Light Measurement Report

Print date: 10-10-2024
Measurement date and time: 10-10-2024 16:50:25 – Measurement no. VFR-241010-1184-MS
Measurement tracking No. and Link: VT241010-001605
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

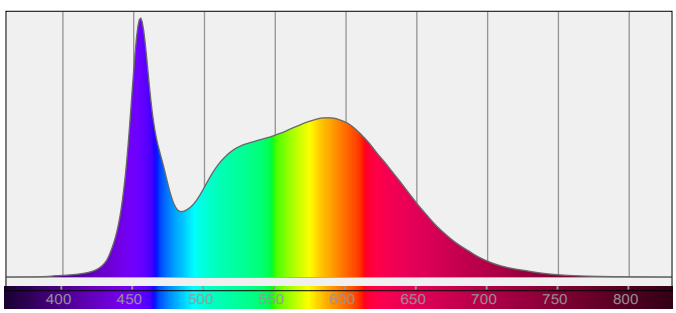
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	7,77 m
Input Power, Power and Displ. Factors	32,6 W – PF 0,95 – DPF 0,96
Input RMS Voltage and Current	230 V – 0,149 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

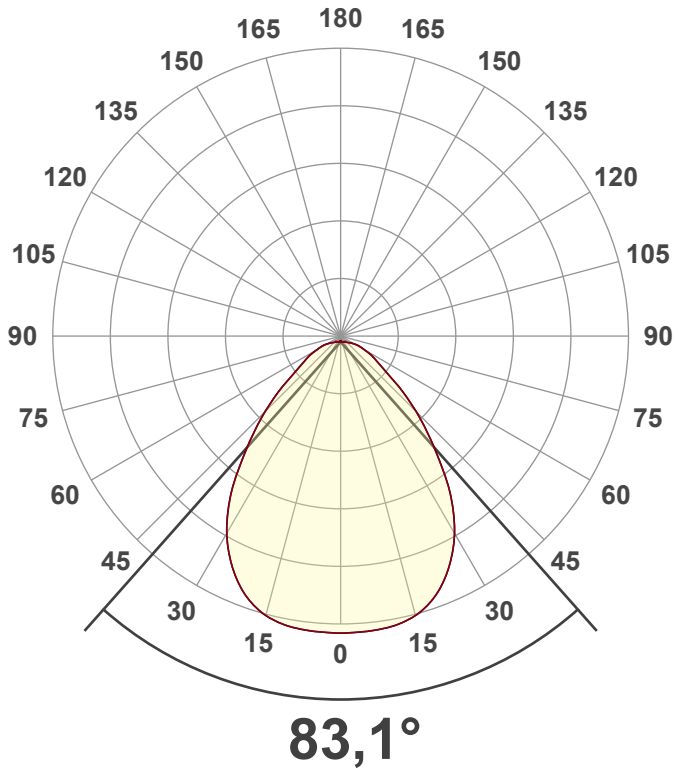
Tested Light Source

Product Name	273610-5000K
Item No. and Manufacturer	273610-5000K – Dutchfulfillment
Product Description (line 1)	SIDE-LIT LED PANEEL | LUNA | 60X60CM | 30W

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	4084 lm – 0,56% / 99,44%
Efficiency	125 lm/W
Peak Intensity and Beam Angle	2077 cd – 83,1°
Correlated Color Temperature, Target/Measured	CCT = 5000 K / 4853 K
Color Rendering Index	CRI 83,1
Color Rendering TM30-18	R_f 83,0 – R_g 93,3
Color Shift, CIE duv and MacAdam Steps	Duv 0,0034 – SDCM 4,1
Flicker	SVM 0,01 – PstLM 0,01





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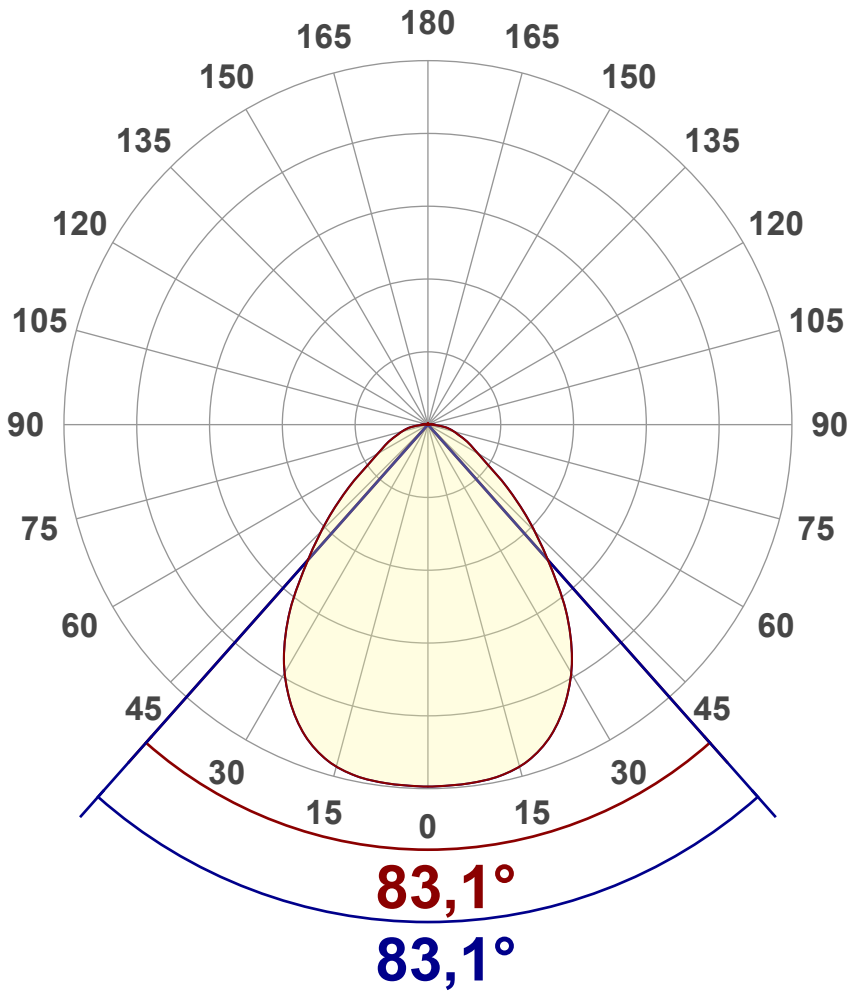
Luminous Intensity diagram Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	4084 lm
Lumen Up% / Down%	0,56% / 99,44%
Peak Intensity	2077 cd
Beam Angle (50%)	83,1°
Beam Angle (90%)	83,1°
Beam Angle (10%)	83,1°

