Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
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

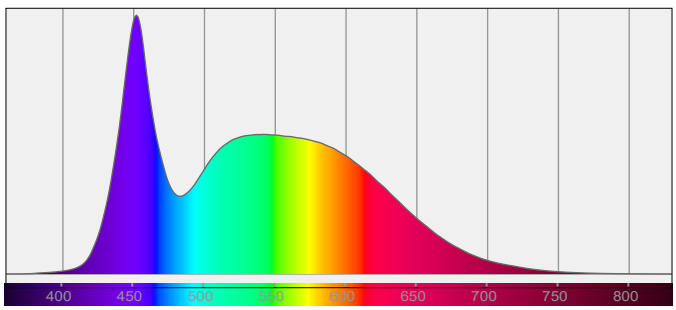
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	2,00 m
Input Power, Power and Displ. Factors	11,1 W – PF 0,55 – DPF 0,94
Input RMS Voltage and Current	230 V – 0,088 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

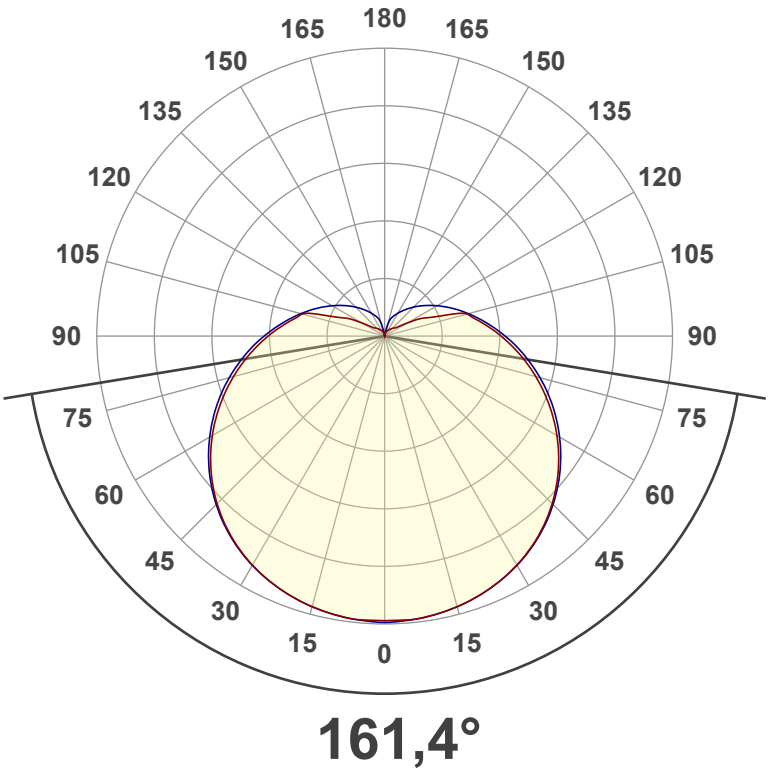
Tested Light Source

Product Name	B10A60-6500K
Item No. and Manufacturer	B10A60-6500K – Dutchfulfillment
Product Description (line 1)	LED LAMP E27 11W VERHUISLAMP

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	868 lm – 22,53% / 77,47%
Efficiency	78 lm/W
Peak Intensity and Beam Angle	152 cd – 161,4°
Correlated Color Temperature, Target/Measured	CCT = 6500 K / 6740 K
Color Rendering Index	CRI 83,9
Color Rendering TM30-18	R_f 84,7 – R_g 95,2
Color Shift, CIE duv and MacAdam Steps	Duv 0,0028 – SDCM 8,9
Flicker	SVM 0,15 – PstLM 0,03



