Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
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

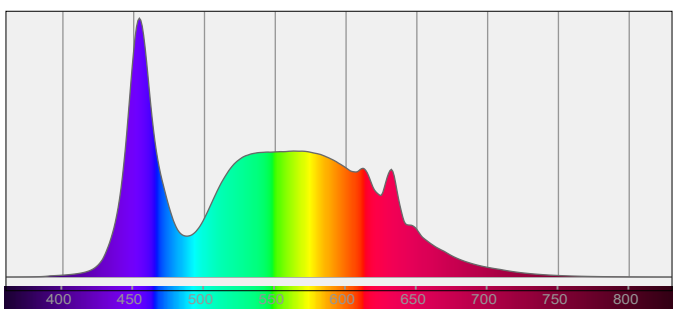
Number of C-planes and Resolution	12 planes – 30°
γ (gamma)-Resolution	5°
Test Distance	12,13 m
Input Power, Power and Displ. Factors	61,9 W – PF 0,98 – DPF 0,98
Input RMS Voltage and Current	230 V – 0,276 A
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec – 2,0%

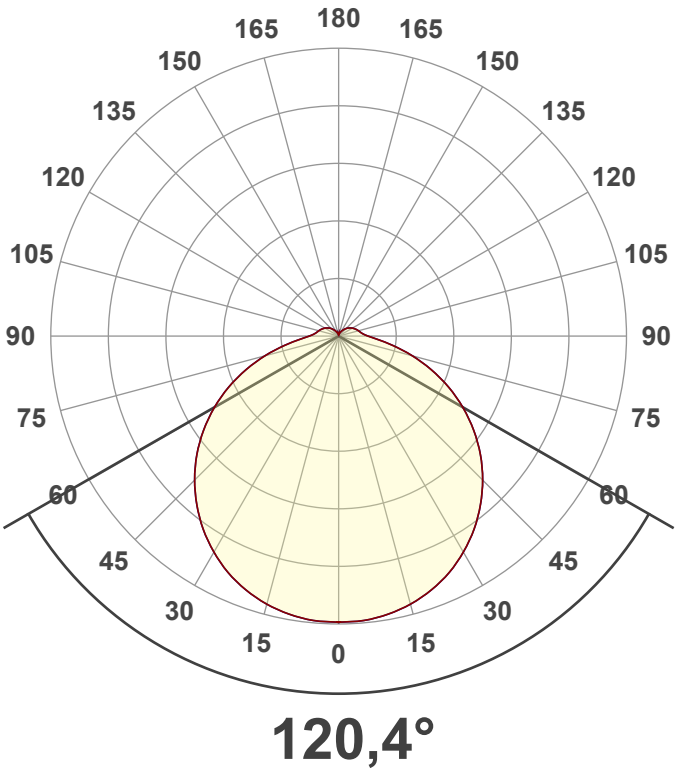
Tested Light Source

Product Name	274488-5700K
Item No. and Manufacturer	274488-5700K – Dutchfulfillment
Product Description (line 1)	RETROFIT TITAN | LED MODULE | 32W/40W/48W/56W | 120°

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	9964 lm – 9,32% / 90,68%
Efficiency	161 lm/W
Peak Intensity and Beam Angle	2799 cd – 120,4°
Correlated Color Temperature, Target/Measured	CCT = 5700 K / 5755 K
Color Rendering Index	CRI 81,5
Color Rendering TM30-18	R_f 80,5 – R_g 94,4
Color Shift, CIE duv and MacAdam Steps	Duv 0,0007 – SDCM 3,6
Flicker	SVM 0,01 – PstLM 0,01

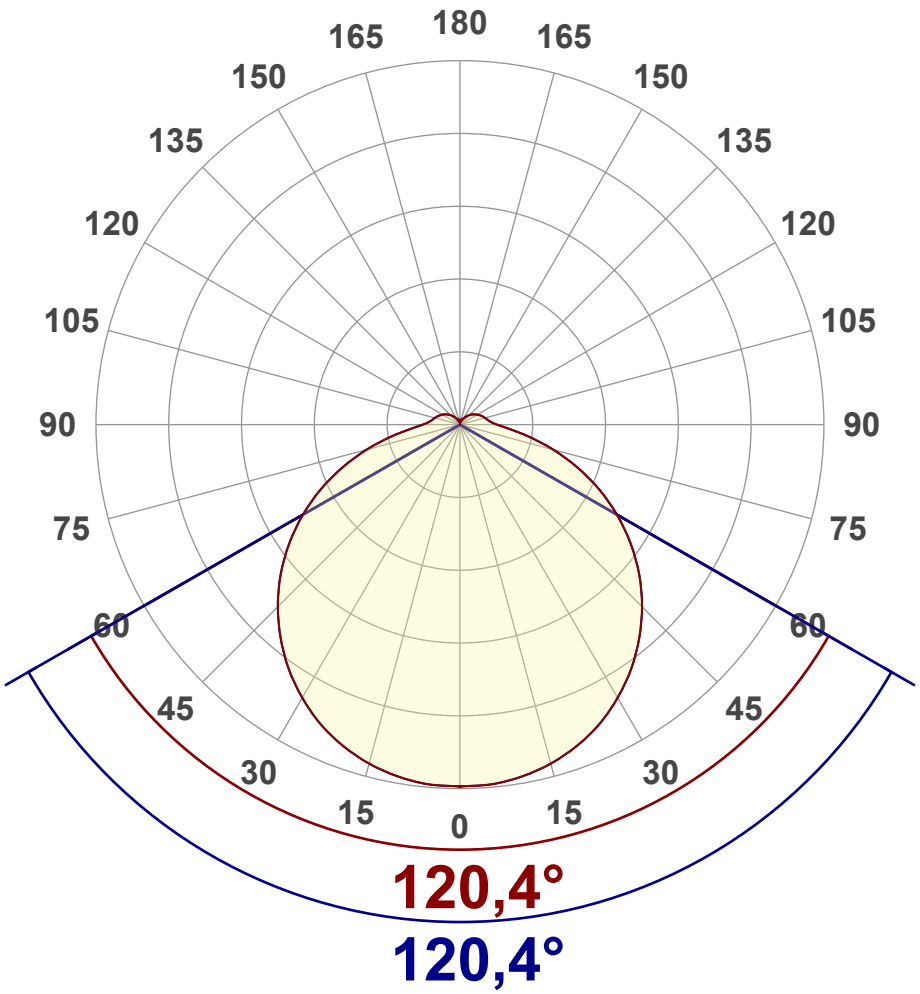




Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
Operator:

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



Main Values

Output (total Lumen)	9964 lm
Lumen Up% / Down%	9,32% / 90,68%
Peak Intensity	2799 cd
Beam Angle (50%)	120,4°
Beam Angle (90%)	120,4°
Beam Angle (10%)	120,4°

Cut-off Angle

Average 2,5%	290,1°

Field Angle

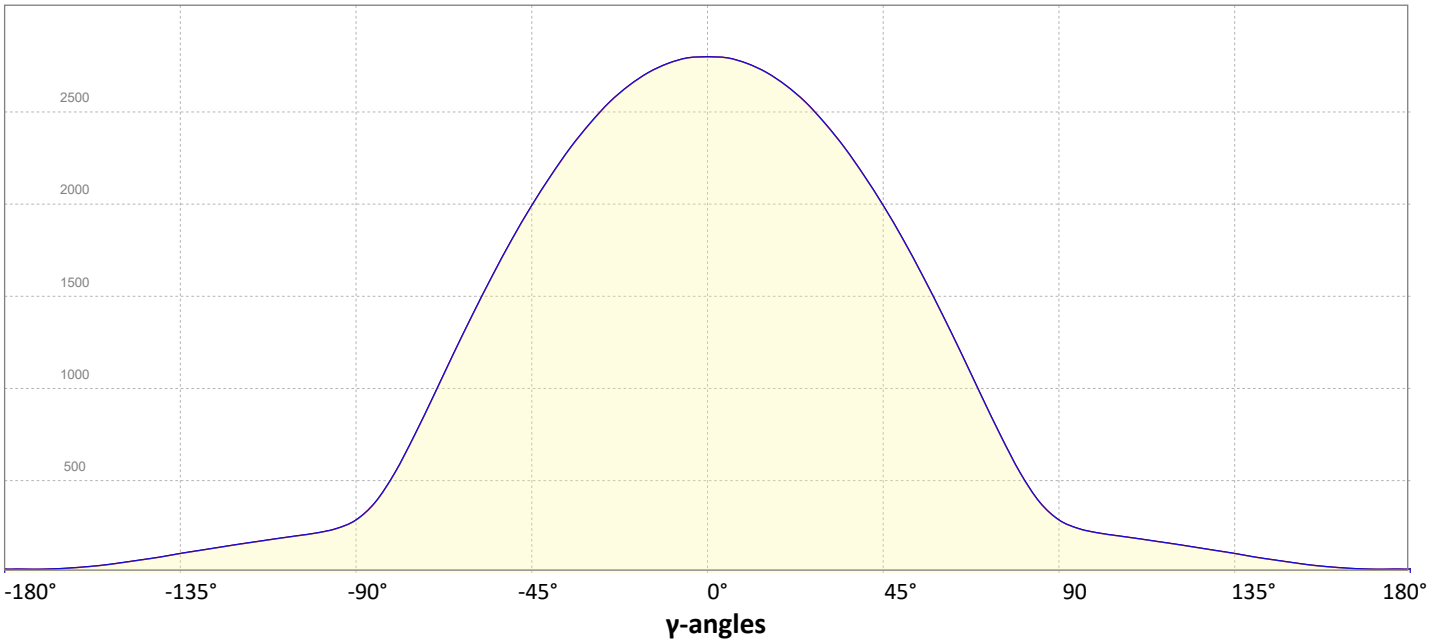
Average 10%	181,4°

Intensity Ratio

In 120° cone	66,5%
In 90° cone	44,4%

C000-C180
C090-C270

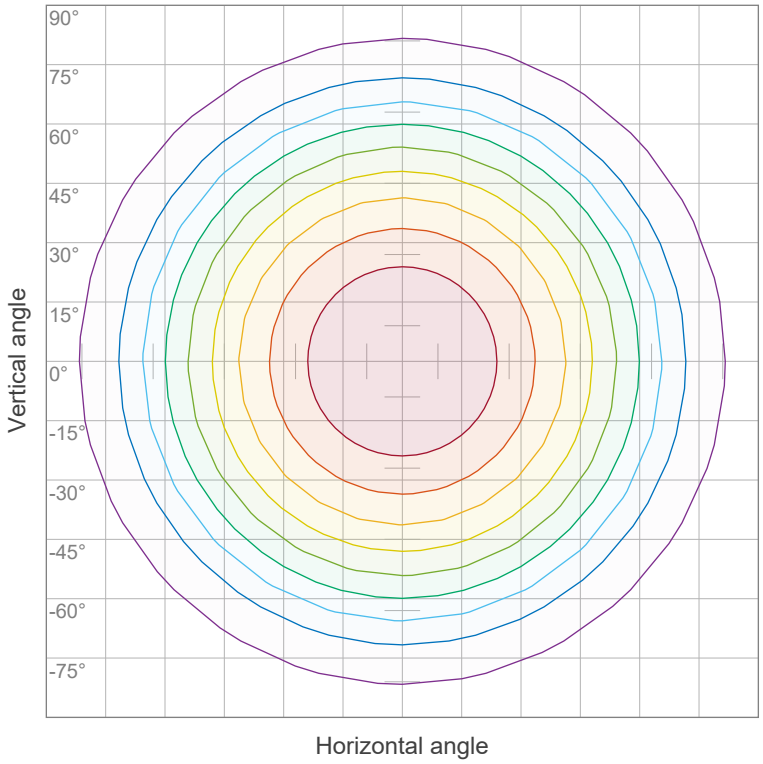
Linear distribution diagram - Intensity (candela) vs γ-angle



Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
Operator:

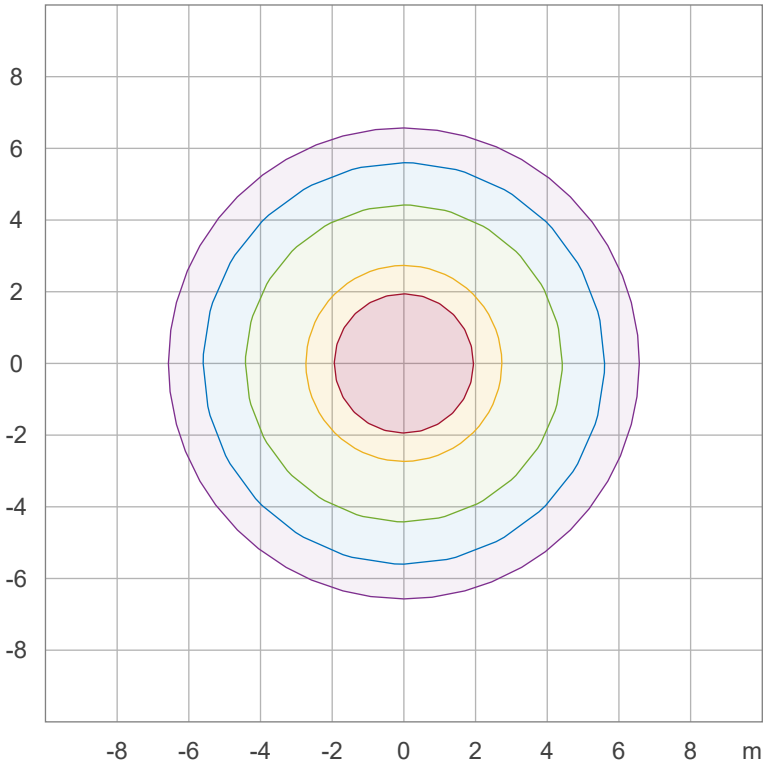
Iso-intensity Diagram (Iso-candela)



90 %	2519,3 cd
80 %	2239,4 cd
70 %	1959,5 cd
60 %	1679,5 cd
50 %	1399,6 cd
40 %	1119,7 cd
30 %	839,8 cd
20 %	559,8 cd
10 %	279,9 cd

Peak intensity: 2799,2 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	155,5 lx
30,0 %	93,3 lx
10,0 %	31,1 lx
5,0 %	15,6 lx
3,0 %	9,3 lx

Peak illuminance: 311,0 lx
Mounting height: 3,0 m
Number of c-planes: 12

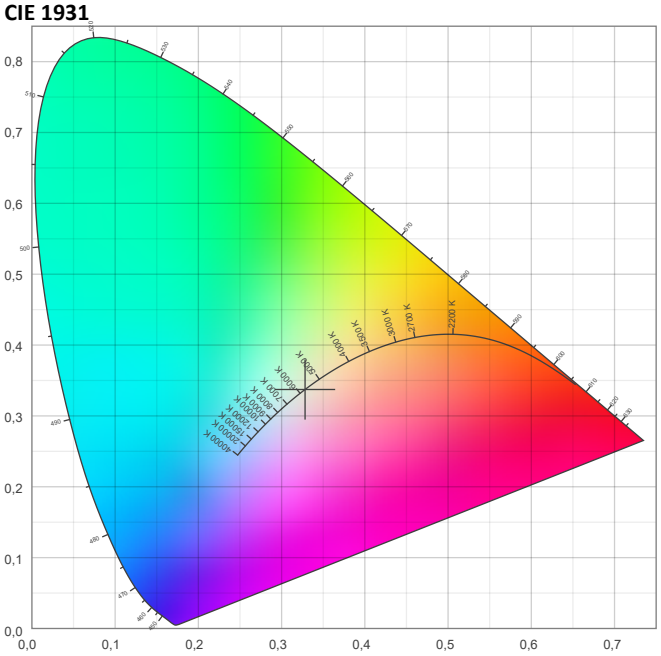
Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
Operator:

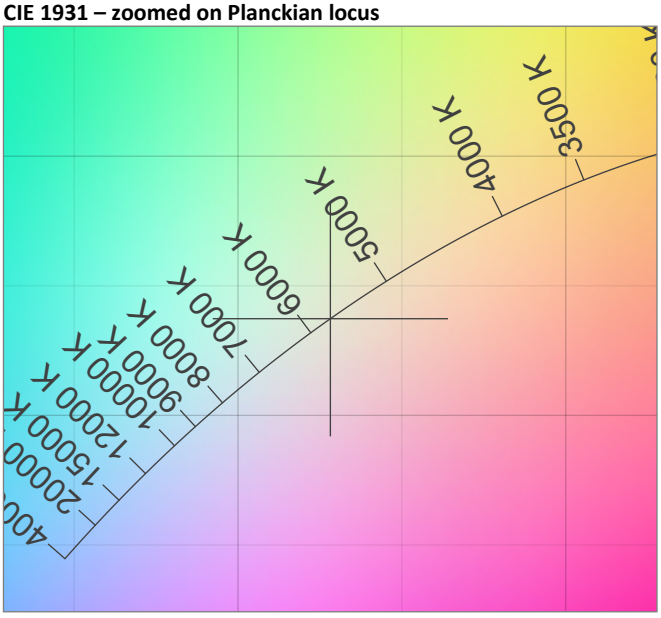
Color details

Correlated Color Temperature, Target	CCT = 5700 K
Correlated Color Temperature, Measured	CCT = 5755 K
Color Rendering Index	CRI 81,5
Color Rendering Index, R9 (red component)	R9 = 10,6
Color Rendering TM30-18	R_f 80,5 – R_g 94,4
Color Quality Scale	CQS = 78,0
MacAdam Steps	SDCM = 3,6
Color coordinates CIE 1931	(x;y) = (0,328;0,337)
Color coordinate CIEs 1960	(u;v) = (0,205;0,317)
Color deviation from BBL	Duv = 0,0007
Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0,205;0,475)

