

Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](#)

Operator:



Laboratory and Equipment

Laboratory Owner and Location
Goniospectrometer System and Type
Sensor Name, Calibr. Date and Serial No.
Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark
LabSpion – Type C, horizontal
LabSensor Model2 – 11-1-2024 – 3130191315
Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution
 γ (gamma)-Resolution
Test Distance
Input Power, Power and Displ. Factors
Input RMS Voltage and Current
Frequency of Input Power
Warm-up Time and Variation

60 planes – 6°
5°
2,09 m
41,0 W – PF 0,97 – DPF 0,98
230 V – 0,183 A
50 Hz
Lamp stabilized in 20 min 16 sec – 2,0%

Tested Light Source

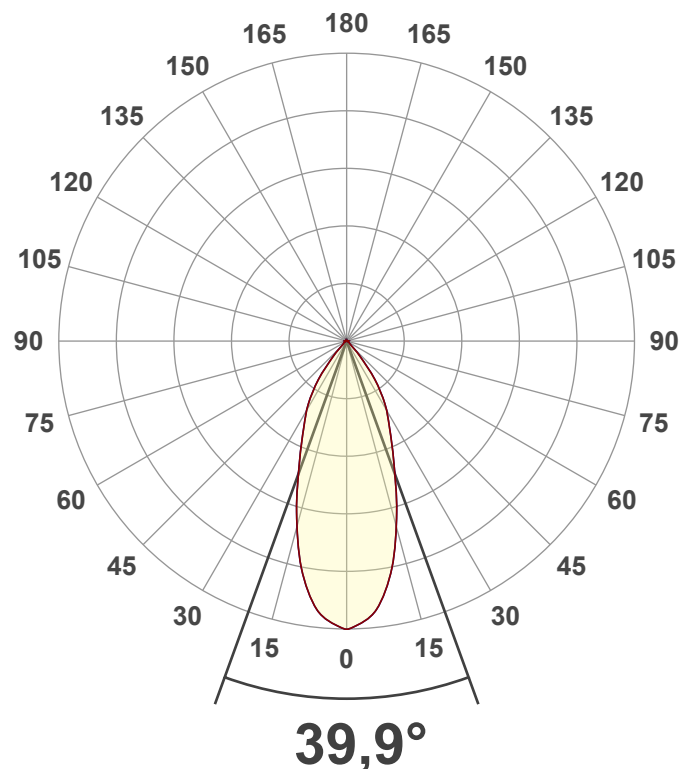
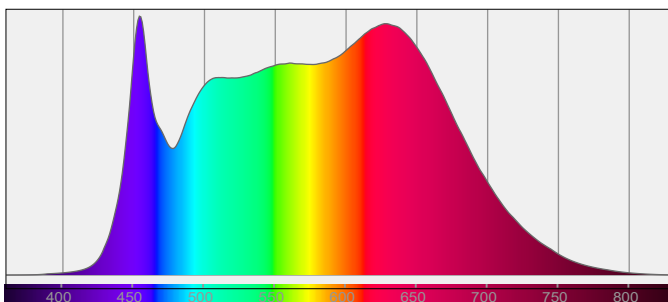
Product Name
Item No. and Manufacturer
Product Description (line 1)

808983-4000K
808983-4000K – Dutchfulfillment
3-FASE RAILSPOT | DURHAM | 38W | WIT

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)
Efficiency
Peak Intensity and Beam Angle
Correlated Color Temperature, Target/Measured
Color Rendering Index
Color Rendering TM30-18
Color Shift, CIE duv and MacAdam Steps
Flicker

3633 lm – 0,06% / 99,94%
89 lm/W
5940 cd – 39,9°
CCT = 4000 K / 4146 K
CRI 97,3
 R_f 91,8 – R_g 97,7
Duv 0,0036 – SDCM 3,9
SVM 0 – PstLM 0,06



Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

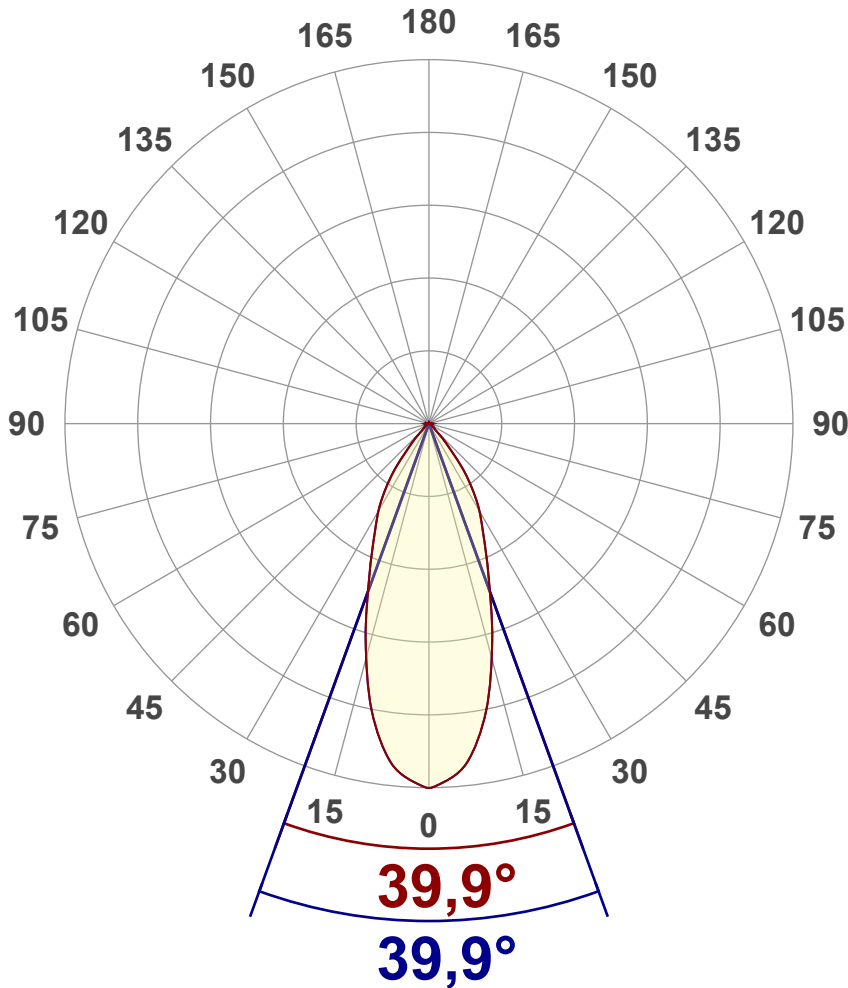
Measurement tracking No. and Link: [VT250219-003929](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3633 lm
Lumen Up% / Down%	0,06% / 99,94%
Peak Intensity	5940 cd
Beam Angle (50%)	39,9°
Beam Angle (90%)	39,9°
Beam Angle (10%)	39,9°