Cut-off Angle

Average 2,5%	171,4°

Field Angle

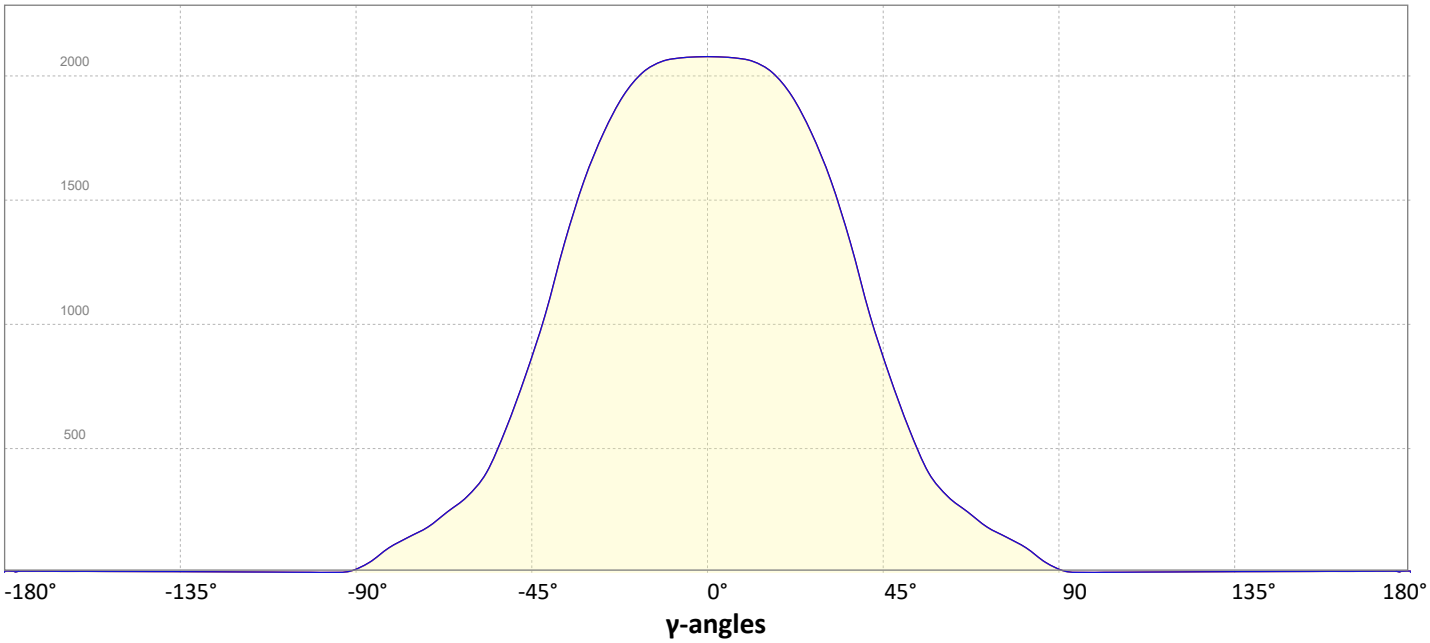
Average 10%	139,3°

Intensity Ratio

In 120° cone	87,3%
In 90° cone	69,7%

C000-C180
C090-C270

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



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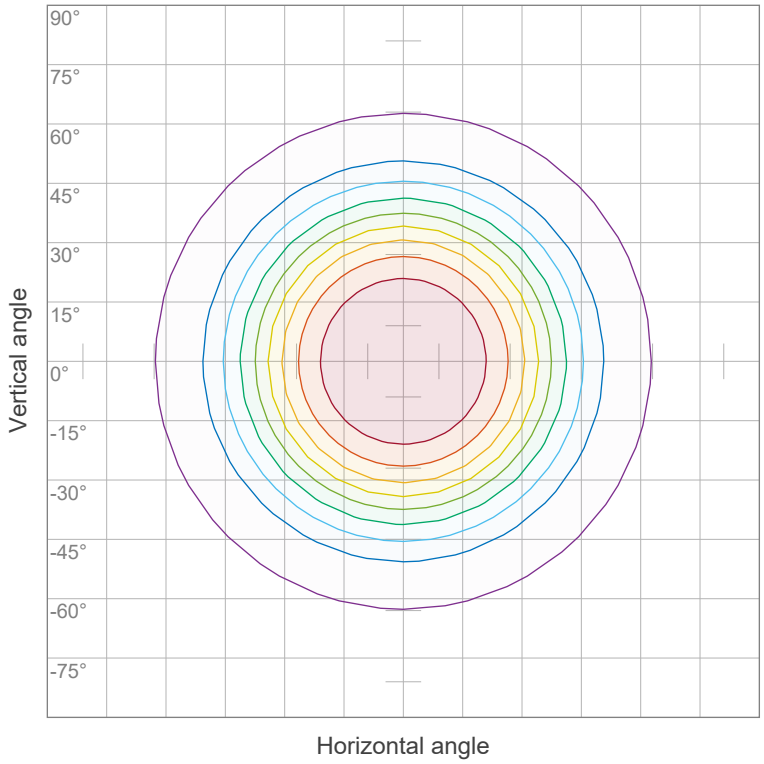
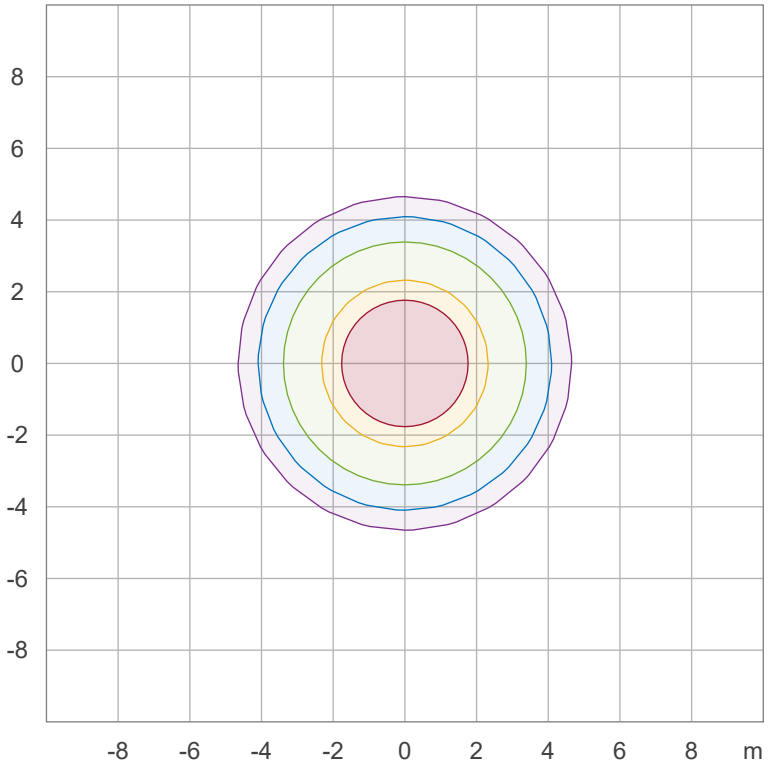
Iso-intensity Diagram (Iso-candela)



90 %	1869,3 cd
80 %	1661,6 cd
70 %	1453,9 cd