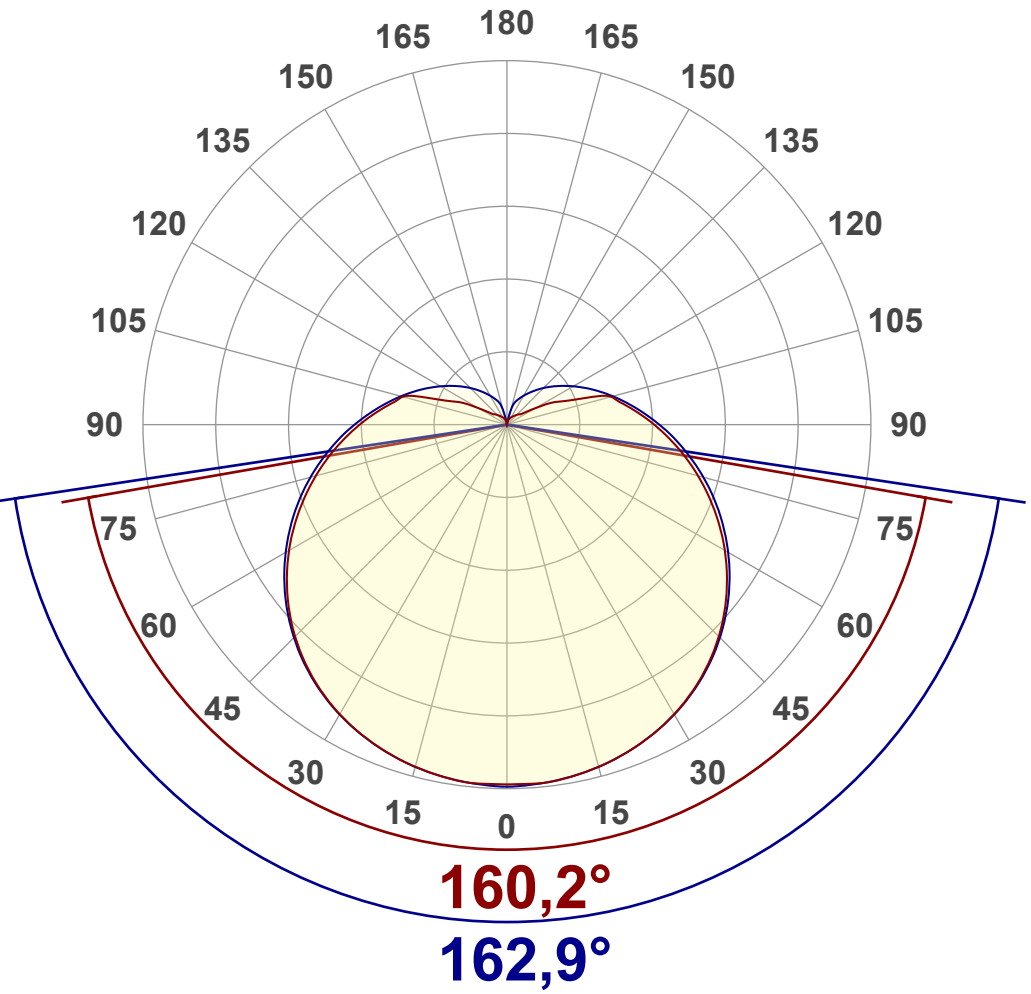


Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	868 lm
Lumen Up% / Down%	22,53% / 77,47%
Peak Intensity	152 cd
Beam Angle (50%)	161,4°
Beam Angle (90%)	162,9°
Beam Angle (10%)	160,2°

Cut-off Angle

Average 2,5%	328,5°

Field Angle

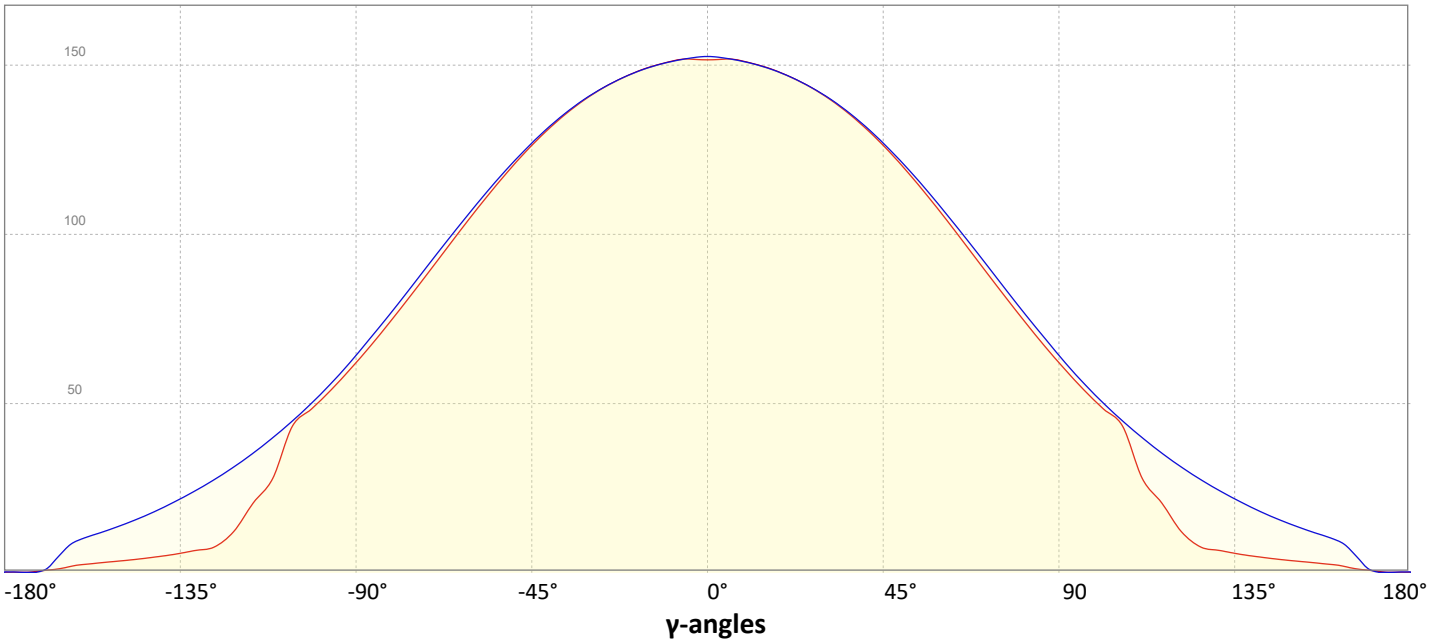
Average 10%	285°

Intensity Ratio

In 120° cone	47,1%
In 90° cone	29,6%

C000-C180
C090-C270

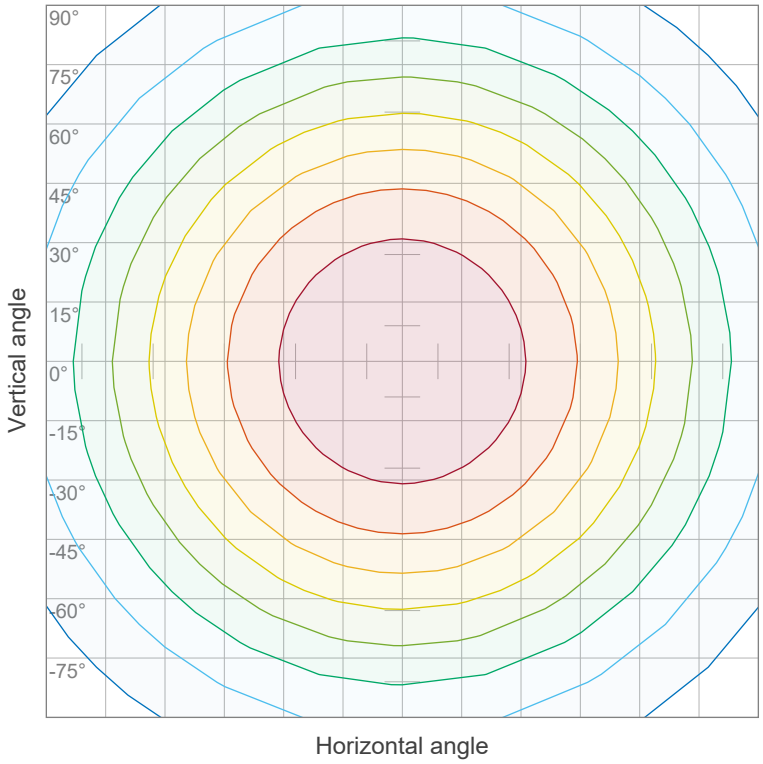
Linear distribution diagram - Intensity (candela) vs γ-angle



Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

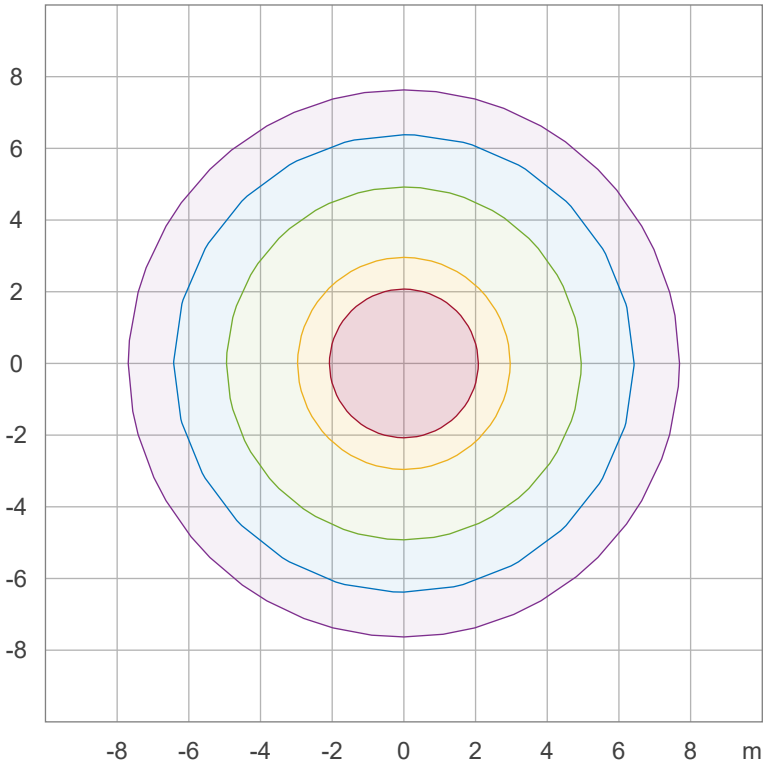
Iso-intensity Diagram (Iso-candela)



90 %	137,2 cd
80 %	122,0 cd
70 %	106,7 cd
60 %	91,5 cd
50 %	76,2 cd
40 %	61,0 cd
30 %	45,7 cd
20 %	30,5 cd
10 %	15,2 cd

Peak intensity: 152,5 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	8,5 lx
30,0 %	5,1 lx
10,0 %	1,7 lx
5,0 %	0,8 lx
3,0 %	0,5 lx

Peak illuminance: 16,9 lx
Mounting height: 3,0 m
Number of c-planes: 12

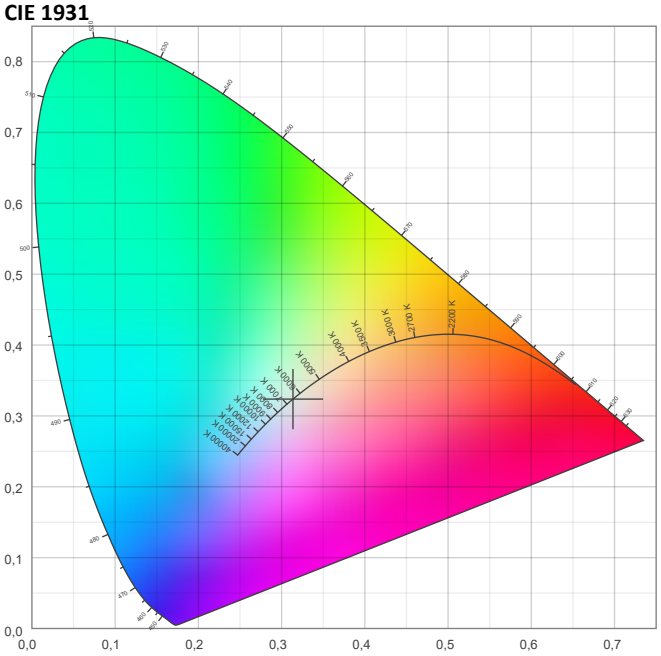
Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

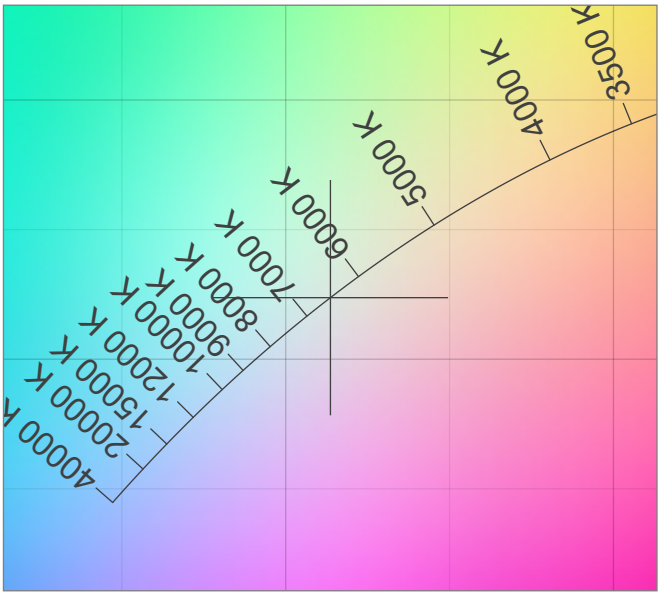
Color details

Correlated Color Temperature, Target	CCT = 6500 K
Correlated Color Temperature, Measured	CCT = 6740 K
Color Rendering Index	CRI 83,9
Color Rendering Index, R9 (red component)	R9 = 11,0
Color Rendering TM30-18	R_f 84,7 – R_g 95,2
Color Quality Scale	CQS = 82,7
MacAdam Steps	SDCM = 8,9
Color coordinates CIE 1931	(x;y) = (0,314;0,324)
Color coordinate CIEs 1960	(u;v) = (0,200;0,310)
Color deviation from BBL	Duv = 0,0028
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,200;0,466)