Cut-off Angle

Average 2,5%	92°
--------------	-----

Field Angle

Average 10%	79,6°
-------------	-------

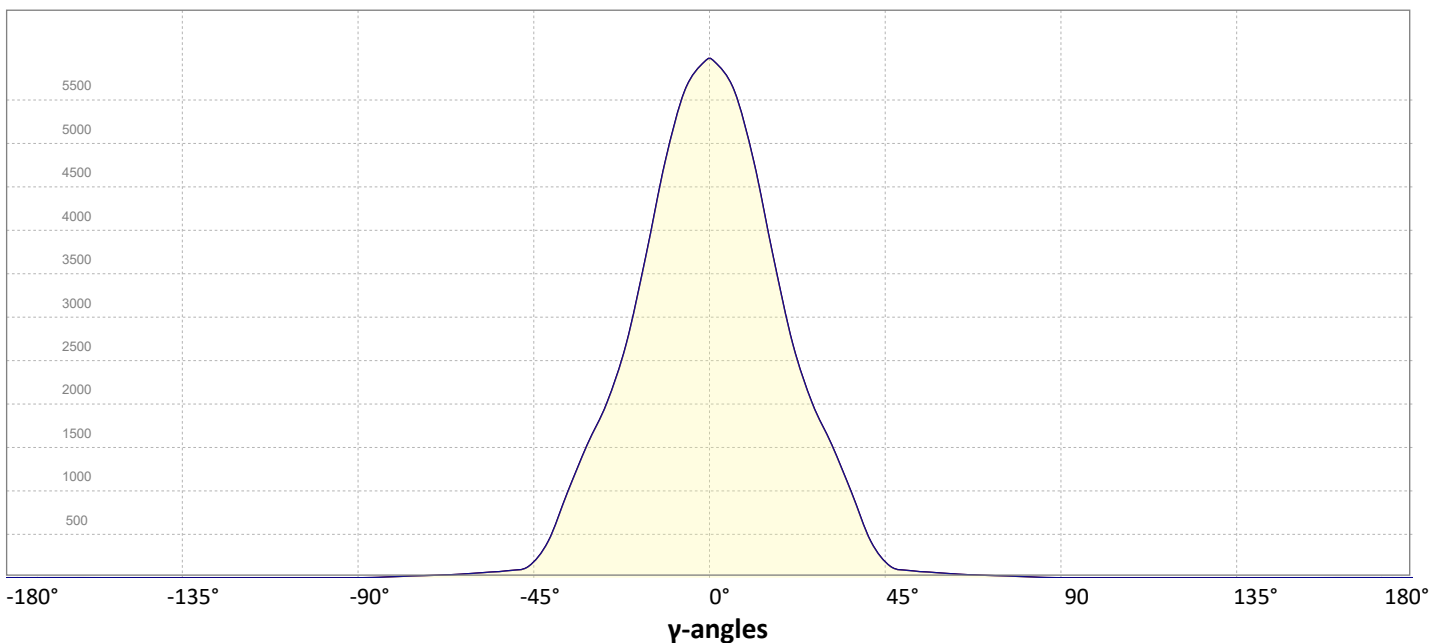
Intensity Ratio

In 120° cone	98,1%
In 90° cone	95,0%

C000-C180

C090-C270

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



Light Measurement Report

Print date: 19-2-2025

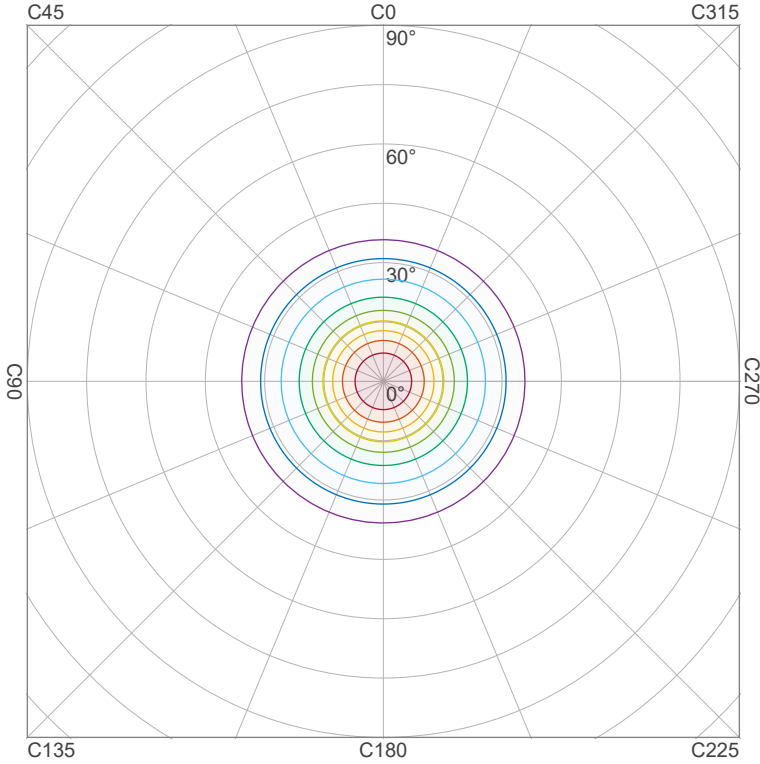
Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](https://www.viso-systems.com/VT250219-003929)