60 %	1246,2 cd
50 %	1038,5 cd
40 %	830,8 cd
30 %	623,1 cd
20 %	415,4 cd
10 %	207,7 cd

Peak intensity: 2077,0 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	115,4 lx
30,0 %	69,2 lx
10,0 %	23,1 lx
5,0 %	11,5 lx
3,0 %	6,9 lx

Peak illuminance: 230,8 lx
Mounting height: 3,0 m
Number of c-planes: 12

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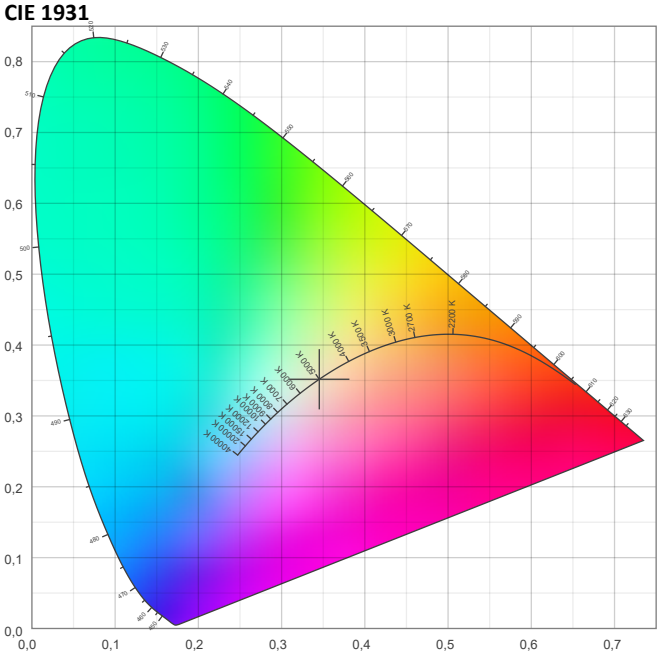
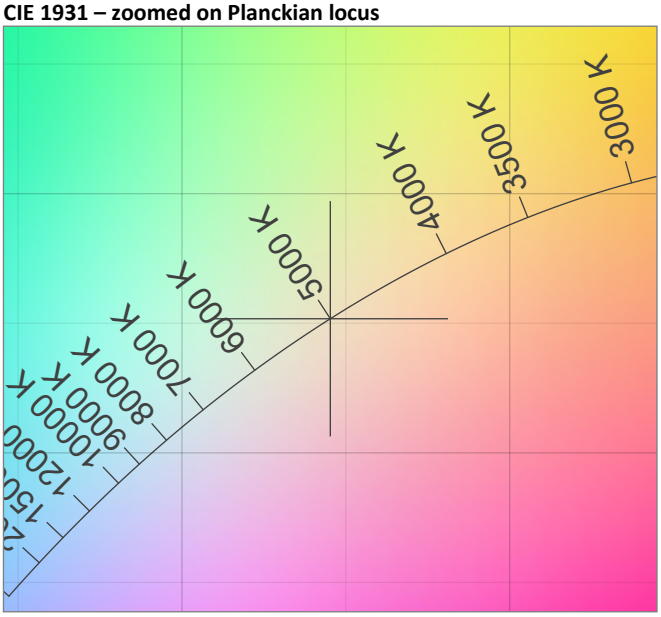
Color details