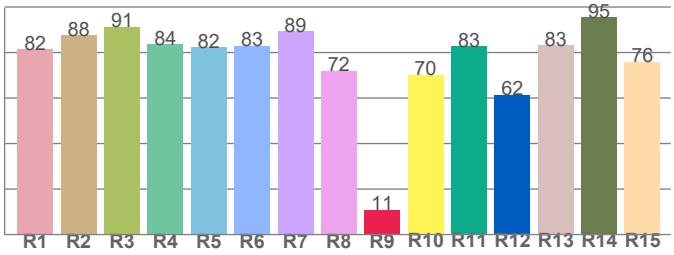
CIE 1931



CIE 1931 – zoomed on Planckian locus



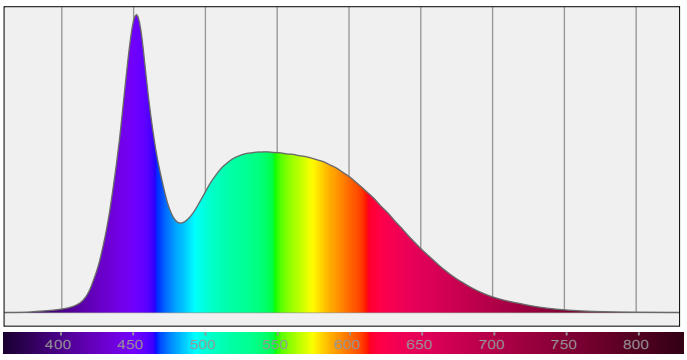
Color Rendering Index per reference color (CIE 1995)



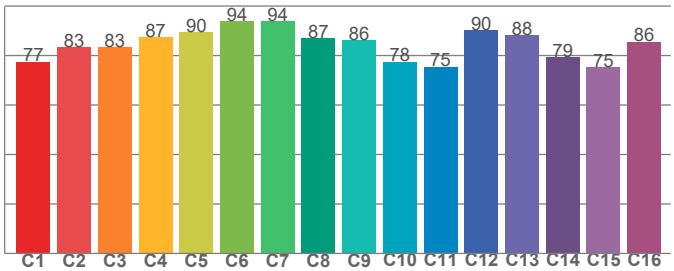
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,6	87,6	91,4	83,7	82,3	83,0	89,4	71,9	11,0	70,3	82,8	61,5	83,3	95,5	76,0

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



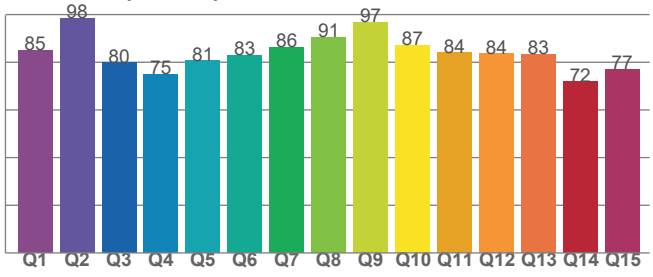
TM30-18 Rf-values per hue bin



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	83,5	83,2	87,3	89,5	93,9	93,8	86,9	86,1	77,5	75,5	90,1	88,1	79,2	75,2	85,5