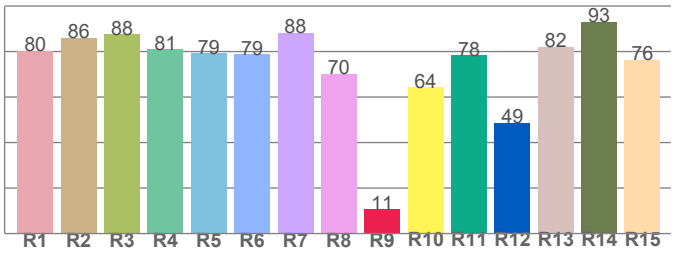
CIE 1931



CIE 1931 – zoomed on Planckian locus



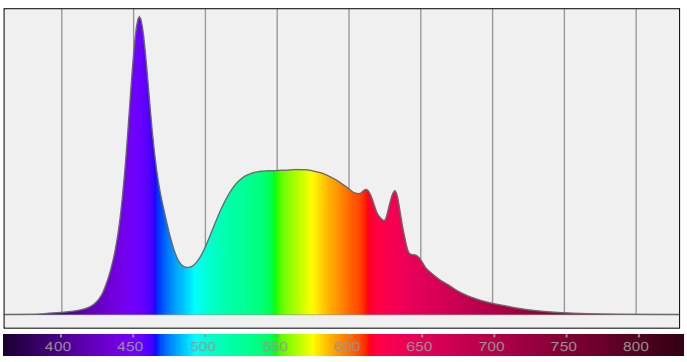
Color Rendering Index per reference color (CIE 1995)



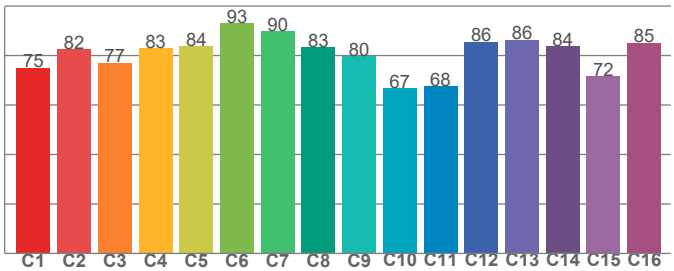
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
80,4	86,1	87,6	80,9	79,4	78,9	88,2	70,3	10,6	64,3	78,5	48,6	82,1	93,0	76,4

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



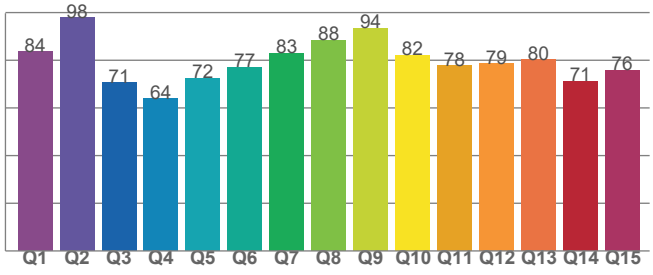
TM30-18 Rf-values per hue bin



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
75,1	82,5	77,1	82,9	83,8	92,9	89,8	83,4	79,6	66,7	67,5	85,6	86,4	83,8	71,7	85,1

Color Quality Scale by reference color



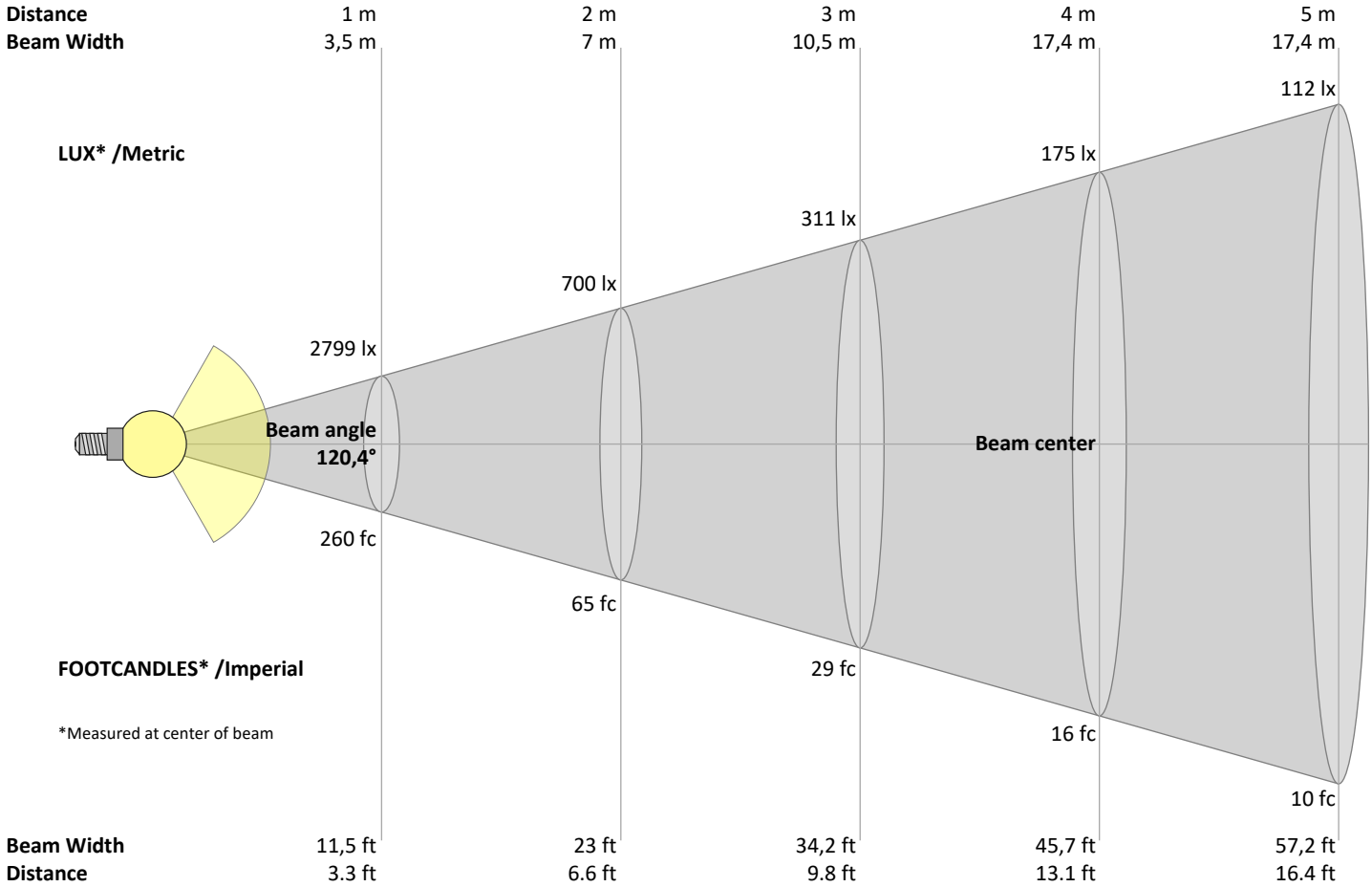
CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
83,6	97,8	70,6	63,8	72,4	77,1	83,0	88,3	93,5	82,1	77,7	78,5	80,2	71,1	75,9

Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
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
2799	700	311	175	112	78	57	44	35	28	23	19	17	14	12	11	10	9	8	7	lux
260,1	65	28,9	16,3	10,4	7,2	5,3	4,1	3,2	2,6	2,1	1,8	1,5	1,3	1,2	1	0,9	0,8	0,7	0,7	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
2799	2770	2673	2509	2279	1993	1655	1277	878	512	287	221	192	164	135	105	73	46	28	19	cd
100%	99%	95%	90%	81%	71%	59%	46%	31%	18%	10%	8%	7%	6%	5%	4%	3%	2%	1%	1%	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
2799	2770	2673	2509	2279	1993	1655	1277	878	512	287	221	192	164	135	105	73	46	28	19	cd
100%	99%	95%	90%	81%	71%	59%	46%	31%	18%	10%	8%	7%	6%	5%	4%	3%	2%	1%	1%	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
2799	2770	2673	2509	2279	1993	1655	1277	878	512	287	221	192	164	135	105	73	46	28	19	cd
100%	99%	95%	90%	81%	71%	59%	46%	31%	18%	10%	8%	7%	6%	5%	4%	3%	2%	1%	1%	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
2799	2770	2673	2509	2279	1993	1655	1277	878	512	287	221	192	164	135	105	73	46	28	19	cd
100%	99%	95%	90%	81%	71%	59%	46%	31%	18%	10%	8%	7%	6%	5%	4%	3%	2%	1%	1%	of 0°val

Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
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	23,7	24,9	24,1	25,3	25,7	23,2	24,4	23,6	24,9	25,3
	3H	25,4	26,6	26,0	27,1	27,5	24,8	26,0	25,3	26,4	26,8
	4H	26,3	27,4	26,8	27,8	28,3	25,5	26,6	26,0	27,1	27,5
	6H	27,1	28,1	27,5	28,5	29,1	26,1	27,1	26,6	27,6	28,1
	8H	27,4	28,4	27,9	28,9	29,5	26,4	27,4	26,8	27,8	28,4
	12H	27,8	28,8	28,3	29,3	29,9	26,6	27,6	27,1	28,0	28,6
4H	2H	24,3	25,4	24,8	25,8	26,3	23,9	25,0	24,4	25,5	25,9
	3H	26,3	27,3	26,8	27,7	28,3	25,8	26,8	26,3	27,2	27,8
	4H	27,2	28,2	27,7	28,6	29,3	26,5	27,5	27,1	28,0	28,6
	6H	28,1	28,9	28,7	29,4	30,0	27,2	28,1	27,8	28,6	29,1
	8H	28,5	29,3	29,1	29,8	30,4	27,5	28,3	28,1	28,8	29,4
	12H	29,0	29,6	29,6	30,2	30,8	27,8	28,4	28,4	29,0	29,6
8H	4H	27,4	28,2	28,1	28,7	29,3	26,9	27,6	27,5	28,2	28,7
	6H	28,5	29,1	29,2	29,7	30,4	27,8	28,4	28,4	29,0	29,7
	8H	29,1	29,6	29,8	30,3	31,1	28,2	28,7	28,8	29,4	30,2
	12H	29,7	30,2	30,4	30,8	31,5	28,6	29,0	29,3	29,7	30,4
12H	4H	27,5	28,1	28,1	28,7	29,3	26,9	27,6	27,5	28,1	28,8
	6H	28,6	29,1	29,3	29,8	30,6	27,9	28,4	28,5	29,1	29,9
	8H	29,2	29,7	29,9	30,3	31,1	28,4	28,8	29,1	29,5	30,2

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 / -0,2
S = 2.0H	0,3 / -0,3	0,3 / -0,4