Correlated Color Temperature, Target	CCT = 5000 K
Correlated Color Temperature, Measured	CCT = 4853 K
Color Rendering Index	CRI 83,1
Color Rendering Index, R9 (red component)	R9 = 7,5
Color Rendering TM30-18	R_f 83,0 – R_g 93,3
Color Quality Scale	CQS = 81,5
MacAdam Steps	SDCM = 4,1
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 = 0,0034
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,211;0,485)

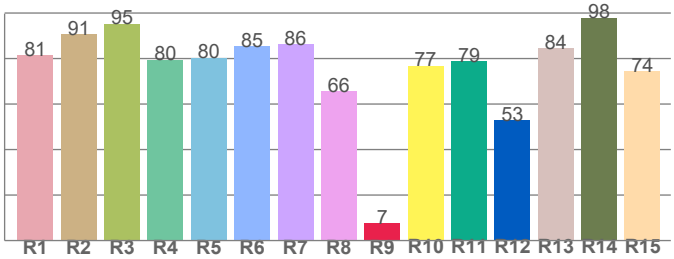
CIE 1931



CIE 1931 – zoomed on Planckian locus



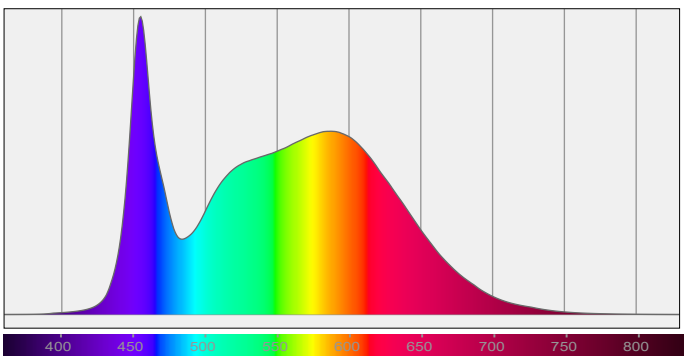
Color Rendering Index per reference color (CIE 1995)



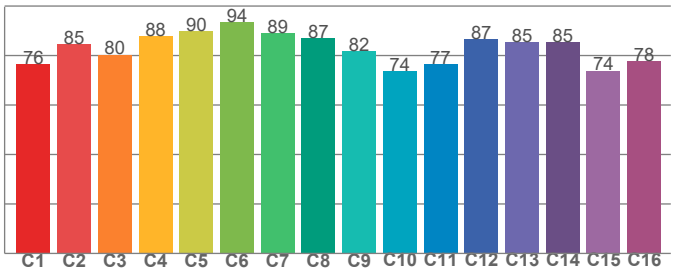
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,4	90,7	95,3	79,6	80,4	85,5	86,2	65,6	7,5	76,9	78,8	52,9	84,5	97,9	74,5

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



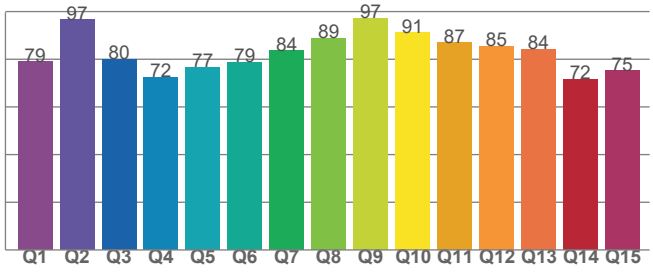
TM30-18 Rf-values per hue bin



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
76,4	84,7	80,3	87,8	89,7	93,5	88,9	86,9	81,7	73,6	76,5	86,6	85,5	85,4	73,8	77,8

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
79,0	96,6	80,1	72,5	76,6	78,7	83,6	88,7	97,3	91,2	86,9	85,4	84,2	71,6	75,2