Color Quality Scale by reference color



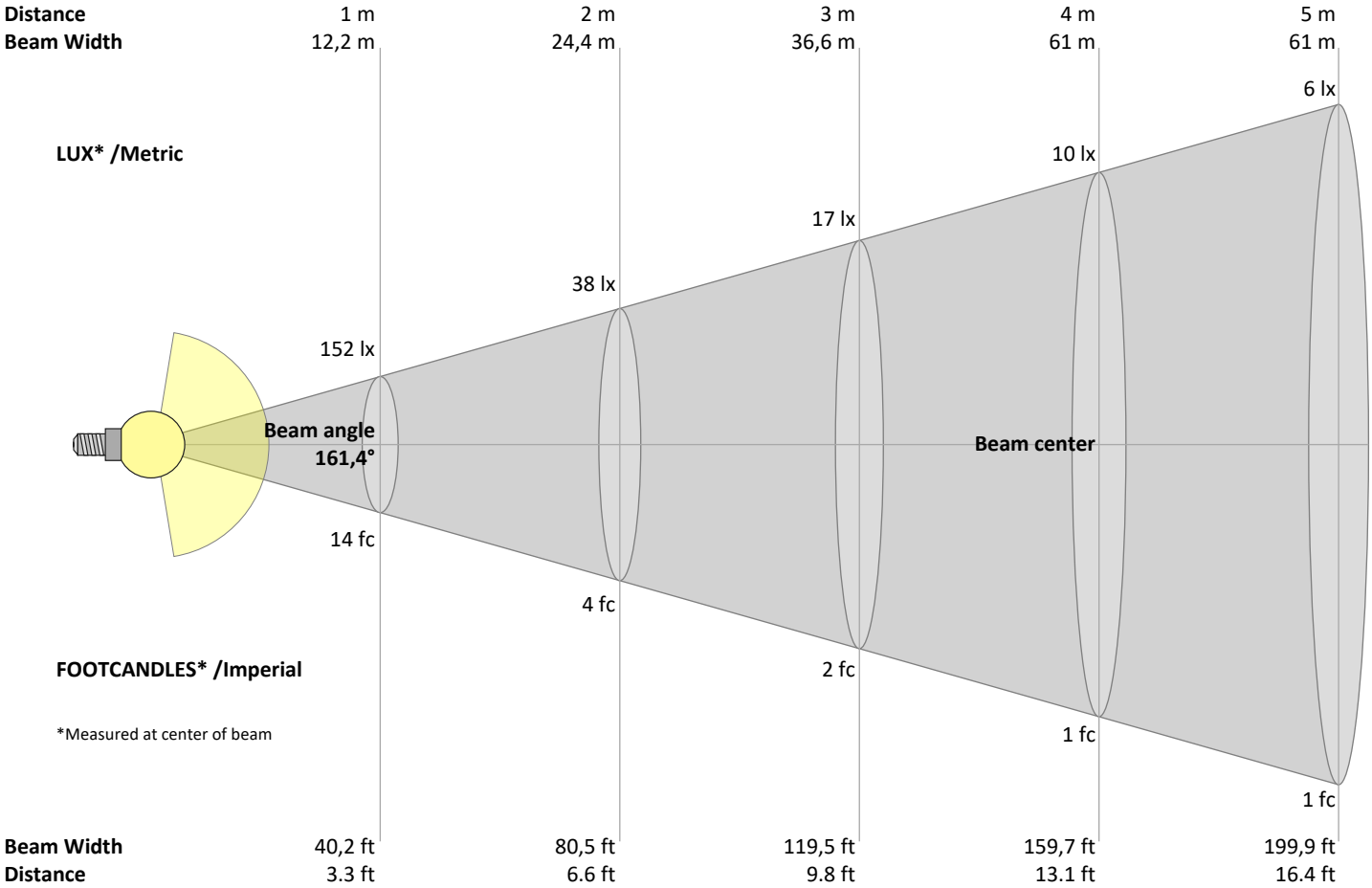
CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
85,0	98,5	79,9	75,0	80,6	83,0	86,3	90,5	96,7	87,3	84,0	83,5	83,4	71,9	77,1

Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

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
152	38	17	10	6	4	3	2	2	2	1	1	1	1	1	1	1	0	0	0	lux
14,1	3,5	1,6	0,9	0,6	0,4	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0	0	0	0	fc

Intensities in 0° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
152	151	148	143	136	126	115	102	88	75	62	51	38	19	8	6	4	3	2	1	cd
100%	99%	97%	94%	89%	83%	75%	67%	58%	49%	41%	34%	25%	13%	5%	4%	3%	2%	1%	0%	of 0°val

Intensities in 90° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
152	151	148	143	136	127	116	103	90	77	64	53	43	35	28	22	17	13	9	0	cd
100%	99%	97%	94%	90%	83%	76%	68%	59%	51%	42%	35%	28%	23%	18%	14%	11%	8%	6%	0%	of 0°val

Intensities in 180° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
152	151	148	143	136	126	115	102	88	75	62	51	38	19	8	6	4	3	2	1	cd
100%	99%	97%	94%	89%	83%	75%	67%	58%	49%	41%	34%	25%	13%	5%	4%	3%	2%	1%	0%	of 0°val

Intensities in 270° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
152	151	148	143	136	127	116	103	90	77	64	53	43	35	28	22	17	13	9	0	cd
100%	99%	97%	94%	90%	83%	76%	68%	59%	51%	42%	35%	28%	23%	18%	14%	11%	8%	6%	0%	of 0°val

Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

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	23,9	25,0	24,4	25,6	26,3	23,9	25,1	24,5	25,7	26,4
	3H	25,7	26,8	26,4	27,4	28,1	25,7	26,9	26,4	27,5	28,2
	4H	26,6	27,7	27,3	28,3	29,0	26,7	27,7	27,4	28,4	29,1
	6H	27,5	28,4	28,1	29,1	29,8	27,6	28,5	28,2	29,2	30,0
	8H	27,8	28,8	28,5	29,5	30,2	28,0	29,0	28,6	29,6	30,4
	12H	28,2	29,2	28,9	29,8	30,6	28,3	29,4	29,0	30,0	30,8
4H	2H	24,5	25,6	25,2	26,2	26,9	24,6	25,6	25,2	26,3	27,0
	3H	26,6	27,7	27,3	28,2	29,0	26,7	27,7	27,4	28,3	29,1
	4H	27,6	28,7	28,3	29,2	30,1	27,7	28,8	28,4	29,3	30,2
	6H	28,6	29,5	29,4	30,1	30,9	28,7	29,6	29,5	30,2	31,0
	8H	29,1	29,8	29,8	30,5	31,3	29,2	29,9	29,9	30,6	31,4
	12H	29,5	30,2	30,3	30,9	31,7	29,7	30,3	30,4	31,0	31,9
8H	4H	28,0	28,7	28,8	29,5	30,2	28,1	28,8	28,8	29,5	30,3
	6H	29,3	29,8	30,0	30,6	31,5	29,3	29,9	30,1	30,7	31,6
	8H	29,9	30,4	30,6	31,2	32,1	30,0	30,5	30,7	31,3	32,2
	12H	30,5	30,9	31,3	31,7	32,6	30,6	31,0	31,4	31,8	32,7
12H	4H	28,1	28,7	28,8	29,4	30,3	28,1	28,7	28,9	29,5	30,3
	6H	29,4	29,9	30,2	30,7	31,7	29,5	30,0	30,2	30,8	31,8
	8H	30,1	30,5	30,9	31,3	32,2	30,2	30,6	31,0	31,4	32,3