Operator:



Iso-intensity Diagram (Iso-candela)

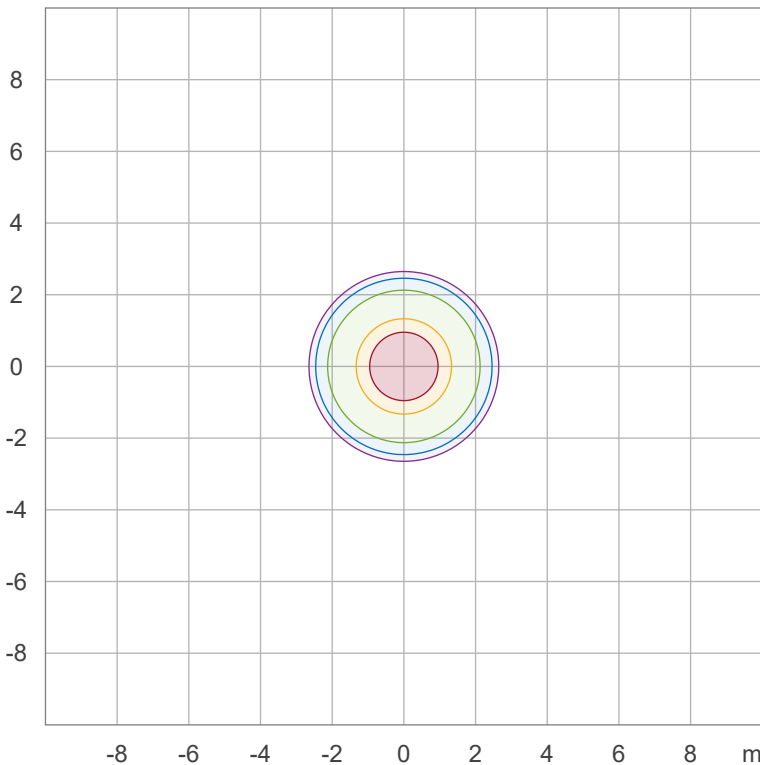


90 %	5345,7 cd
80 %	4751,8 cd
70 %	4157,8 cd
60 %	3563,8 cd
50 %	2969,9 cd
40 %	2375,9 cd
30 %	1781,9 cd
20 %	1187,9 cd
10 %	594,0 cd

Peak intensity: 5939,7 cd

Number of c-planes: 60

Iso-illuminance Diagram (Iso-lux)



50,0 %	330,0 lx
30,0 %	198,0 lx
10,0 %	66,0 lx
5,0 %	33,0 lx
3,0 %	19,8 lx

Peak illuminance: 660,0 lx

Mounting height: 3,0 m

Number of c-planes: 60

Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](https://www.viso-systems.com/VT250219-003929)

Operator:

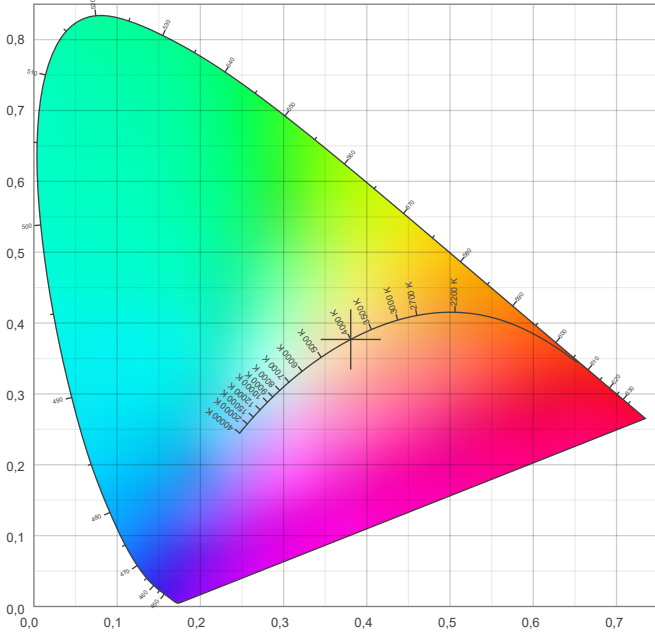


Color details

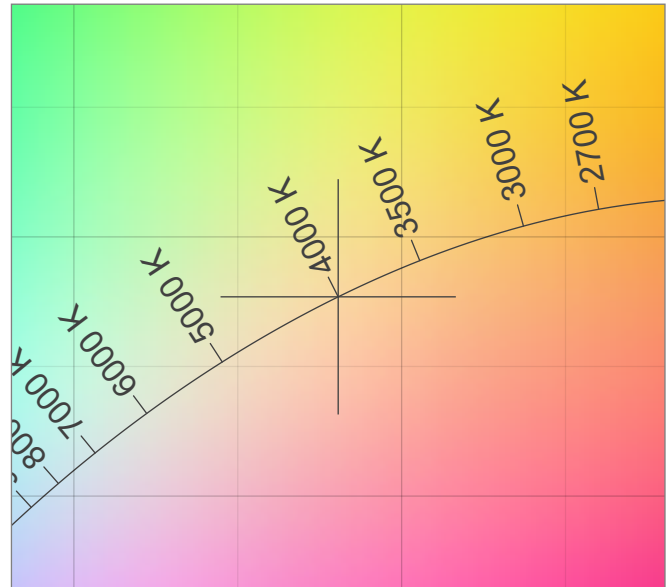
Correlated Color Temperature, Target CCT = 4000 K
 Correlated Color Temperature, Measured CCT = 4146 K
 Color Rendering Index CRI 97,3
 Color Rendering Index, R9 (red component) R9 = 96,3
 Color Rendering TM30-18 R_f 91,8 – R_g 97,7
 Color Quality Scale CQS = 94,9