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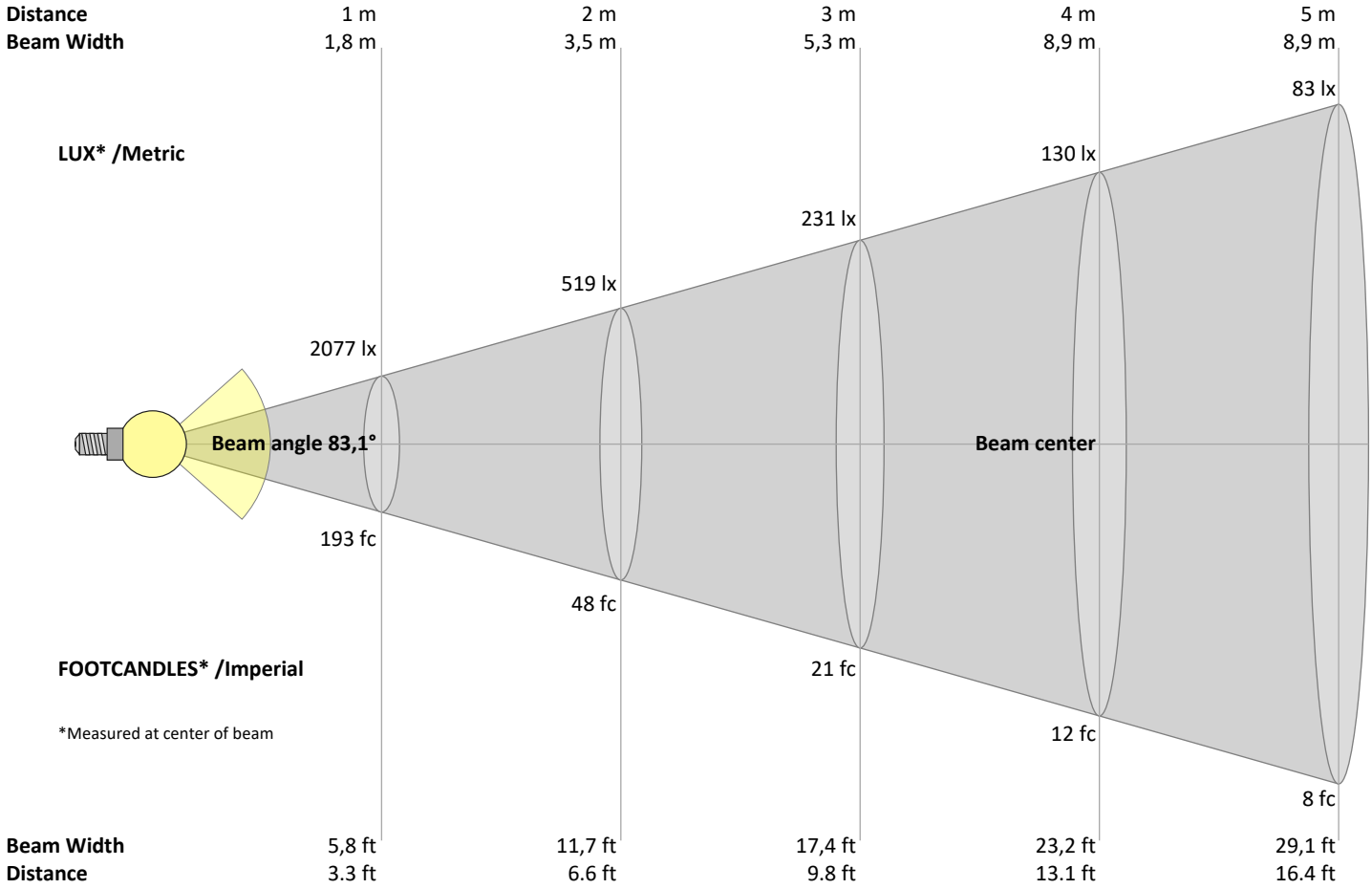
Beam Details



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
2077	519	231	130	83	58	42	32	26	21	17	14	12	11	9	8	7	6	6	5	lux
193	48,2	21,4	12,1	7,7	5,4	3,9	3	2,4	1,9	1,6	1,3	1,1	1	0,9	0,8	0,7	0,6	0,5	0,5	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
2077	2074	2063	2028	1949	1818	1640	1408	1129	871	648	459	337	265	203	156	114	60	17	3	cd
100%	100%	99%	98%	94%	88%	79%	68%	54%	42%	31%	22%	16%	13%	10%	8%	5%	3%	1%	0%	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
2077	2074	2063	2028	1949	1818	1640	1408	1129	871	648	459	337	265	203	156	114	60	17	3	cd
100%	100%	99%	98%	94%	88%	79%	68%	54%	42%	31%	22%	16%	13%	10%	8%	5%	3%	1%	0%	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
2077	2074	2063	2028	1949	1818	1640	1408	1129	871	648	459	337	265	203	156	114	60	17	3	cd
100%	100%	99%	98%	94%	88%	79%	68%	54%	42%	31%	22%	16%	13%	10%	8%	5%	3%	1%	0%	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
2077	2074	2063	2028	1949	1818	1640	1408	1129	871	648	459	337	265	203	156	114	60	17	3	cd
100%	100%	99%	98%	94%	88%	79%	68%	54%	42%	31%	22%	16%	13%	10%	8%	5%	3%	1%	0%	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	15,2	16,2	15,4	16,5	16,7	15,2	16,2	15,4	16,5	16,7
	3H	15,9	17,0	16,3	17,3	17,5	15,9	17,0	16,3	17,3	17,5
	4H	16,4	17,4	16,8	17,7	18,0	16,4	17,4	16,8	17,7	18,0
	6H	16,9	17,8	17,2	18,1	18,5	16,9	17,8	17,2	18,1	18,5
	8H	17,1	18,0	17,5	18,3	18,7	17,1	18,0	17,5	18,3	18,7
	12H	17,3	18,1	17,6	18,4	18,9	17,3	18,1	17,6	18,4	18,9
4H	2H	15,4	16,4	15,8	16,7	17,0	15,4	16,4	15,8	16,7	17,0
	3H	16,5	17,4	16,9	17,7	18,2	16,5	17,4	16,9	17,7	18,2
	4H	17,1	17,9	17,5	18,3	18,8	17,1	17,9	17,5	18,3	18,8
	6H	17,7	18,5	18,2	18,9	19,2	17,7	18,5	18,2	18,9	19,2
	8H	18,0	18,7	18,5	19,1	19,5	18,0	18,7	18,5	19,1	19,5
	12H	18,2	18,8	18,7	19,2	19,7	18,2	18,8	18,7	19,2	19,7
8H	4H	17,3	18,0	17,9	18,4	18,8	17,3	18,0	17,9	18,4	18,8
	6H	18,2	18,7	18,7	19,2	19,7	18,2	18,7	18,7	19,2	19,7
	8H	18,6	19,0	19,1	19,5	20,2	18,6	19,0	19,1	19,5	20,2
	12H	18,9	19,3	19,5	19,8	20,4	18,9	19,3	19,5	19,8	20,4
12H	4H	17,4	17,9	17,9	18,4	18,8	17,4	17,9	17,9	18,4	18,8
	6H	18,3	18,7	18,8	19,3	19,9	18,3	18,7	18,8	19,3	19,9
	8H	18,7	19,1	19,3	19,6	20,2	18,7	19,1	19,3	19,6	20,2