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

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	114	114	114	114	108	108	108	108	99	99	99	90	90	90	81	81	81	77
1	100	93	88	83	95	89	84	79	80	76	73	73	69	66	65	63	61	57
2	89	79	71	64	84	76	68	62	68	62	57	61	57	52	55	51	48	44
3	81	69	59	52	76	65	57	50	59	52	46	53	47	43	48	43	39	36
4	73	60	50	43	69	57	48	41	52	44	38	47	40	35	42	37	33	30
5	67	53	43	36	63	51	42	35	46	38	33	41	35	30	37	32	28	25
6	62	47	38	31	58	45	36	30	41	34	28	37	31	26	34	28	24	21
7	57	43	33	27	54	41	32	26	37	30	24	34	27	23	31	25	21	19
8	53	39	30	24	50	37	29	23	34	27	22	31	25	20	28	23	19	16
9	49	35	27	21	46	34	26	20	31	24	19	28	22	18	26	21	17	15
10	46	32	24	19	44	31	23	18	29	22	17	26	20	16	24	19	15	13

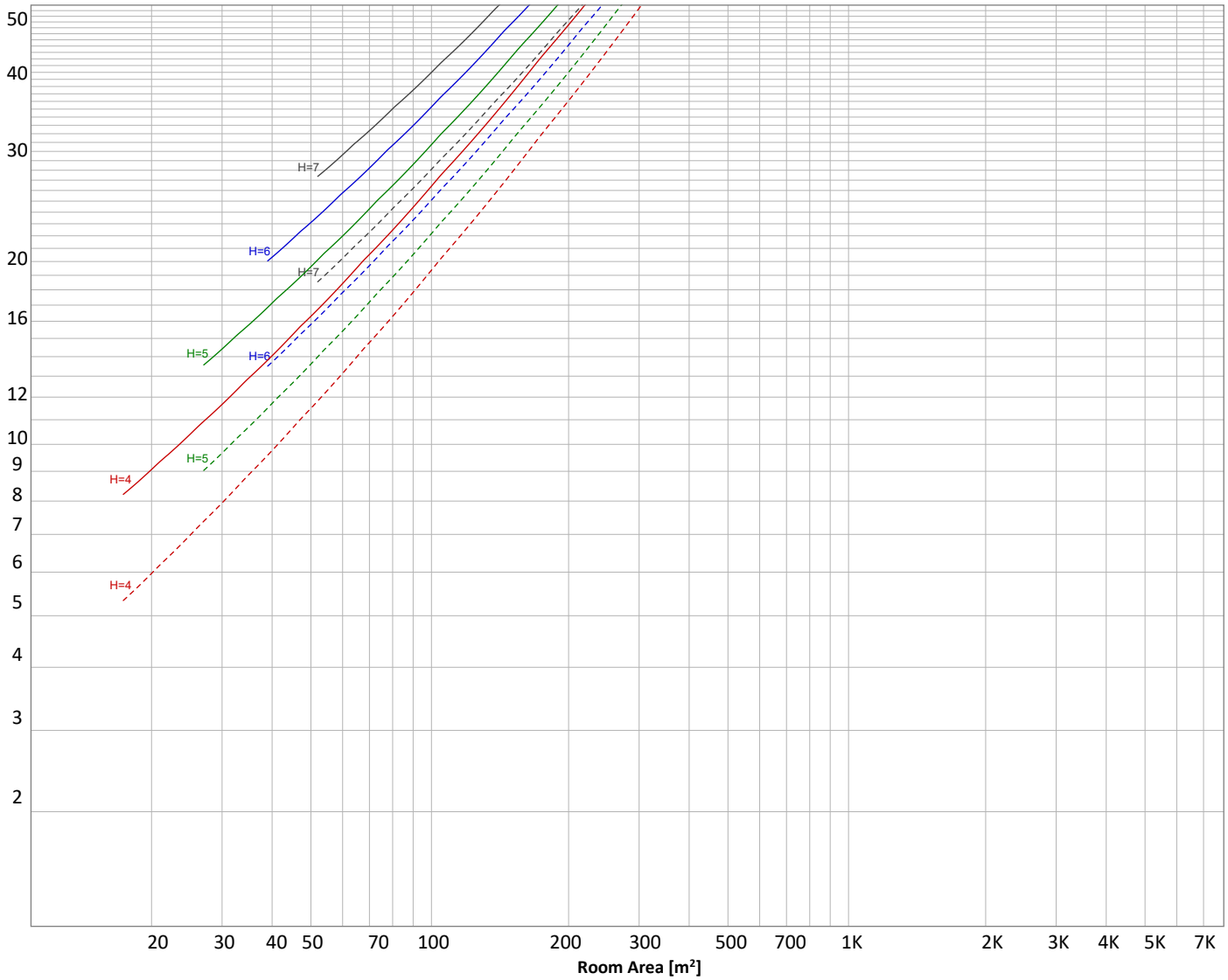
Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 868 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°
14,5 lm	42,2 lm	66,6 lm	85,7 lm	97,7 lm	102 lm	98,6 lm	89,3 lm	76,3 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
61,8 lm	47,8 lm	33,5 lm	22,4 lm	14,7 lm	8,98 lm	4,82 lm	1,59 lm	0,041 lm

Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	14 lm	1,7%
10-20°	42 lm	4,9%
20-30°	67 lm	7,7%
30-40°	86 lm	9,9%
40-50°	98 lm	11,3%
50-60°	102 lm	11,7%
60-70°	99 lm	11,3%
70-80°	89 lm	10,3%
80-90°	76 lm	8,8%
90-100°	62 lm	7,1%
100-110°	48 lm	5,5%
110-120°	34 lm	3,9%
120-130°	22 lm	2,6%
130-140°	15 lm	1,7%
140-150°	9 lm	1,0%
150-160°	5 lm	0,6%
160-170°	2 lm	0,2%
170-180°	0 lm	0,0%
Total	868 lm	100,0%