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	117	117	117	117	113	113	113	113	106	106	106	99	99	99	93	93	93	91
1	105	100	95	91	101	97	92	88	91	87	84	85	82	80	80	78	76	73
2	95	86	79	73	92	84	77	71	78	73	68	74	69	65	69	66	62	60
3	86	75	67	60	83	73	65	59	69	62	57	65	59	54	61	56	52	50
4	79	66	57	50	76	64	56	49	61	53	48	57	51	46	54	49	45	42
5	72	59	50	43	70	57	49	42	54	47	41	51	45	40	48	43	38	36
6	67	53	44	37	64	52	43	37	49	41	36	46	40	35	44	38	34	31
7	62	48	39	33	59	47	38	32	44	37	31	42	35	31	40	34	30	28
8	57	44	35	29	55	43	34	29	40	33	28	38	32	27	37	31	27	24
9	54	40	32	26	52	39	31	26	37	30	25	35	29	24	34	28	24	22
10	50	37	29	24	48	36	28	23	34	27	23	33	27	22	31	26	22	20

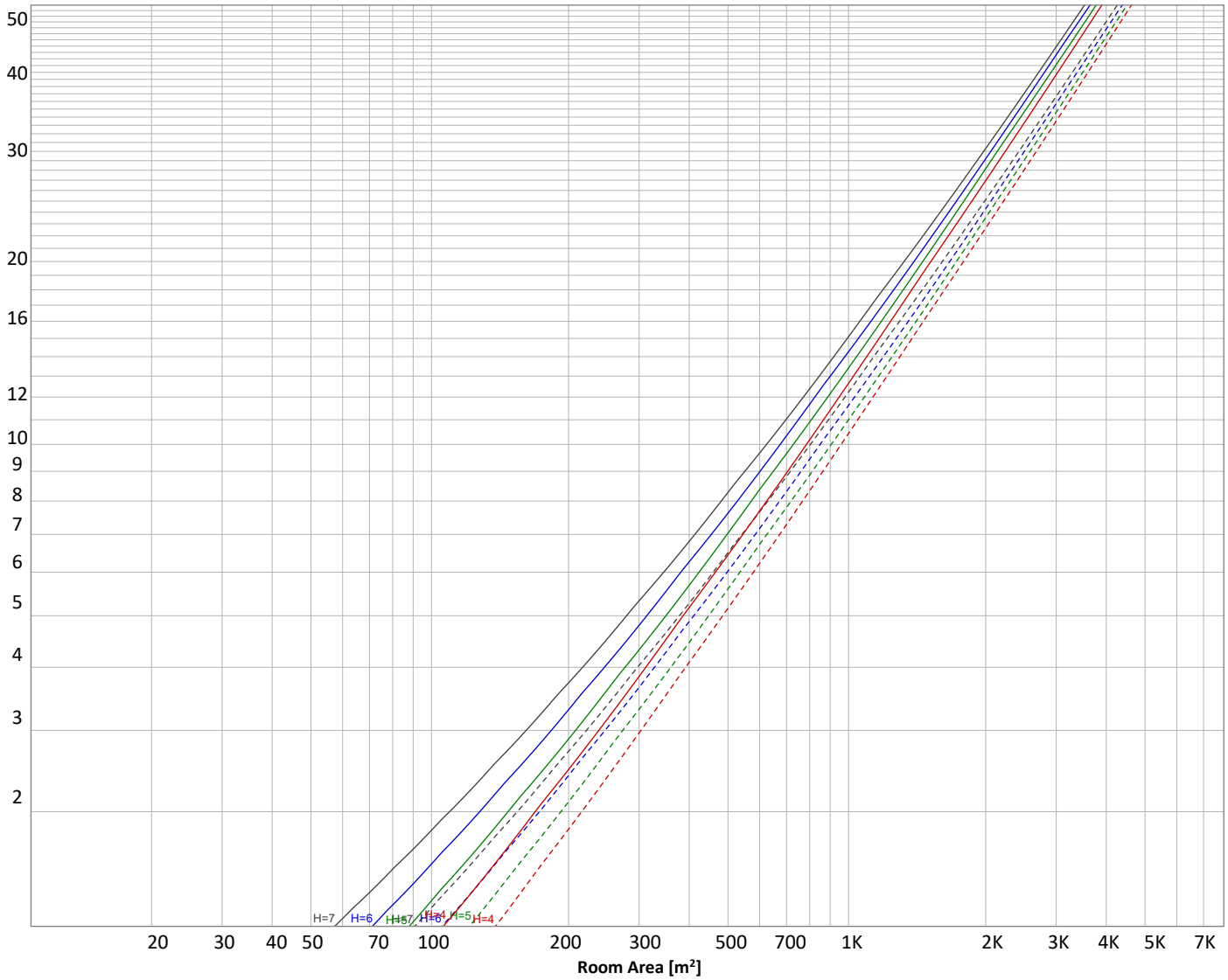
Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
Operator:

Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 9964 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°
265 lm	766 lm	1176 lm	1443 lm	1536 lm	1442 lm	1176 lm	793 lm	436 lm

90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
268 lm	213 lm	169 lm	124 lm	81,1 lm	44,5 lm	19,7 lm	6,99 lm	1,85 lm

Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
Operator:

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	265 lm	2,7%
10-20°	766 lm	7,7%
20-30°	1176 lm	11,8%
30-40°	1443 lm	14,5%
40-50°	1536 lm	15,4%
50-60°	1442 lm	14,5%
60-70°	1176 lm	11,8%
70-80°	793 lm	8,0%
80-90°	436 lm	4,4%
90-100°	268 lm	2,7%
100-110°	213 lm	2,1%
110-120°	169 lm	1,7%
120-130°	124 lm	1,2%
130-140°	81 lm	0,8%
140-150°	45 lm	0,4%
150-160°	20 lm	0,2%
160-170°	7 lm	0,1%
170-180°	2 lm	0,0%
Total	9964 lm	100,0%

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	2208 lm	22,2%
0-40°	3651 lm	36,6%
0-60°	6630 lm	66,5%
60-90°	2405 lm	24,1%
70-100°	1497 lm	15,0%
90-120°	650 lm	6,5%
0-90°	9035 lm	90,7%
90-180°	929 lm	9,3%
0-180°	9964 lm	100,0%

Intensity peaks

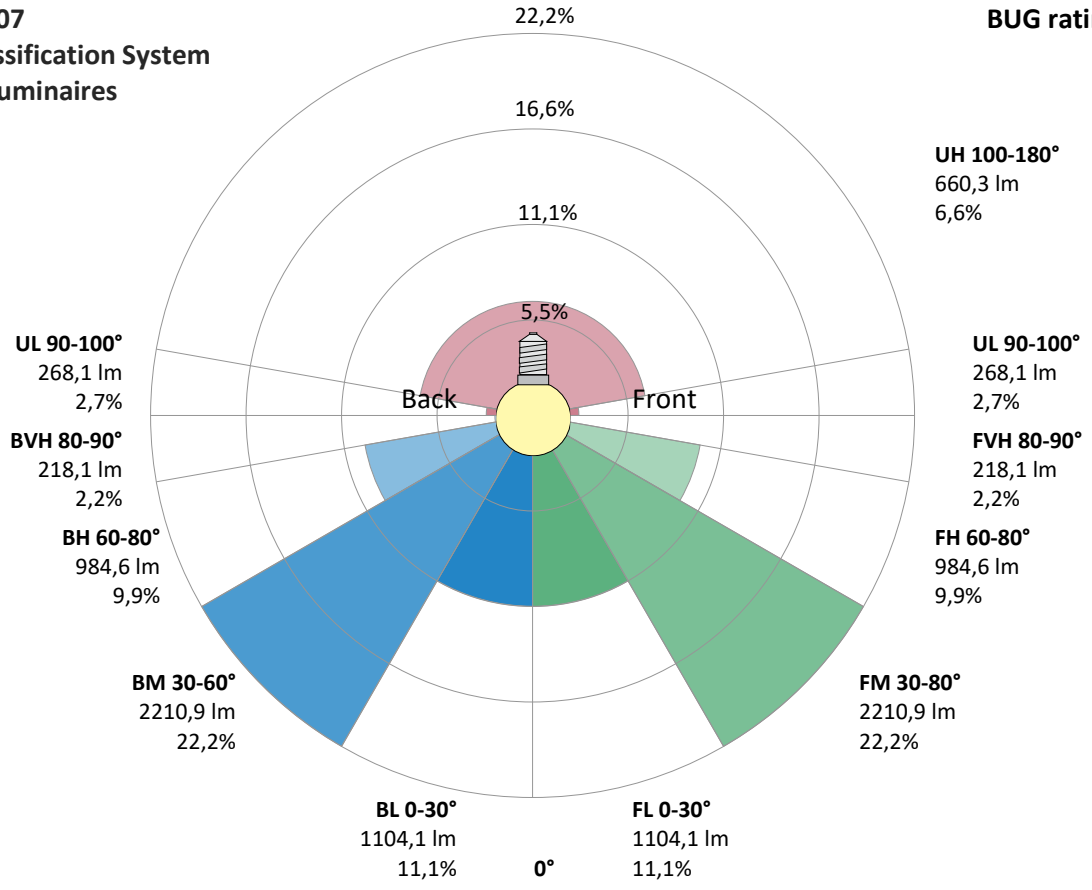
Max intensity	2799 cd
Intensity, 90°	287 cd
Intensity, 0°	2799 cd

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1104 lm	11,1%
Medium(30-60°)	2211 lm	22,2%
High(60-80°)	985 lm	9,9%
Very high(80-90°)	218 lm	2,2%
Back light		
Low(0-30°)	1104 lm	11,1%
Medium(30-60°)	2211 lm	22,2%
High(60-80°)	985 lm	9,9%
Very high(80-90°)	218 lm	2,2%
Uplight		
Low(90-100°)	268 lm	2,7%
High(100-180°)	660 lm	6,6%

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

BUG rating B3 U4 G2



Light Measurement Report

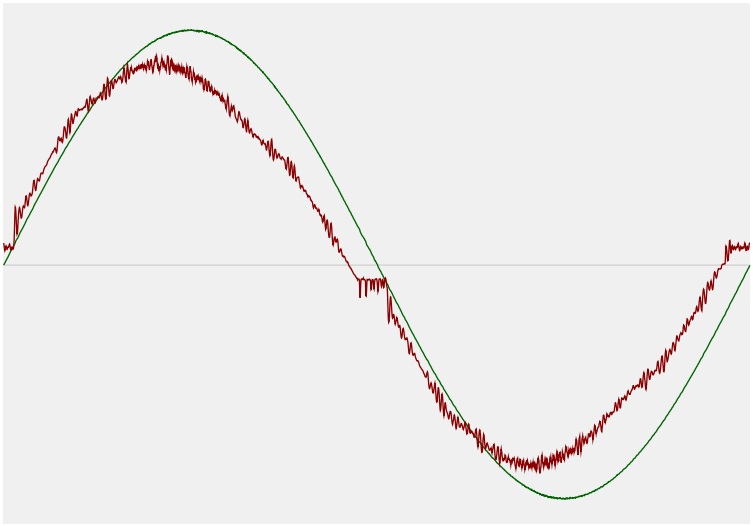
Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
Operator:

Power Details

Input Power

Power feed to light source	61,9 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,276 A
Volt-Ampere or apparent power = V_{RMS}*I_{RMS}	63,46 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	6,33%
Total harmonic distortion of the voltage	0,05%

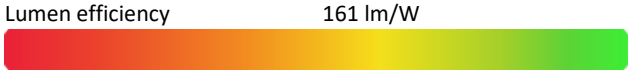
Input Power Curve



Efficiency

Radiated power efficiency 49,7%

Lumen efficiency 161 lm/W



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	5695 K
CCT shift	+5 K
CCT end	5700 K

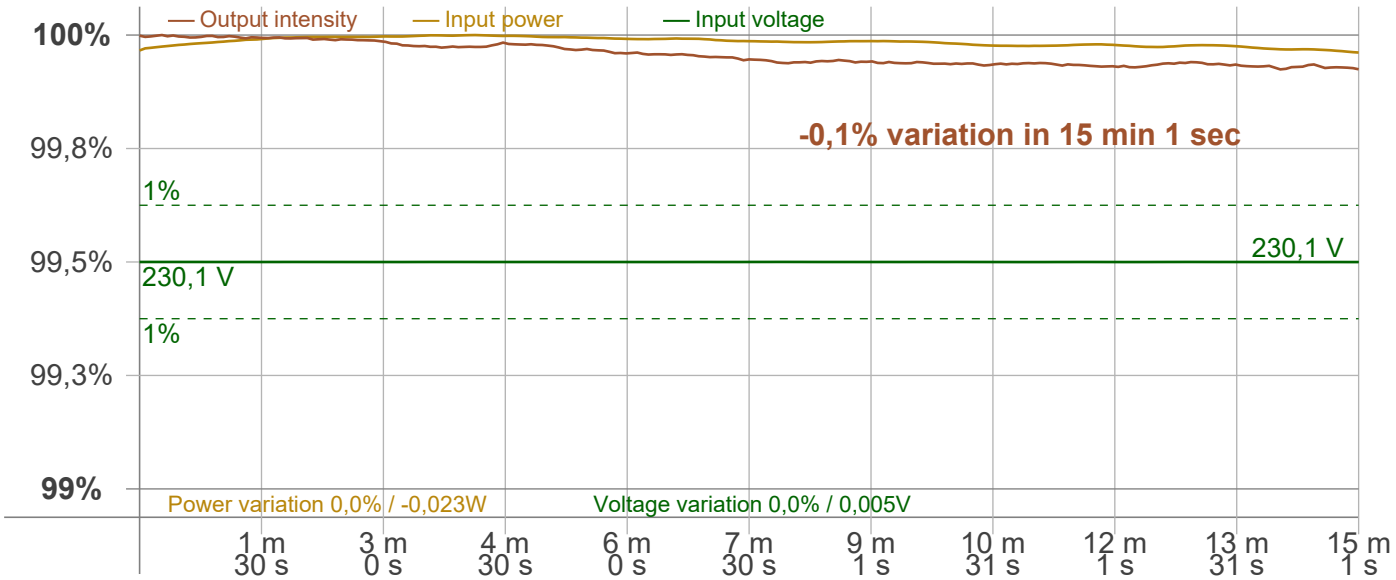
Warmup Result

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

Output Change

Output start	9970 lm
Output change	-6 lm
Output end	9964 lm

Stabilization Curve



Light Measurement Report

Print date: 12-11-2024
Measurement date and time: 12-11-2024 15:18:24 – Measurement no. VFR-241112-2015-MS
Measurement tracking No. and Link: VT241112-009332
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	99,01 Hz
Percent Flicker	0,19 %
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	0,17 %
JA8/10 400 Hz	0,18 %
JA8/10 1000 Hz	0,19 %

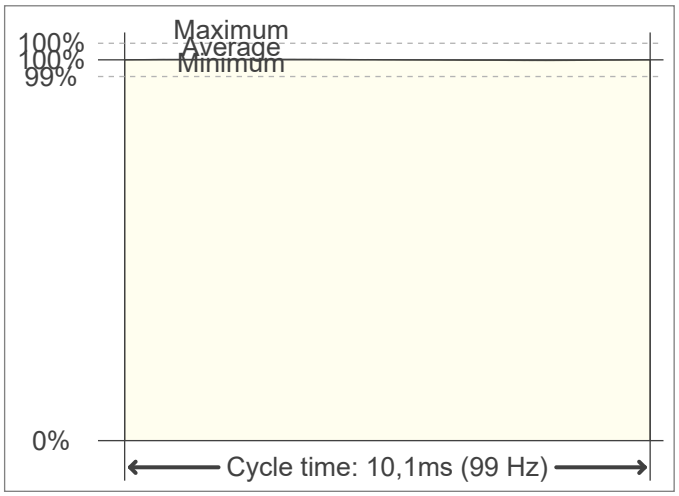
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

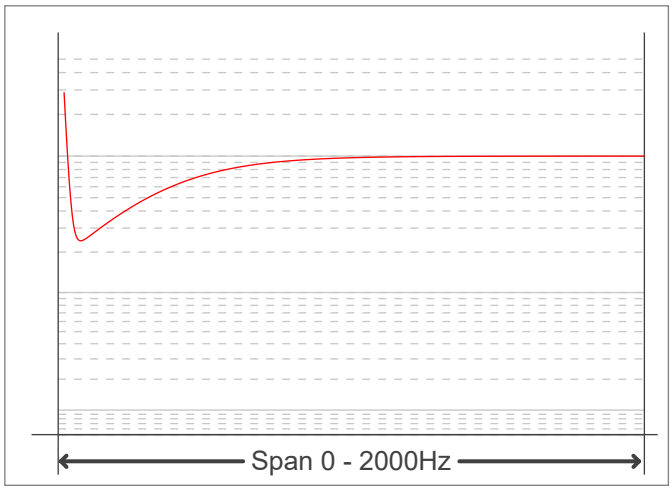
Flicker indices according to Lighting Research Center (2015)

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