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

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	99
1	110	106	102	99	108	104	100	97	100	97	94	96	93	91	92	90	89	87
2	102	95	89	84	99	93	88	83	89	85	81	86	82	79	83	80	77	75
3	94	85	78	72	92	84	77	72	81	75	70	78	73	69	75	71	68	66
4	87	77	69	63	85	76	68	63	73	67	62	71	65	61	69	64	60	58
5	81	70	62	56	79	69	61	56	67	60	55	65	59	54	63	58	54	52
6	76	64	56	50	74	63	55	50	61	54	49	59	53	49	58	53	48	47
7	71	58	51	45	69	58	50	45	56	49	45	55	49	44	53	48	44	42
8	66	54	46	41	65	53	46	41	52	45	40	51	45	40	50	44	40	38
9	62	50	42	37	61	49	42	37	48	42	37	47	41	37	46	41	37	35
10	59	46	39	34	57	46	39	34	45	38	34	44	38	34	43	38	34	32

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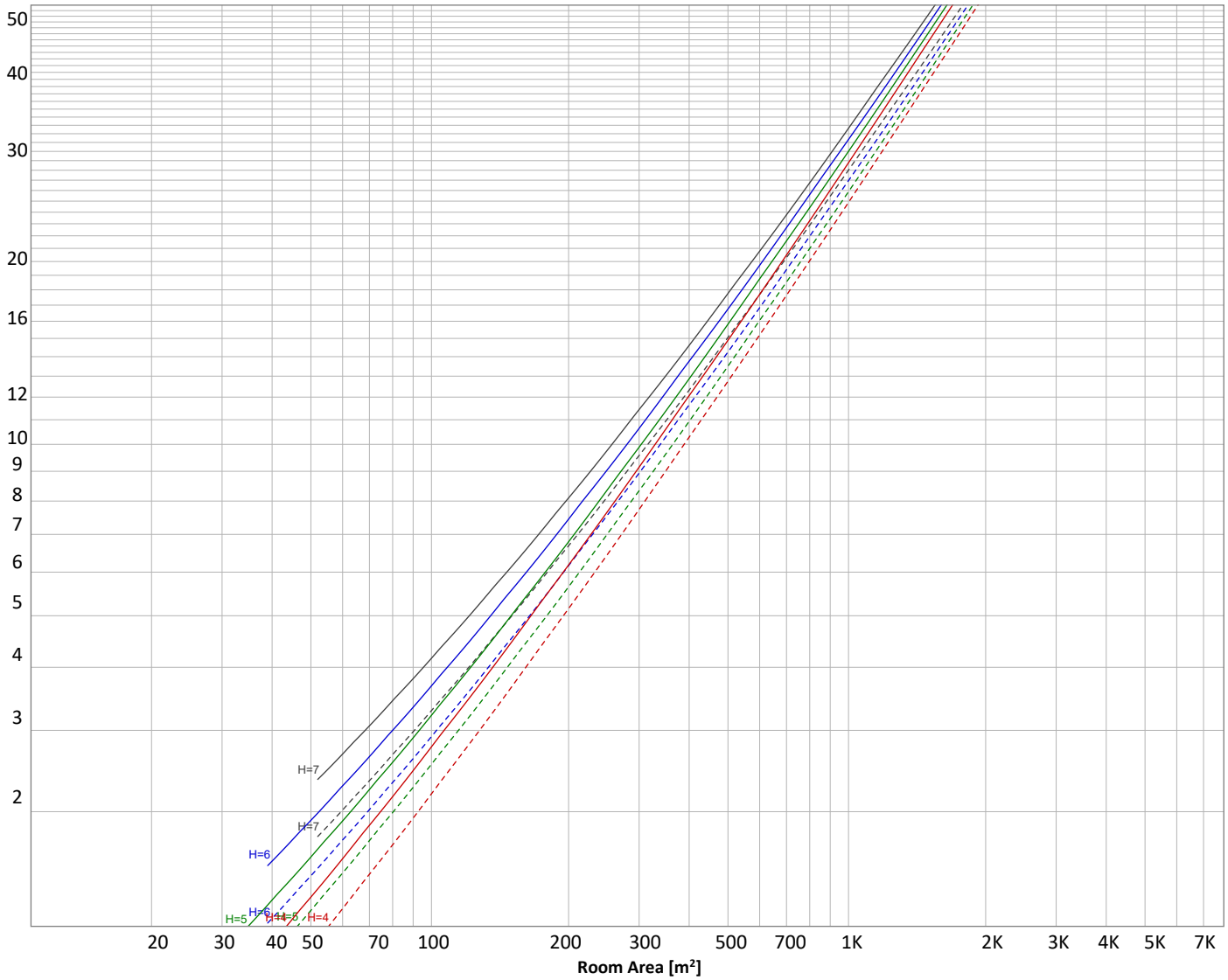
Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 4084 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°
198 lm	572 lm	835 lm	875 lm	671 lm	416 lm	262 lm	165 lm	67,8 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
3,70 lm	2,18 lm	2,74 lm	3,15 lm	3,36 lm	3,05 lm	2,50 lm	1,64 lm	0,590 lm

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Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	198 lm	4,8%
10-20°	572 lm	14,0%
20-30°	835 lm	20,4%
30-40°	875 lm	21,4%
40-50°	671 lm	16,4%
50-60°	416 lm	10,2%
60-70°	262 lm	6,4%
70-80°	165 lm	4,0%
80-90°	68 lm	1,7%
90-100°	4 lm	0,1%
100-110°	2 lm	0,1%
110-120°	3 lm	0,1%
120-130°	3 lm	0,1%
130-140°	3 lm	0,1%
140-150°	3 lm	0,1%
150-160°	2 lm	0,1%
160-170°	2 lm	0,0%
170-180°	1 lm	0,0%
Total	4084 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	1605 lm	39,3%
0-40°	2480 lm	60,7%
0-60°	3567 lm	87,3%
60-90°	494 lm	12,1%
70-100°	236 lm	5,8%
90-120°	9 lm	0,2%
0-90°	4061 lm	99,4%
90-180°	23 lm	0,6%
0-180°	4084 lm	100,0%

Intensity peaks

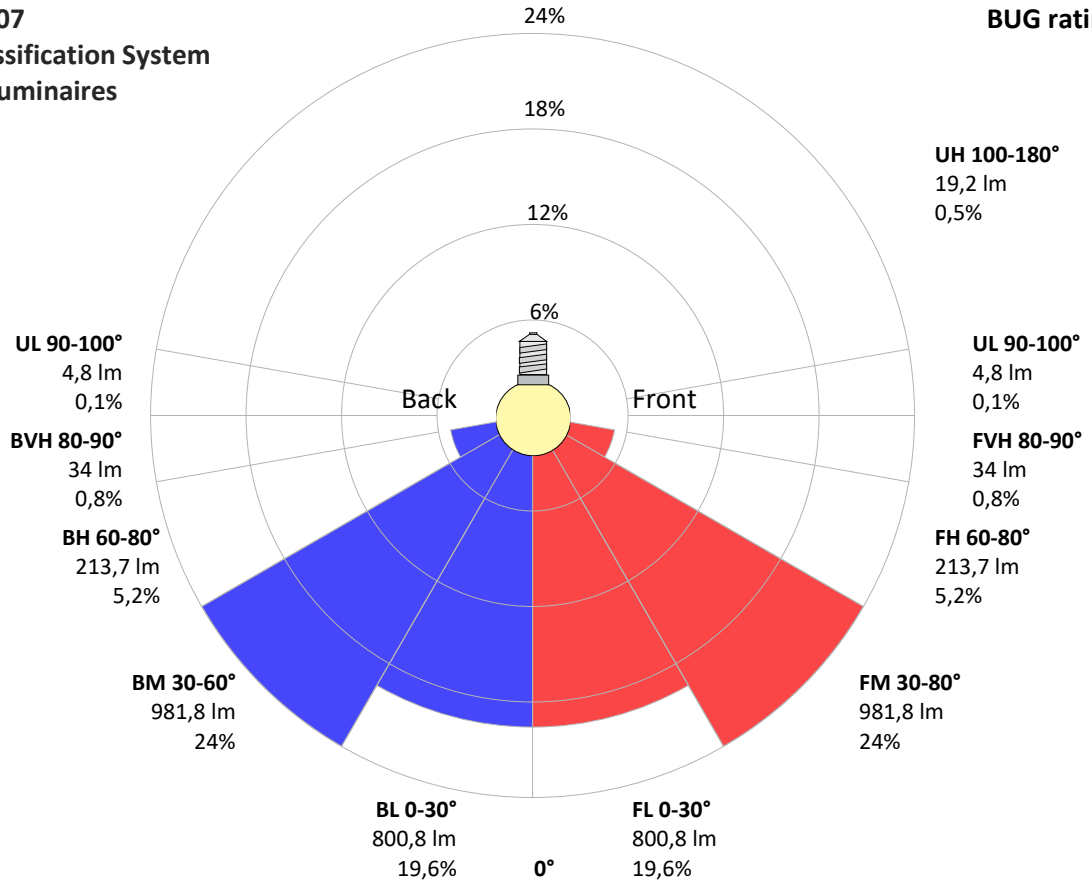
Max intensity	2077 cd
Intensity, 90°	17 cd
Intensity, 0°	2077 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	801 lm	19,6%
Medium(30-60°)	982 lm	24,0%
High(60-80°)	214 lm	5,2%
Very high(80-90°)	34 lm	0,8%
Back light		
Low(0-30°)	801 lm	19,6%
Medium(30-60°)	982 lm	24,0%
High(60-80°)	214 lm	5,2%
Very high(80-90°)	34 lm	0,8%
Uplight		
Low(90-100°)	5 lm	0,1%
High(100-180°)	19 lm	0,5%

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

BUG rating B2 U2 G1



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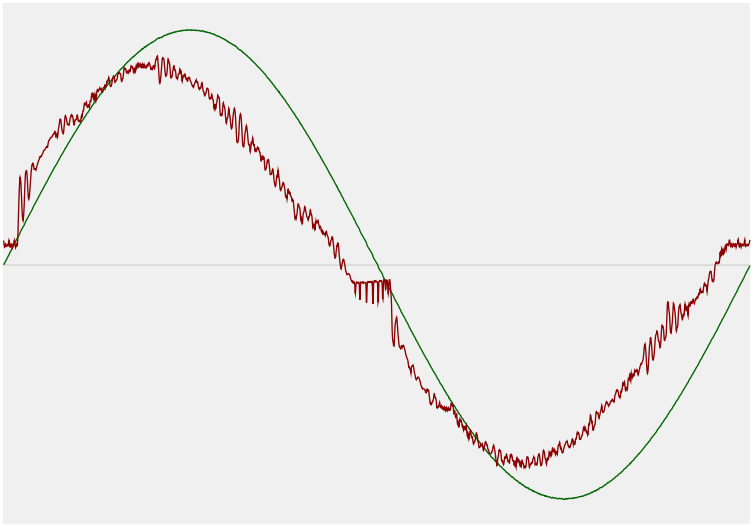
Power Details

Input Power

Power feed to light source	32,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,149 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	34,3 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,95
Total harmonic distortion of the current	9,15%
Total harmonic distortion of the voltage	0,08%

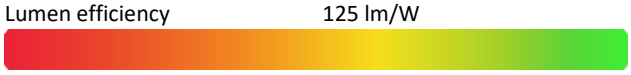
Input Power Curve



Efficiency

Radiated power efficiency 38,3%

Lumen efficiency 125 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	4979 K
CCT shift	+21 K
CCT end	5000 K

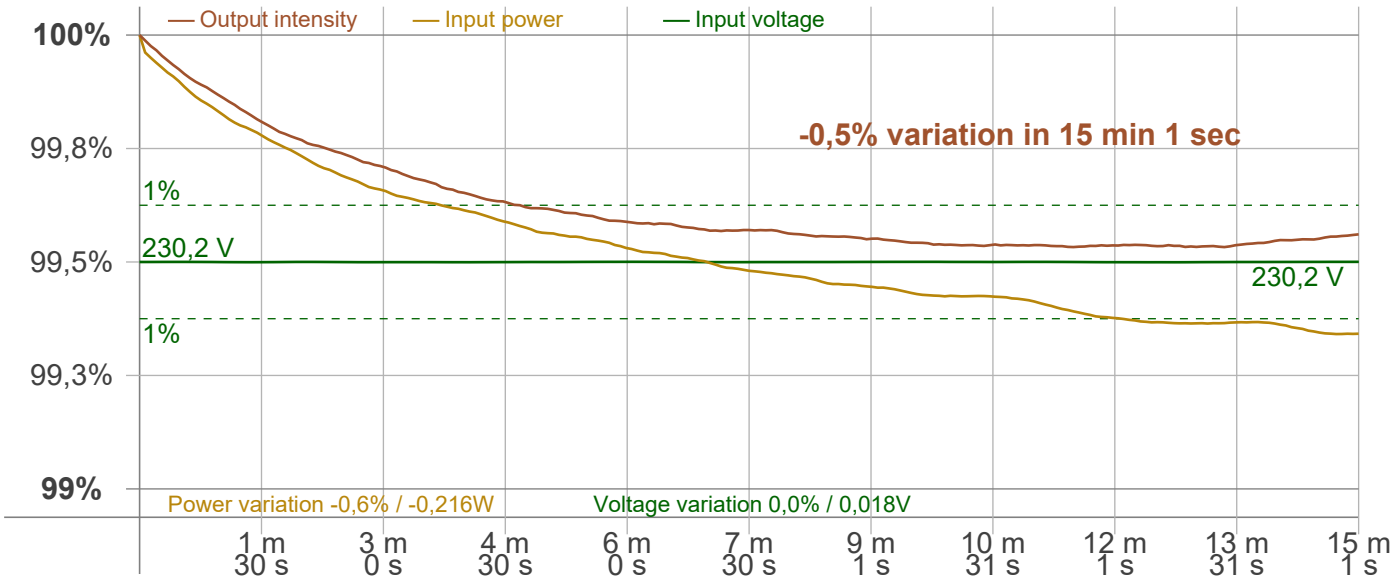
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,5%

Output Change

Output start	4105 lm
Output change	-20 lm
Output end	4084 lm

Stabilization Curve



Light Measurement Report

Print date: 10-10-2024
Measurement date and time: 10-10-2024 16:50:25 – Measurement no. VFR-241010-1184-MS
Measurement tracking No. and Link: VT241010-001605
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	97,56 Hz
Percent Flicker	0,24 %
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	0,18 %
JA8/10 400 Hz	0,2 %
JA8/10 1000 Hz	0,22 %

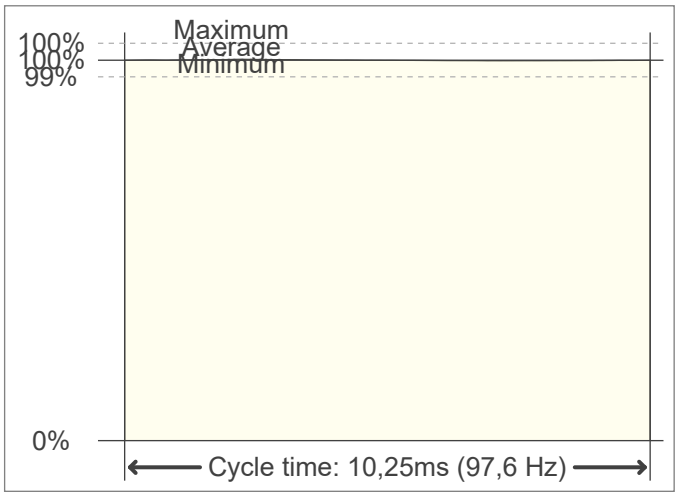
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

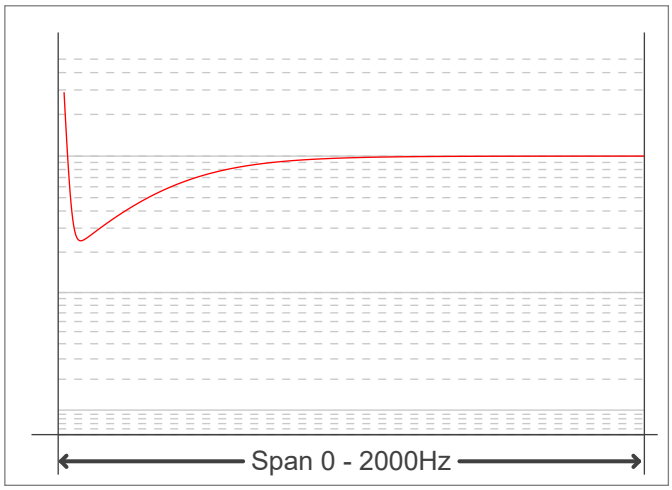
Flicker indices according to Lighting Research Center (2015)

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