Intensity peaks

Max intensity	152 cd
Intensity, 90°	62 cd
Intensity, 0°	152 cd

Zonal Lumen summary

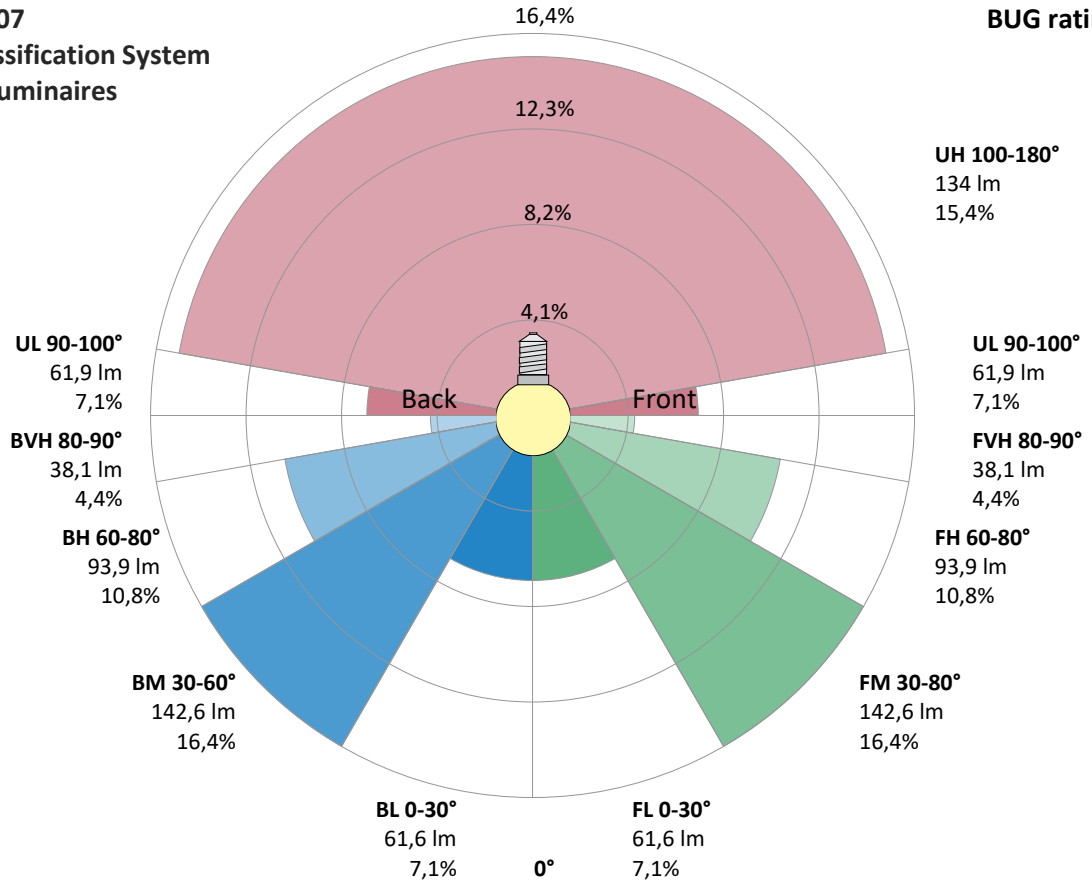
Zone (γ)	Lumen	% Total
0-30°	123 lm	14,2%
0-40°	209 lm	24,1%
0-60°	409 lm	47,1%
60-90°	264 lm	30,4%
70-100°	227 lm	26,2%
90-120°	143 lm	16,5%
0-90°	673 lm	77,5%
90-180°	196 lm	22,5%
0-180°	868 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	62 lm	7,1%
Medium(30-60°)	143 lm	16,4%
High(60-80°)	94 lm	10,8%
Very high(80-90°)	38 lm	4,4%
Back light		
Low(0-30°)	62 lm	7,1%
Medium(30-60°)	143 lm	16,4%
High(60-80°)	94 lm	10,8%
Very high(80-90°)	38 lm	4,4%
Uplight		
Low(90-100°)	62 lm	7,1%
High(100-180°)	134 lm	15,4%

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

BUG rating B0 U3 G1



Light Measurement Report

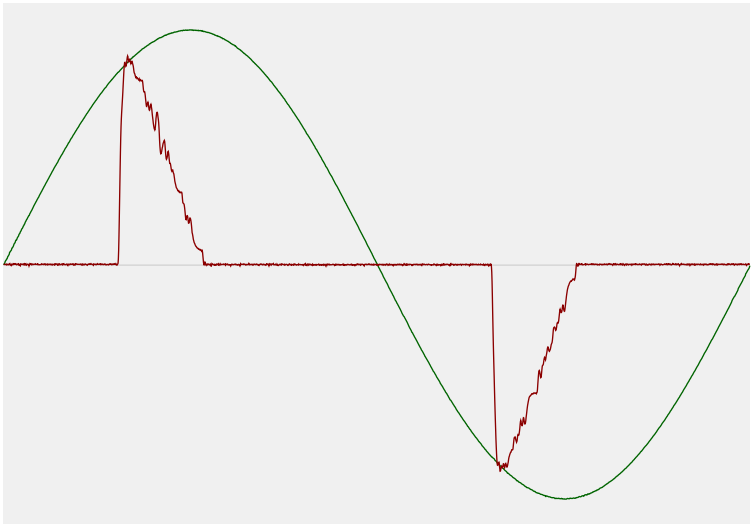
Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
Operator:

Power Details

Input Power

Power feed to light source	11,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,088 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	20,3 VA
Displacement factor of AC power feed	0,94
Power factor of AC current feed	0,55
Total harmonic distortion of the current	137,16%
Total harmonic distortion of the voltage	0,15%

