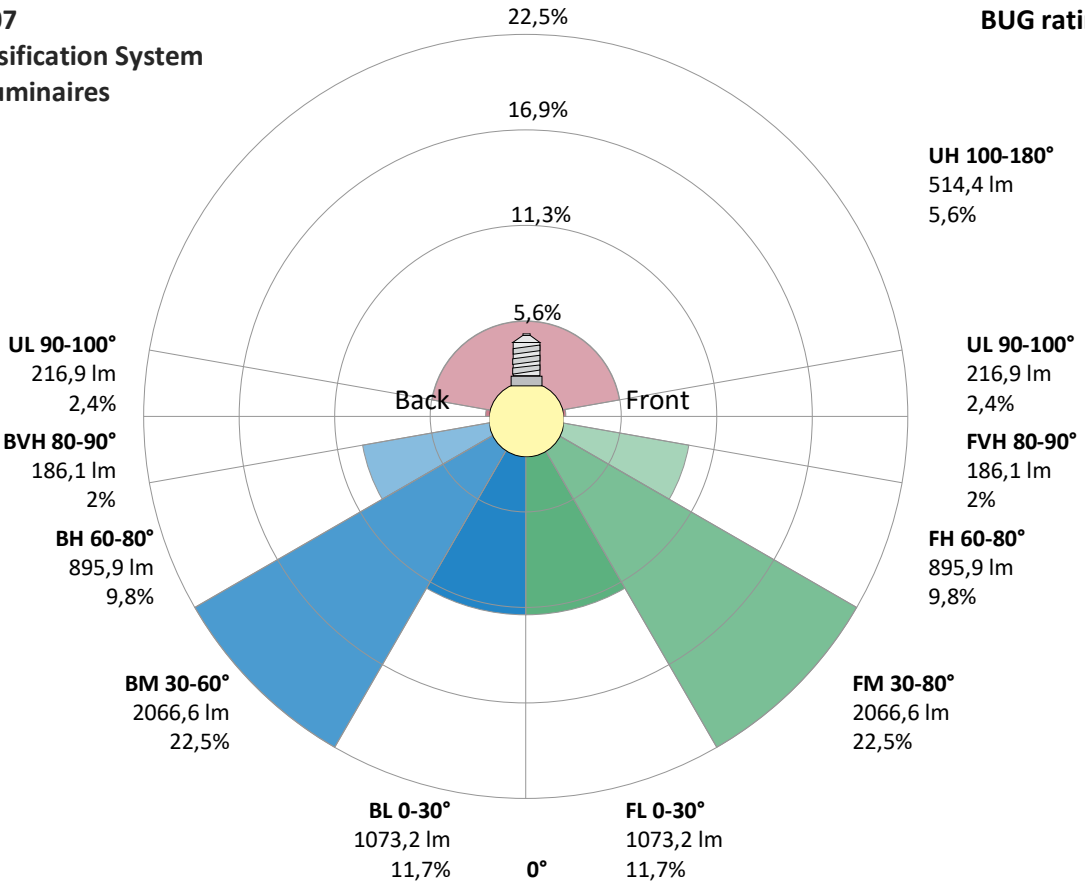
Zone (γ)	Lumen	% Total
0-30°	2149 lm	23,4%
0-40°	3520 lm	38,4%
0-60°	6287 lm	68,5%
60-90°	2159 lm	23,5%
70-100°	1297 lm	14,1%
90-120°	506 lm	5,5%
0-90°	8446 lm	92,1%
90-180°	729 lm	7,9%
0-180°	9175 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1073 lm	11,7%
Medium(30-60°)	2067 lm	22,5%
High(60-80°)	896 lm	9,8%
Very high(80-90°)	186 lm	2,0%
Back light		
Low(0-30°)	1073 lm	11,7%
Medium(30-60°)	2067 lm	22,5%
High(60-80°)	896 lm	9,8%
Very high(80-90°)	186 lm	2,0%
Uplight		
Low(90-100°)	217 lm	2,4%
High(100-180°)	514 lm	5,6%

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

BUG rating B3 U4 G2



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Power Details

Input Power

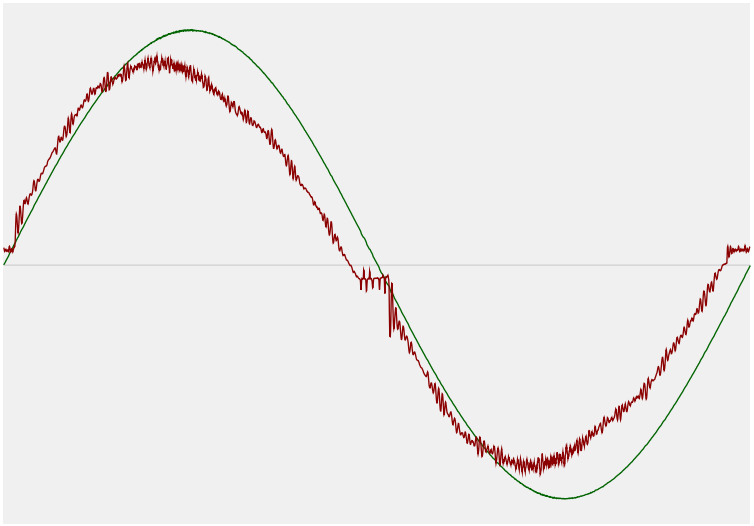
Power feed to light source	59,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,263 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	60,57 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	6,5%
Total harmonic distortion of the voltage	0,07%

Efficiency

Radiated power efficiency 45,2%

Lumen efficiency 155 lm/W

Input Power Curve



Stabilization Details

Warmup Conditions

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

Warmup Result

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

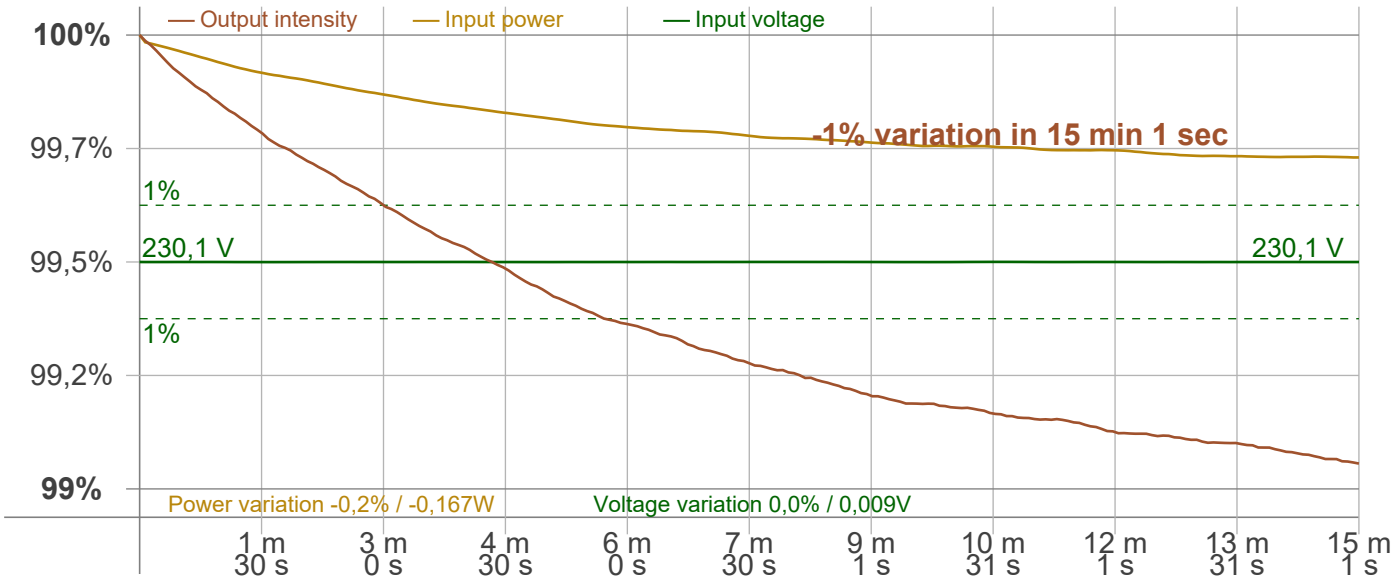
Color Temperature Change

CCT start	4001 K
CCT shift	-1 K
CCT end	4000 K

Output Change

Output start	9268 lm
Output change	-93 lm
Output end	9175 lm

Stabilization Curve



Light Measurement Report

Print date: 18-11-2024
Measurement date and time: 18-11-2024 10:35:40 – Measurement no. VFR-241118-2040-MS
Measurement tracking No. and Link: VT241118-006209
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	0,16 %
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	0,15 %
JA8/10 400 Hz	0,15 %
JA8/10 1000 Hz	0,15 %

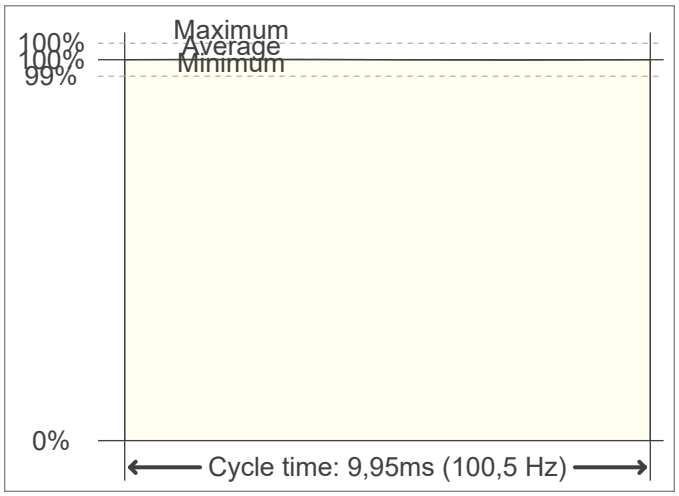
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

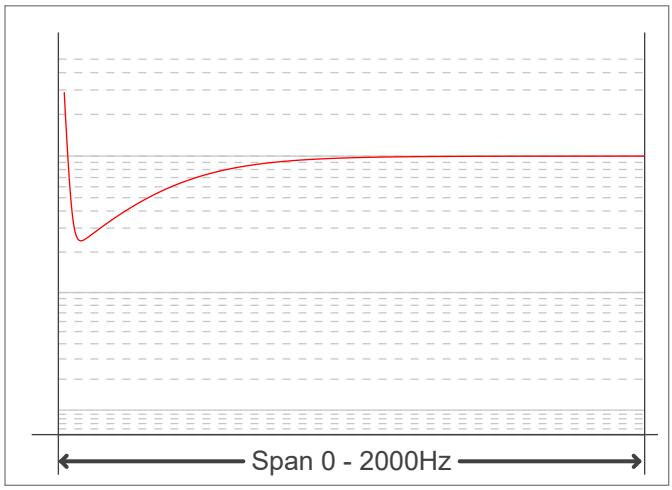
Flicker indices according to Lighting Research Center (2015)

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