MacAdam Steps
 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 = 0,0036
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

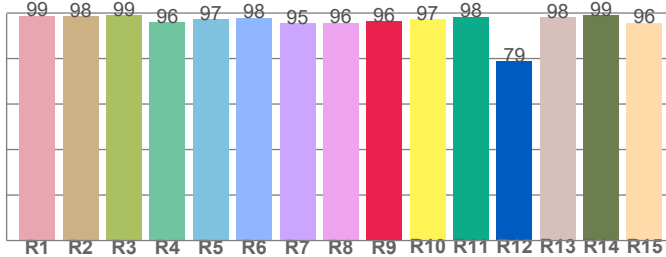
CIE 1931



CIE 1931 – zoomed on Planckian locus



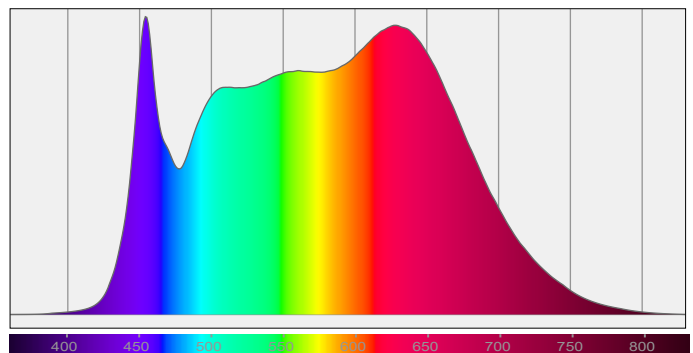
Color Rendering Index per reference color (CIE 1995)



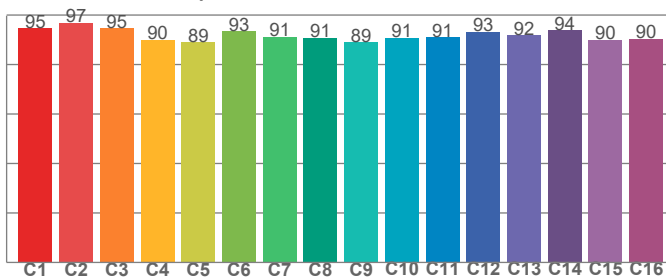
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
98,7	98,5	99,0	96,0	97,3	97,9	95,4	95,7	96,3	97,3	98,3	78,8	98,1	99,0	95,7

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



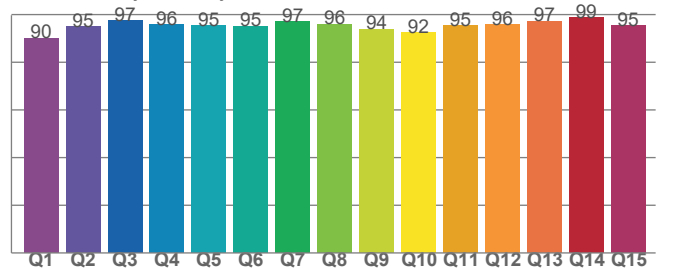
TM30-18 R_f-values per hue bin



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
94,6	96,8	94,7	90,1	89,0	93,5	91,2	90,8	89,1	90,8	91,0	93,2	91,9	93,8	90,0	90,3

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
90,1	94,8	97,4	95,7	95,4	95,1	97,0	96,0	93,8	92,3	95,3	95,8	97,2	98,7	95,2

Light Measurement Report

Print date: 19-2-2025

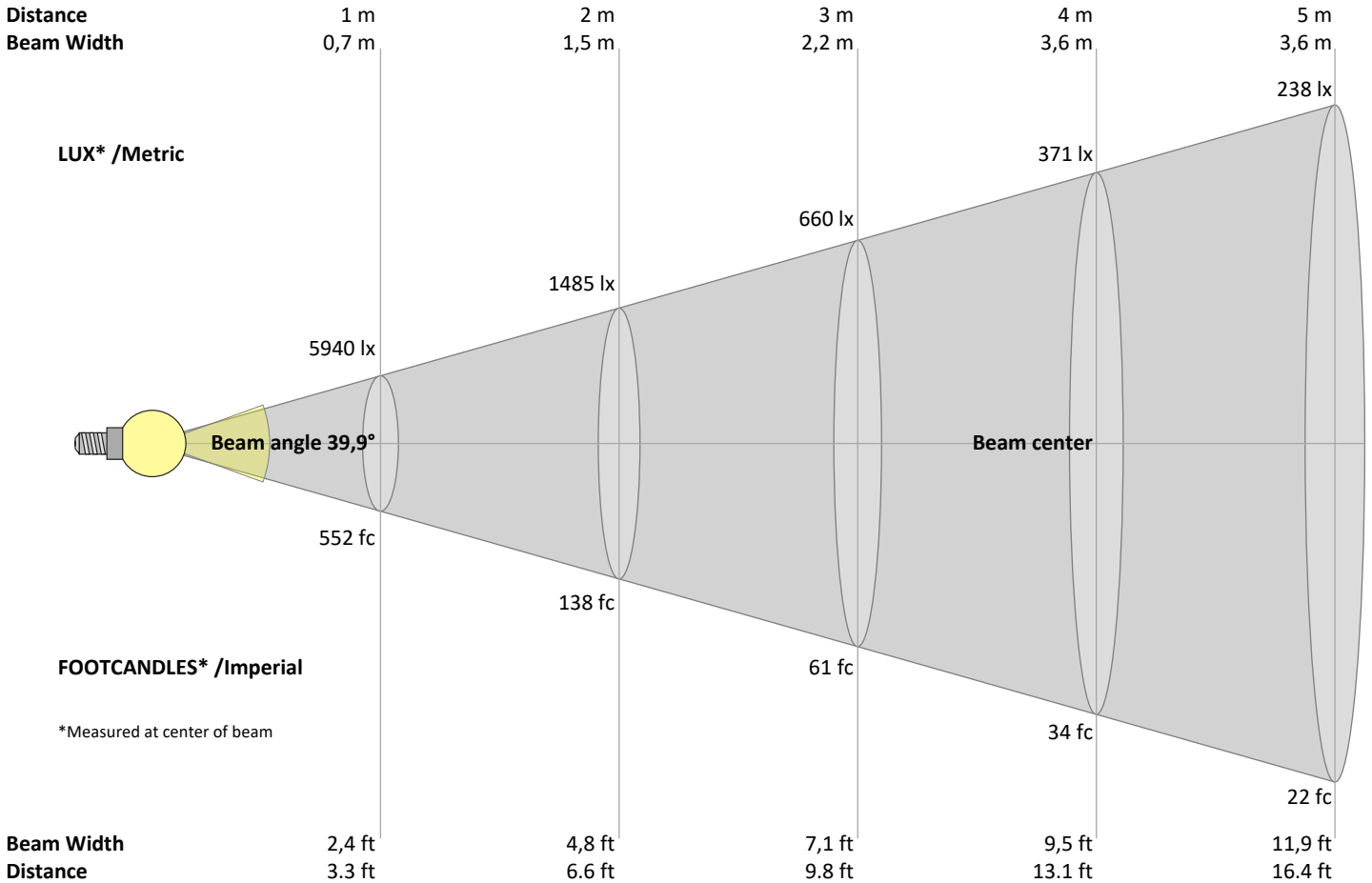
Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](https://www.viso-systems.com/VT250219-003929)

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
5940	1485	660	371	238	165	121	93	73	59	49	41	35	30	26	23	21	18	16	15	lux
551,8	138	61,3	34,5	22,1	15,3	11,3	8,6	6,8	5,5	4,6	3,8	3,3	2,8	2,5	2,2	1,9	1,7	1,5	1,4	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
5940	5895	5763	5631	5337	5011	4647	4208	3768	3360	2958	2600	2326	2052	1848	1657	1457	1240	1022	796	cd
100%	99%	97%	95%	90%	84%	78%	71%	63%	57%	50%	44%	39%	35%	31%	28%	25%	21%	17%	13%	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
5940	5895	5763	5631	5337	5011	4647	4208	3768	3360	2958	2600	2326	2052	1848	1657	1457	1240	1022	796	cd
100%	99%	97%	95%	90%	84%	78%	71%	63%	57%	50%	44%	39%	35%	31%	28%	25%	21%	17%	13%	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
5940	5895	5763	5631	5337	5011	4647	4208	3768	3360	2958	2600	2326	2052	1848	1657	1457	1240	1022	796	cd
100%	99%	97%	95%	90%	84%	78%	71%	63%	57%	50%	44%	39%	35%	31%	28%	25%	21%	17%	13%	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
5940	5895	5763	5631	5337	5011	4647	4208	3768	3360	2958	2600	2326	2052	1848	1657	1457	1240	1022	796	cd
100%	99%	97%	95%	90%	84%	78%	71%	63%	57%	50%	44%	39%	35%	31%	28%	25%	21%	17%	13%	of 0°val

Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](https://www.viso-systems.com/VT250219-003929)

Operator:



Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	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		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	21,4	22,1	21,5	22,3	22,5	21,4	22,1	21,5	22,3	22,5
	3H	21,2	22,0	21,6	22,2	22,4	21,2	22,0	21,6	22,2	22,4
	4H	21,2	21,9	21,6	22,1	22,4	21,2	21,9	21,6	22,1	22,4
	6H	21,2	21,8	21,5	22,1	22,5	21,2	21,8	21,5	22,1	22,5
	8H	21,2	21,8	21,5	22,1	22,5	21,2	21,8	21,5	22,1	22,5
	12H	21,1	21,7	21,5	22,0	22,5	21,1	21,7	21,5	22,0	22,5
4H	2H	21,1	21,8	21,5	22,1	22,3	21,1	21,8	21,5	22,1	22,3
	3H	21,1	21,7	21,5	22,0	22,5	21,1	21,7	21,5	22,0	22,5
	4H	21,0	21,6	21,5	22,0	22,5	21,0	21,6	21,5	22,0	22,5
	6H	21,0	21,6	21,5	21,9	22,3	21,0	21,6	21,5	21,9	22,3
	8H	21,0	21,5	21,5	21,8	22,2	21,0	21,5	21,5	21,8	22,2
	12H	20,9	21,3	21,4	21,7	22,2	20,9	21,3	21,4	21,7	22,2
8H	4H	20,9	21,5	21,5	21,8	22,2	20,9	21,5	21,5	21,8	22,2
	6H	21,0	21,3	21,5	21,8	22,3	21,0	21,3	21,5	21,8	22,3
	8H	21,0	21,2	21,5	21,8	22,4	21,0	21,2	21,5	21,8	22,4
	12H	20,9	21,2	21,5	21,7	22,3	20,9	21,2	21,5	21,7	22,3
12H	4H	20,9	21,3	21,4	21,7	22,2	20,9	21,3	21,4	21,7	22,2
	6H	21,0	21,2	21,5	21,8	22,4	21,0	21,2	21,5	21,8	22,4
	8H	20,9	21,2	21,5	21,7	22,3	20,9	21,2	21,5	21,7	22,3

Variations with the observer position for the luminaire spacings, S:

S = 1.0H	4,5 / -6,0	4,5 / -6,0
S = 1.5H	7,0 / -6,8	7,0 / -6,8
S = 2.0H	8,9 / -7,4	8,9 / -7,4

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	113	111	108	106	111	109	106	104	104	103	101	101	99	98	97	96	95	93
2	108	103	99	96	106	101	98	95	98	95	93	95	93	91	92	90	89	87
3	103	96	91	87	101	95	90	87	92	88	85	90	87	84	88	85	83	81
4	98	90	85	81	96	89	84	80	87	83	79	85	81	78	83	80	77	76
5	93	85	79	75	91	84	79	75	82	77	74	80	76	73	79	75	73	71
6	89	80	74	70	87	79	74	70	78	73	69	76	72	69	75	71	68	67
7	84	75	70	66	83	75	69	65	74	69	65	72	68	65	71	67	64	63
8	81	71	66	62	79	71	65	62	70	65	61	69	64	61	68	64	61	59
9	77	68	62	58	76	67	62	58	66	61	58	65	61	58	65	61	58	56
10	74	64	59	55	73	64	59	55	63	58	55	62	58	55	62	58	55	53

Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](#)

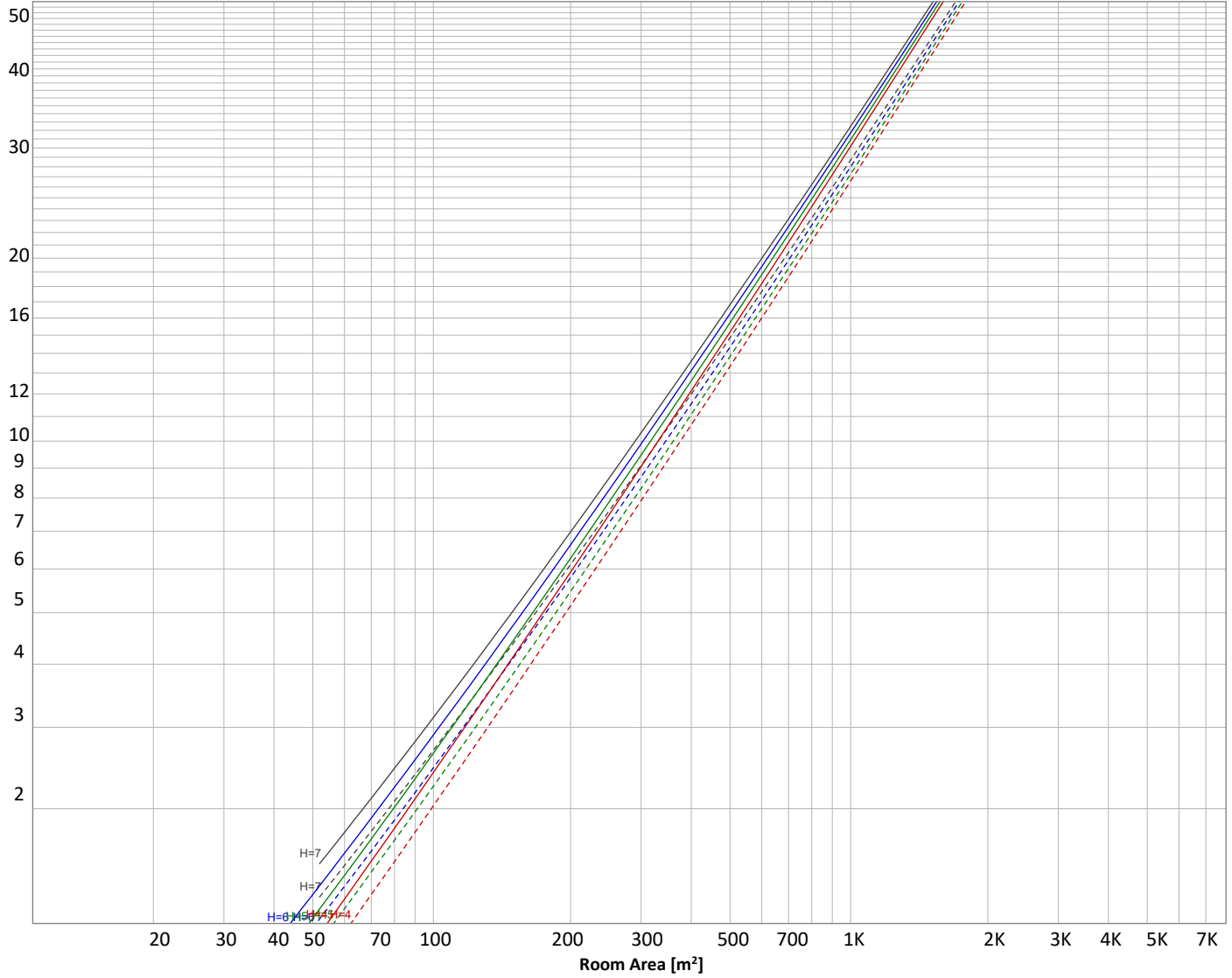
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3633 lm				
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) 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°
523 lm	1100 lm	1006 lm	694 lm	177 lm	62,1 lm	39,6 lm	23,2 lm	5,69 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,198 lm	0,074 lm	0,045 lm	0,071 lm	0,212 lm	0,442 lm	0,568 lm	0,439 lm	0,133 lm

Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](https://www.viso-systems.com/VT250219-003929)

Operator:



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	523 lm	14,4%
10-20°	1100 lm	30,3%
20-30°	1006 lm	27,7%
30-40°	694 lm	19,1%
40-50°	177 lm	4,9%
50-60°	62 lm	1,7%
60-70°	40 lm	1,1%
70-80°	23 lm	0,6%
80-90°	6 lm	0,2%
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°	0 lm	0,0%
150-160°	1 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	3633 lm	100,0%

Intensity peaks

Max intensity	5940 cd
Intensity, 90°	1 cd
Intensity, 0°	5940 cd

Zonal Lumen summary

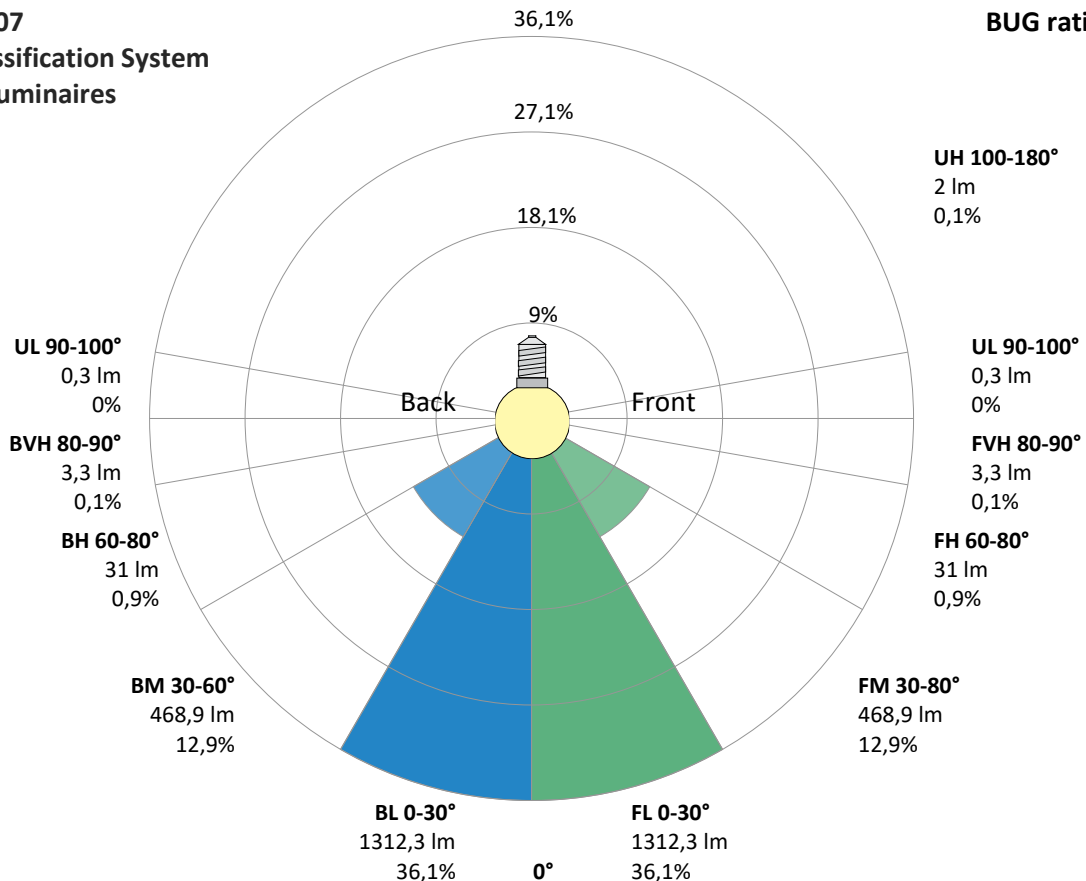
Zone (γ)	Lumen	% Total
0-30°	2629 lm	72,4%
0-40°	3323 lm	91,5%
0-60°	3562 lm	98,1%
60-90°	68 lm	1,9%
70-100°	29 lm	0,8%
90-120°	0 lm	0,0%
0-90°	3631 lm	99,9%
90-180°	2 lm	0,1%
0-180°	3633 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	1312 lm	36,1%
Medium(30-60°)	469 lm	12,9%
High(60-80°)	31 lm	0,9%
Very high(80-90°)	3 lm	0,1%
Back light		
Low(0-30°)	1312 lm	36,1%
Medium(30-60°)	469 lm	12,9%
High(60-80°)	31 lm	0,9%
Very high(80-90°)	3 lm	0,1%
Uplight		
Low(90-100°)	0 lm	0,0%
High(100-180°)	2 lm	0,1%

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

BUG rating B3 U1 G0



Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](#)

Operator:

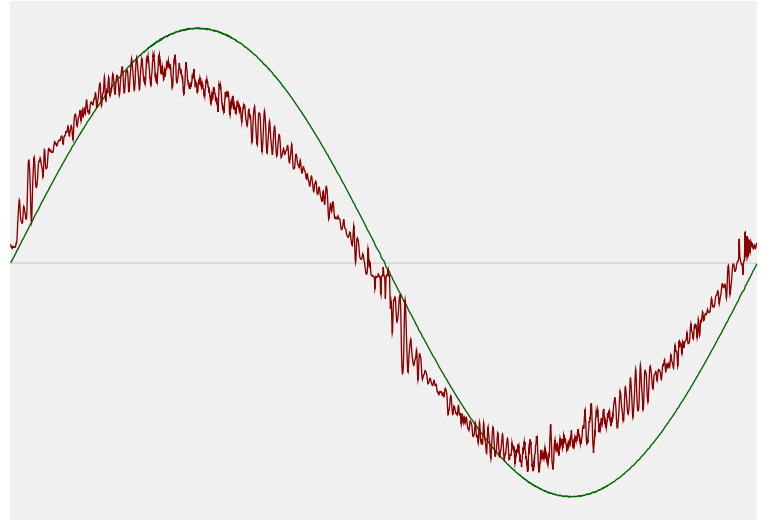


Power Details

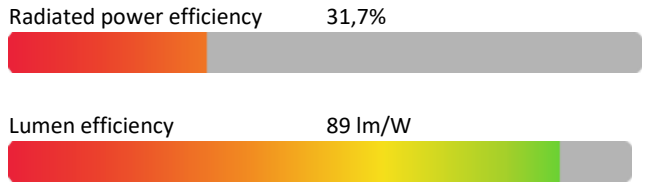
Input Power

Power feed to light source	41,0 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,183 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	42,15 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	6,87%
Total harmonic distortion of the voltage	0,06%

Input Power Curve



Efficiency



Stabilization Details

Warmup Conditions

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

Color Temperature Change

CCT start	4013 K
CCT shift	-13 K
CCT end	4000 K

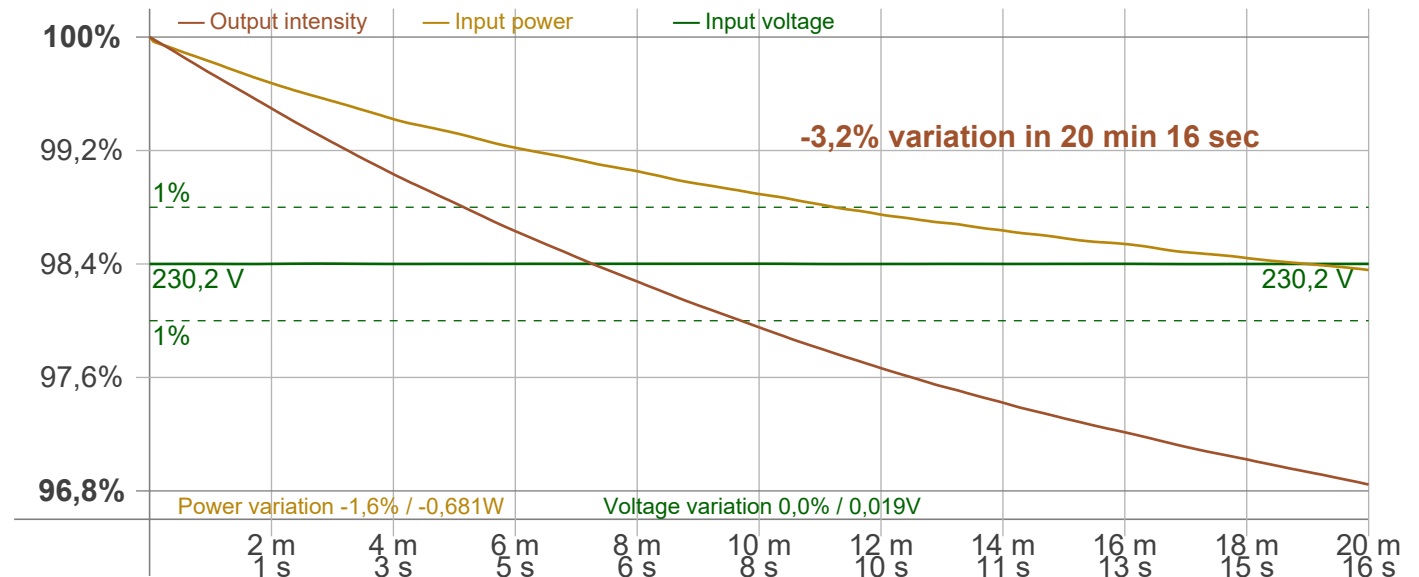
Warmup Result

Total warmup time	Lamp stabilized in 20 min 16 sec
Warmup variation	-3,2%

Output Change

Output start	3751 lm
Output change	-118 lm
Output end	3633 lm

Stabilization Curve



Light Measurement Report

Print date: 19-2-2025

Measurement date and time: 19-2-2025 14:16:19 – Measurement no. VFR-250219-0061-MS

Measurement tracking No. and Link: [VT250219-003929](https://www.viso-systems.com/VT250219-003929)

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 0,32 %
 Flicker index 0

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

JA8/10 40 Hz 0,07 %
 JA8/10 90 Hz 0,12 %
 JA8/10 200 Hz 0,26 %
 JA8/10 400 Hz 0,31 %
 JA8/10 1000 Hz 0,31 %

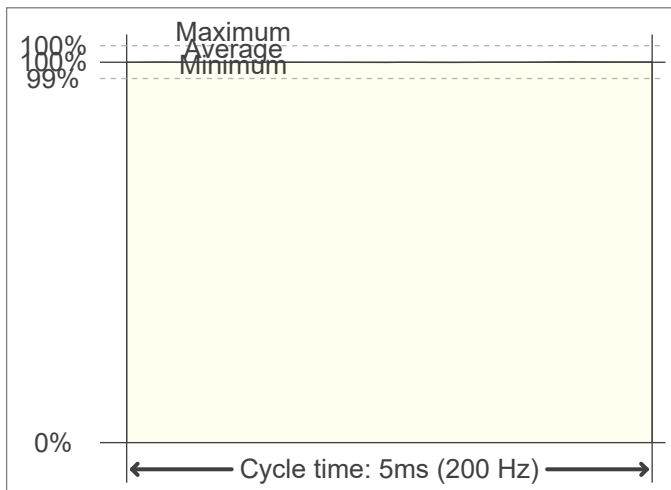
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,06
 SVM value (80 < F < 2000 Hz) 0

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