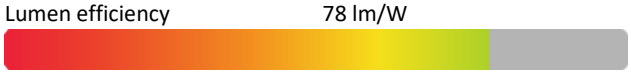
Input Power Curve



Efficiency

Radiated power efficiency 25,5%

Lumen efficiency 78 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	6495 K
CCT shift	+5 K
CCT end	6500 K

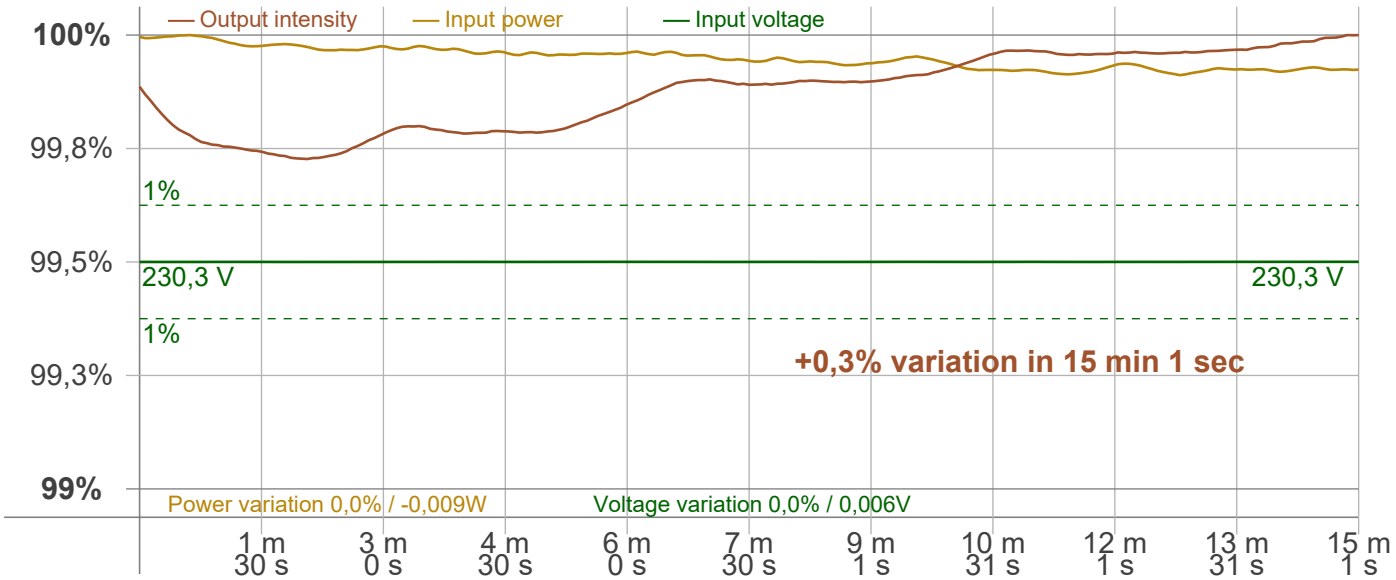
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	+0,3%

Output Change

Output start	868 lm
Output change	+ lm
Output end	868 lm

Stabilization Curve



Light Measurement Report

Print date: 13-1-2025
Measurement date and time: 13-1-2025 15:15:03 – Measurement no. VFR-250113-2895-MS
Measurement tracking No. and Link: VT250113-005472
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	200 Hz
Percent Flicker	11,87 %
Flicker index	0

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

PstLM value (F < 80 Hz)	0,03
SVM value (80 < F < 2000 Hz)	0,15

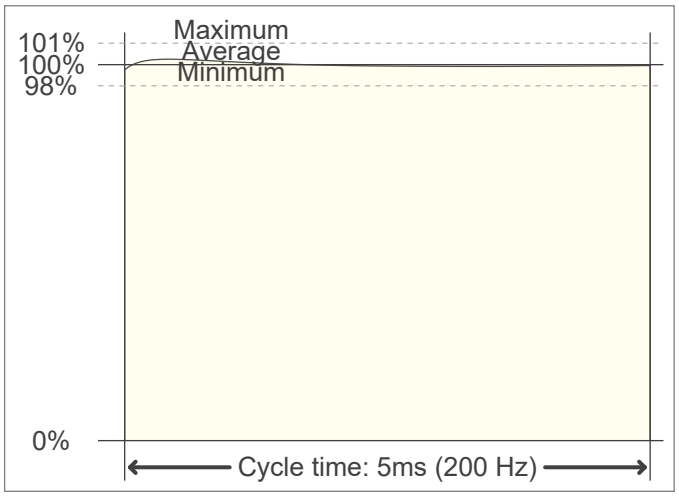
Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz	0,06 %
JA8/10 90 Hz	0,11 %
JA8/10 200 Hz	4,44 %
JA8/10 400 Hz	8,79 %
JA8/10 1000 Hz	12,08 %

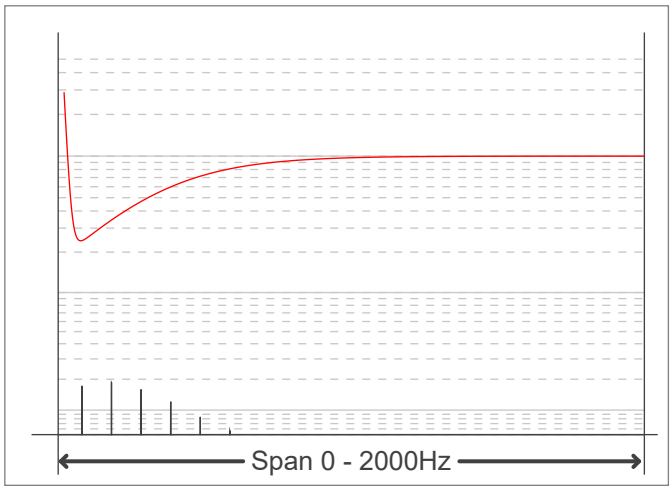
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp	0,04

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot