

# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](https://www.viso-systems.com/track/VT250116-008157)

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  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power  
Warm-up Time and Variation

44 planes – 8,18°  
5°  
5,84 m  
102,1 W – PF 0,98 – DPF 1,0  
230 V – 0,452 A  
50 Hz  
Lamp stabilized in 22 min 47 sec – 2,0%

## Tested Light Source

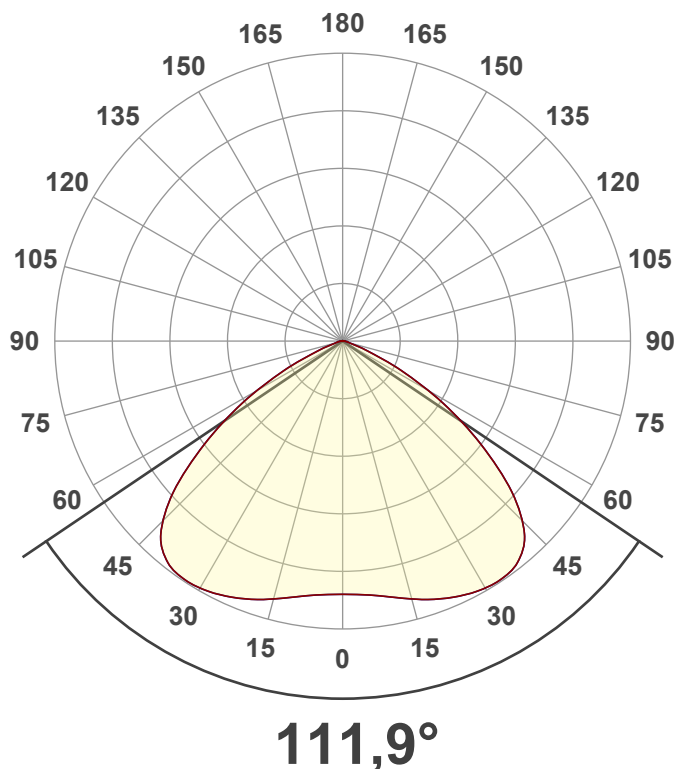
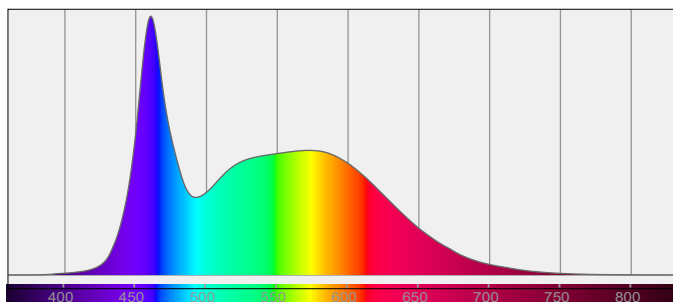
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

809829-6000K  
809829-6000K – Dutchfulfillment  
LED STRAATLAMP | HERSE | 100W | MET INGEBOUWDE DAGLICHTSENSOR

## 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

14898 lm – 0,3% / 99,7%  
146 lm/W  
5293 cd – 111,9°  
CCT = 6000 K / 6351 K  
CRI 82,1  
 $R_f$  79,9 –  $R_g$  87,9  
Duv 0,0040 – SDCM 11,3  
SVM 4,21 – PstLM 0,09



# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

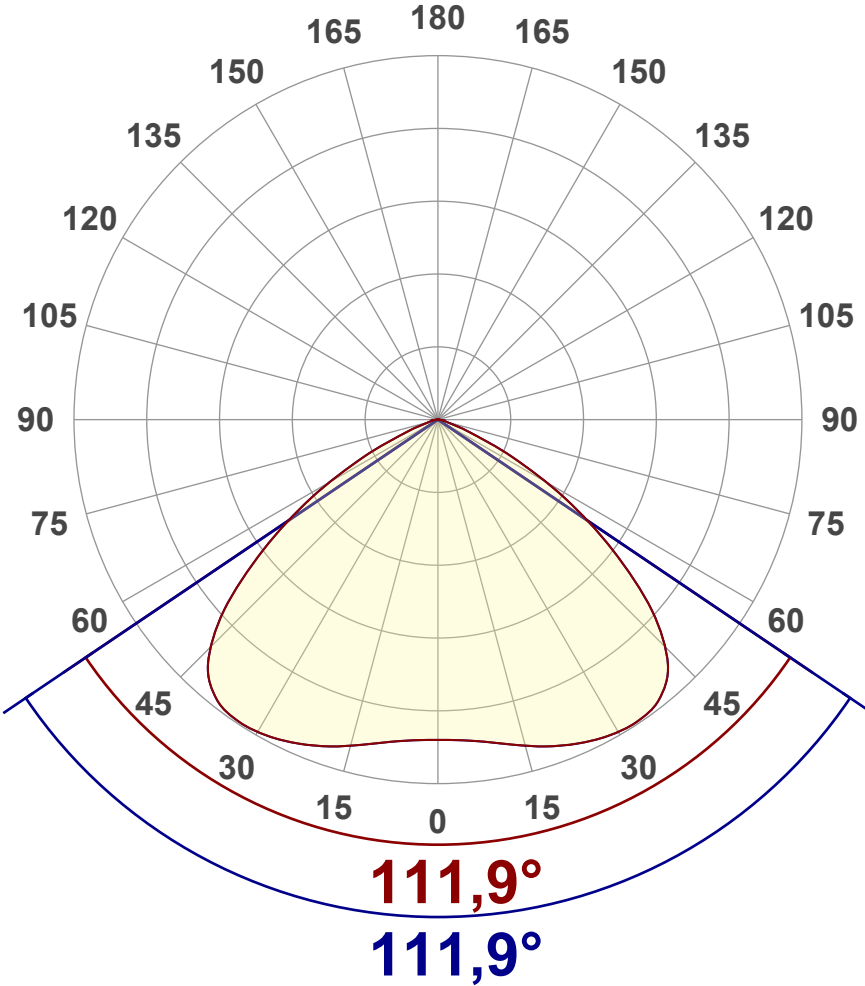
Measurement tracking No. and Link: [VT250116-008157](https://www.viso-systems.com/VT250116-008157)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	14898 lm
Lumen Up% / Down%	0,3% / 99,7%
Peak Intensity	5293 cd
Beam Angle (50%)	111,9°
Beam Angle (90%)	111,9°
Beam Angle (10%)	111,9°

## Cut-off Angle

Average 2,5%	151,3°
--------------	--------

## Field Angle

Average 10%	136,1°
-------------	--------

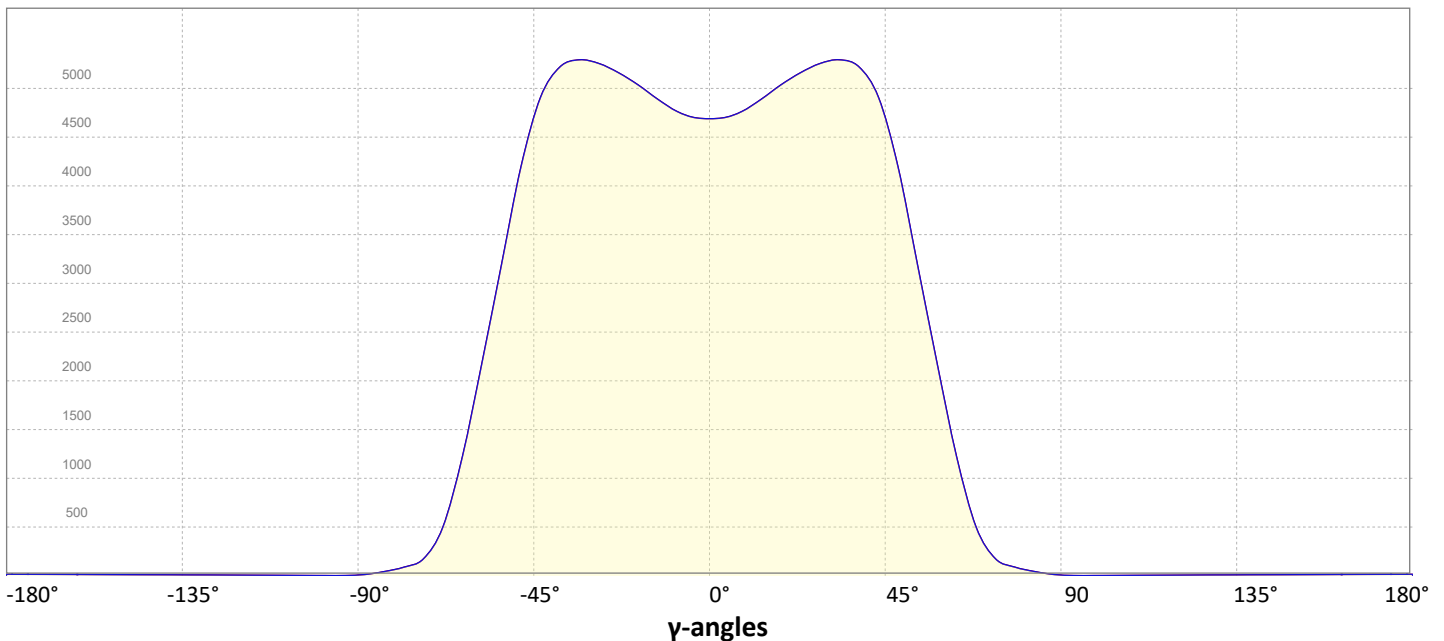
## Intensity Ratio

In 120° cone	91,8%
In 90° cone	63,1%

**C000-C180**

**C090-C270**

## Linear distribution diagram - Intensity (candela) vs $\gamma$ -angle



# Light Measurement Report

Print date: 16-1-2025

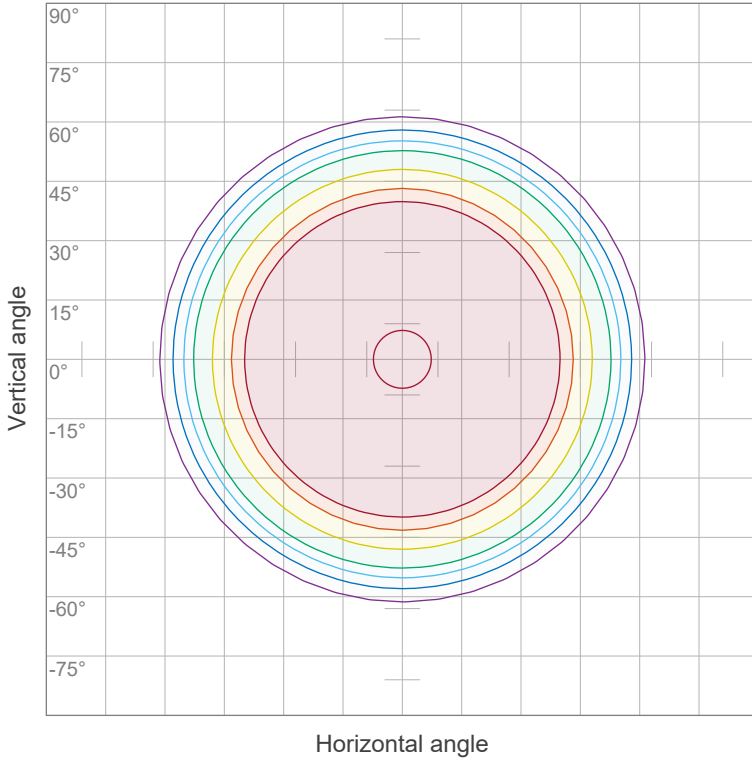
Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](#)

Operator:



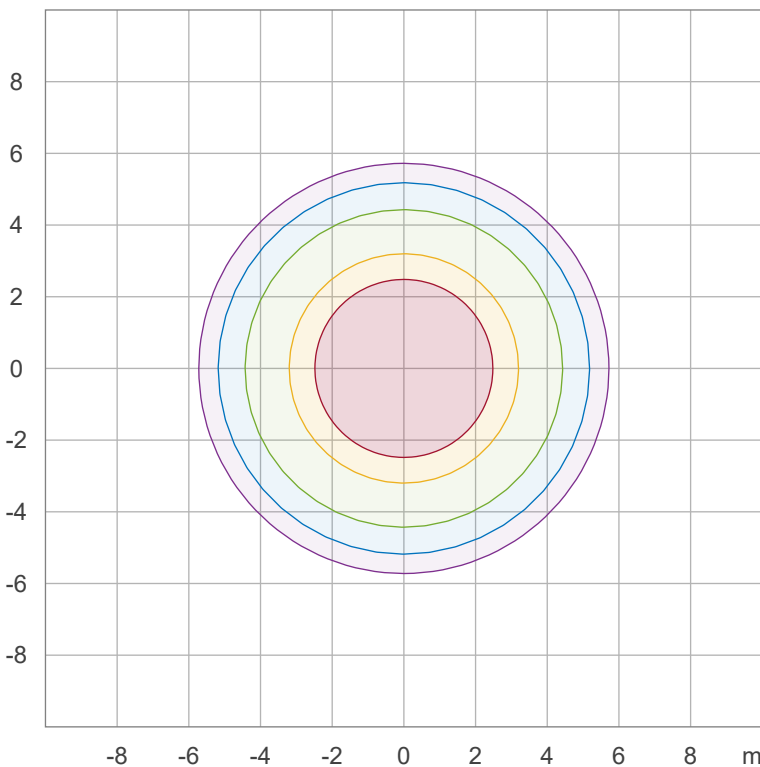
## Iso-intensity Diagram (Iso-candela)



90 %	4762,1 cd
80 %	4233,0 cd
70 %	3703,8 cd
60 %	3174,7 cd
50 %	2645,6 cd
40 %	2116,5 cd
30 %	1587,4 cd
20 %	1058,2 cd
10 %	529,1 cd

Peak intensity: 5291,2 cd  
Number of c-planes: 44

## Iso-illuminance Diagram (Iso-lux)



50,0 %	260,9 lx
30,0 %	156,6 lx
10,0 %	52,2 lx
5,0 %	26,1 lx
3,0 %	15,7 lx

Peak illuminance: 521,9 lx  
Mounting height: 3,0 m  
Number of c-planes: 44

# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](https://www.viso-systems.com/VT250116-008157)

Operator:

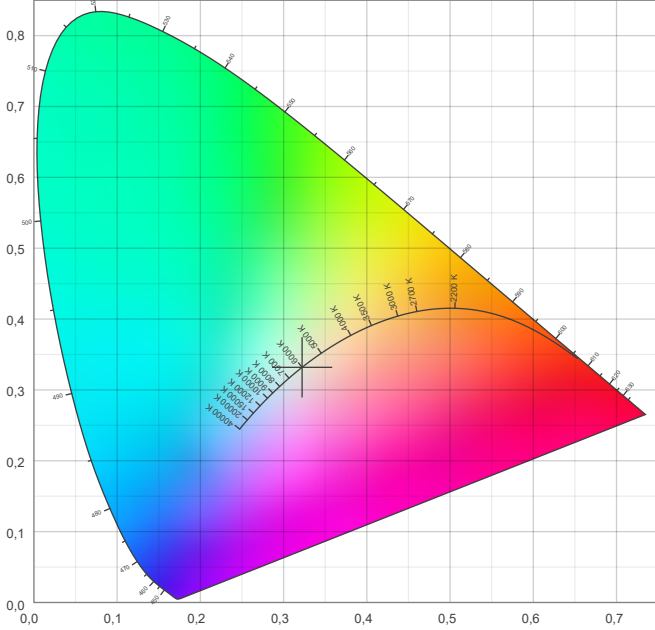


## Color details

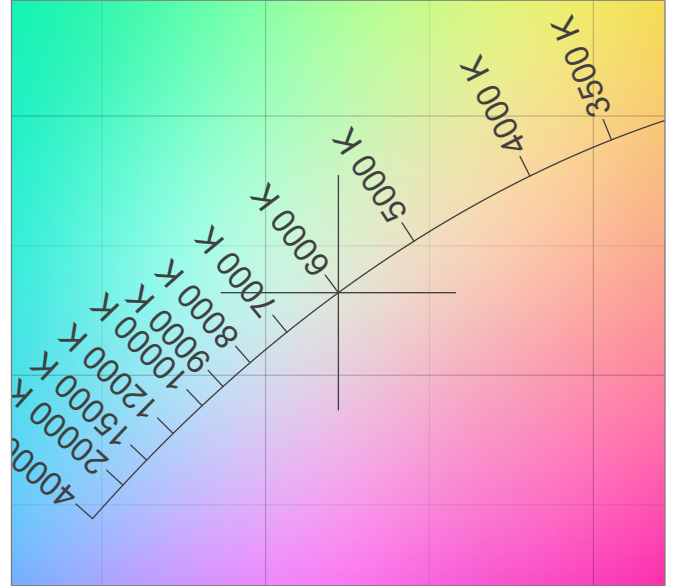
Correlated Color Temperature, Target CCT = 6000 K  
 Correlated Color Temperature, Measured CCT = 6351 K  
 Color Rendering Index CRI 82,1  
 Color Rendering Index, R9 (red component) R9 = 3,6  
 Color Rendering TM30-18 R<sub>f</sub> 79,9 – R<sub>g</sub> 87,9  
 Color Quality Scale CQS = 79,3

MacAdam Steps SDCM = 11,3  
 Color coordinates CIE 1931 (x;y) = (0,322;0,332)  
 Color coordinate CIEs 1960 (u;v) = (0,203;0,314)  
 Color deviation from BBL Duv = 0,0040  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,203;0,471)

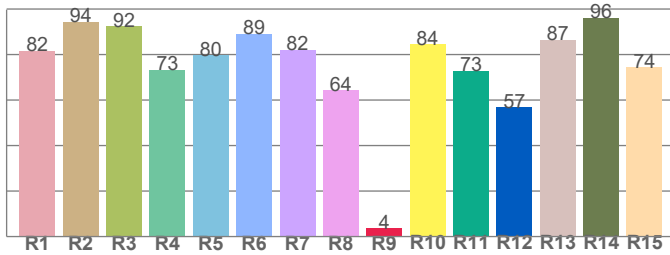
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



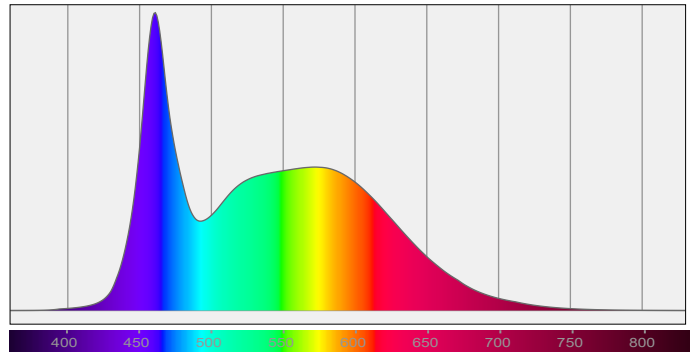
### Color Rendering Index per reference color (CIE 1995)



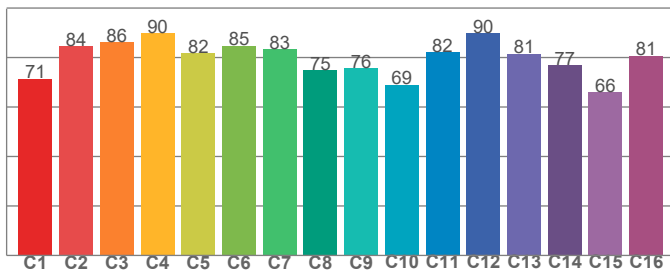
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,6	94,5	92,3	73,3	79,6	89,1	82,2	64,2	3,6	84,5	72,9	56,9	86,6	96,2	74,5

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



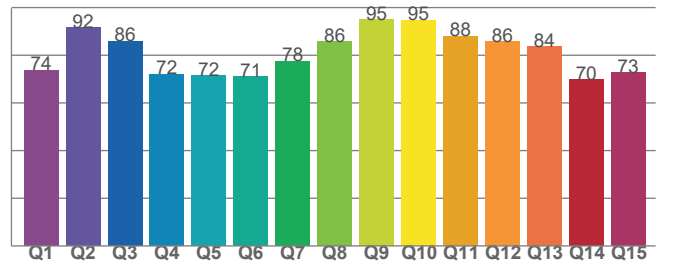
### TM30-18 Rf-values per hue bin



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
71,4	84,5	86,1	89,7	81,6	84,8	83,5	75,0	75,6	69,1	82,1	89,8	81,5	76,8	66,0	80,8

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
73,8	91,5	85,8	72,0	71,5	71,0	77,6	85,6	95,0	94,7	88,1	85,6	83,6	69,7	72,8

# Light Measurement Report

Print date: 16-1-2025

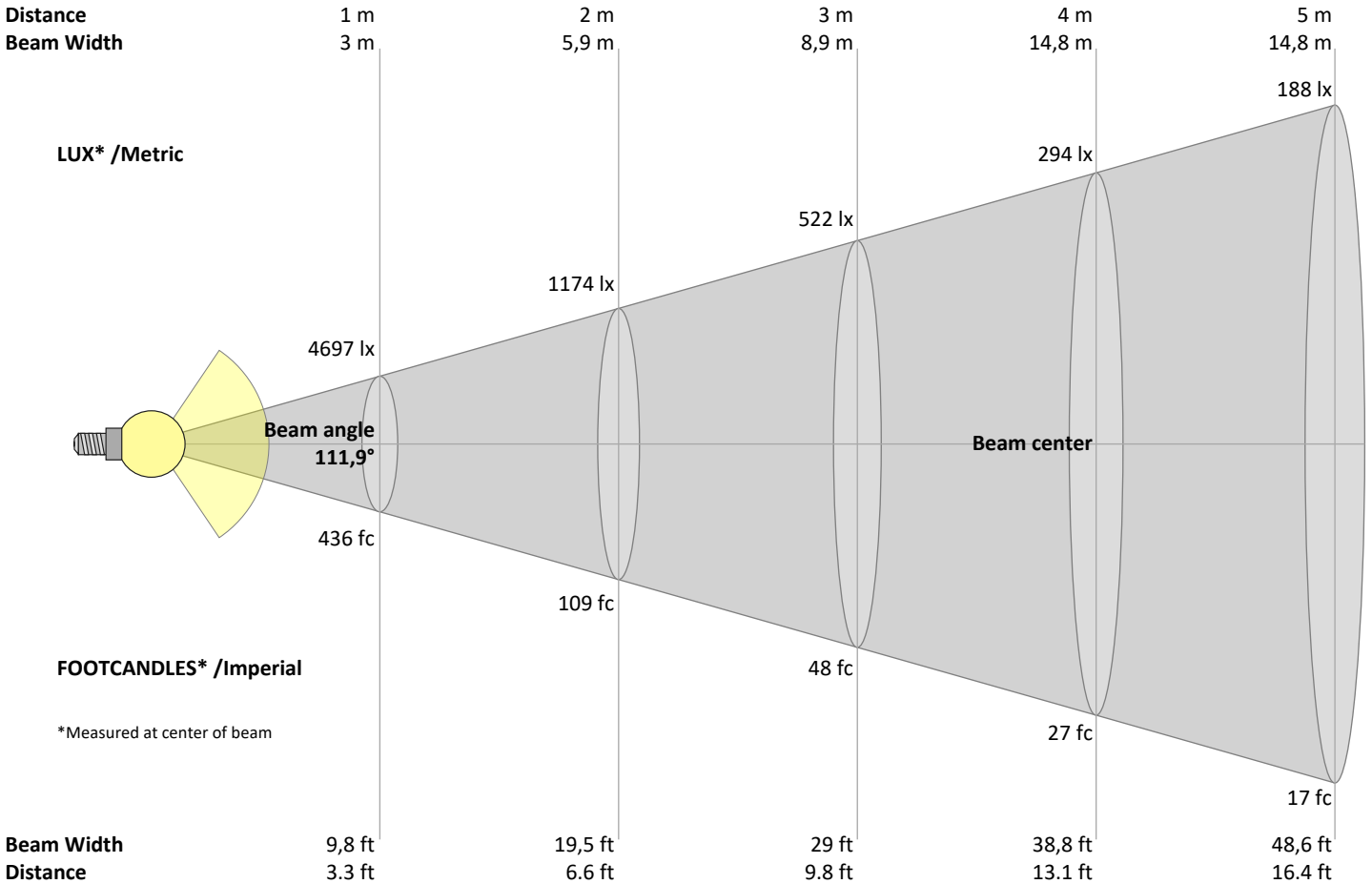
Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](https://www.viso-systems.com/VT250116-008157)

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
4697	1174	522	294	188	130	96	73	58	47	39	33	28	24	21	18	16	14	13	12	lux
436,4	109,1	48,5	27,3	17,5	12,1	8,9	6,8	5,4	4,4	3,6	3	2,6	2,2	1,9	1,7	1,5	1,3	1,2	1,1	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
4697	4720	4807	4940	5079	5193	5268	5269	5113	4663	3849	2842	1851	973	387	144	72	33	9	3	cd
100%	100%	102%	105%	108%	111%	112%	112%	109%	99%	82%	61%	39%	21%	8%	3%	2%	1%	0%	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
4697	4720	4807	4940	5079	5193	5268	5269	5113	4663	3849	2842	1851	973	387	144	72	33	9	3	cd
100%	100%	102%	105%	108%	111%	112%	112%	109%	99%	82%	61%	39%	21%	8%	3%	2%	1%	0%	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
4697	4720	4807	4940	5079	5193	5268	5269	5113	4663	3849	2842	1851	973	387	144	72	33	9	3	cd
100%	100%	102%	105%	108%	111%	112%	112%	109%	99%	82%	61%	39%	21%	8%	3%	2%	1%	0%	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
4697	4720	4807	4940	5079	5193	5268	5269	5113	4663	3849	2842	1851	973	387	144	72	33	9	3	cd
100%	100%	102%	105%	108%	111%	112%	112%	109%	99%	82%	61%	39%	21%	8%	3%	2%	1%	0%	0%	of 0°val

# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](#)

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	30,4	31,5	30,6	31,8	32,0	30,3	31,4	30,5	31,7	31,9
	3H	30,5	31,6	30,9	31,9	32,1	30,4	31,5	30,8	31,8	32,0
	4H	30,4	31,5	30,8	31,8	32,0	30,3	31,4	30,7	31,7	31,9
	6H	30,4	31,4	30,8	31,7	32,0	30,3	31,3	30,6	31,5	31,9
	8H	30,4	31,3	30,7	31,6	32,0	30,3	31,2	30,6	31,5	31,9
	12H	30,3	31,2	30,7	31,6	32,0	30,2	31,1	30,6	31,4	31,9
4H	2H	30,5	31,6	30,9	31,9	32,1	30,4	31,5	30,8	31,8	32,0
	3H	30,7	31,6	31,1	31,9	32,4	30,6	31,5	31,0	31,8	32,3
	4H	30,6	31,4	31,1	31,8	32,4	30,5	31,3	31,0	31,7	32,3
	6H	30,6	31,3	31,1	31,7	32,1	30,5	31,3	31,0	31,6	32,0
	8H	30,5	31,2	31,1	31,6	32,0	30,4	31,1	31,0	31,5	31,9
	12H	30,5	31,1	31,0	31,5	32,0	30,4	31,0	30,9	31,4	31,9
8H	4H	30,5	31,2	31,1	31,6	32,0	30,4	31,1	31,0	31,5	31,9
	6H	30,5	31,0	31,0	31,5	32,0	30,4	30,9	30,9	31,4	31,9
	8H	30,5	30,9	31,0	31,5	32,1	30,4	30,9	30,9	31,4	32,0
	12H	30,5	30,8	31,1	31,4	32,0	30,4	30,7	31,0	31,3	31,9
12H	4H	30,5	31,1	31,0	31,5	32,0	30,4	31,0	30,9	31,4	31,9
	6H	30,5	30,9	31,0	31,5	32,1	30,4	30,8	30,9	31,4	32,0
	8H	30,5	30,8	31,1	31,3	32,0	30,4	30,7	31,0	31,2	31,9

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

S = 1.0H	0,4 / -0,5	0,4 / -0,6
S = 1.5H	1,4 / -2,6	1,4 / -2,6
S = 2.0H	2,9 / -6,0	2,8 / -6,0

## 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	111	107	103	100	108	105	101	98	100	98	95	96	94	92	93	91	90	88
2	102	95	89	84	99	93	88	83	89	85	81	86	82	79	83	80	77	75
3	94	84	77	71	91	83	76	70	80	74	69	77	72	68	74	70	67	65
4	86	75	67	61	84	74	66	60	71	65	60	69	63	59	67	62	58	56
5	79	67	59	53	77	66	58	52	64	57	52	62	56	51	60	55	51	49
6	73	60	52	46	71	59	51	46	58	51	45	56	50	45	54	49	44	42
7	68	55	46	40	66	54	46	40	52	45	40	51	44	40	50	44	39	37
8	63	50	41	36	61	49	41	36	48	41	36	46	40	35	45	39	35	33
9	58	45	37	32	57	45	37	32	44	37	32	43	36	32	42	36	31	30
10	55	42	34	29	53	41	34	29	40	33	29	39	33	29	38	33	28	27

# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](#)

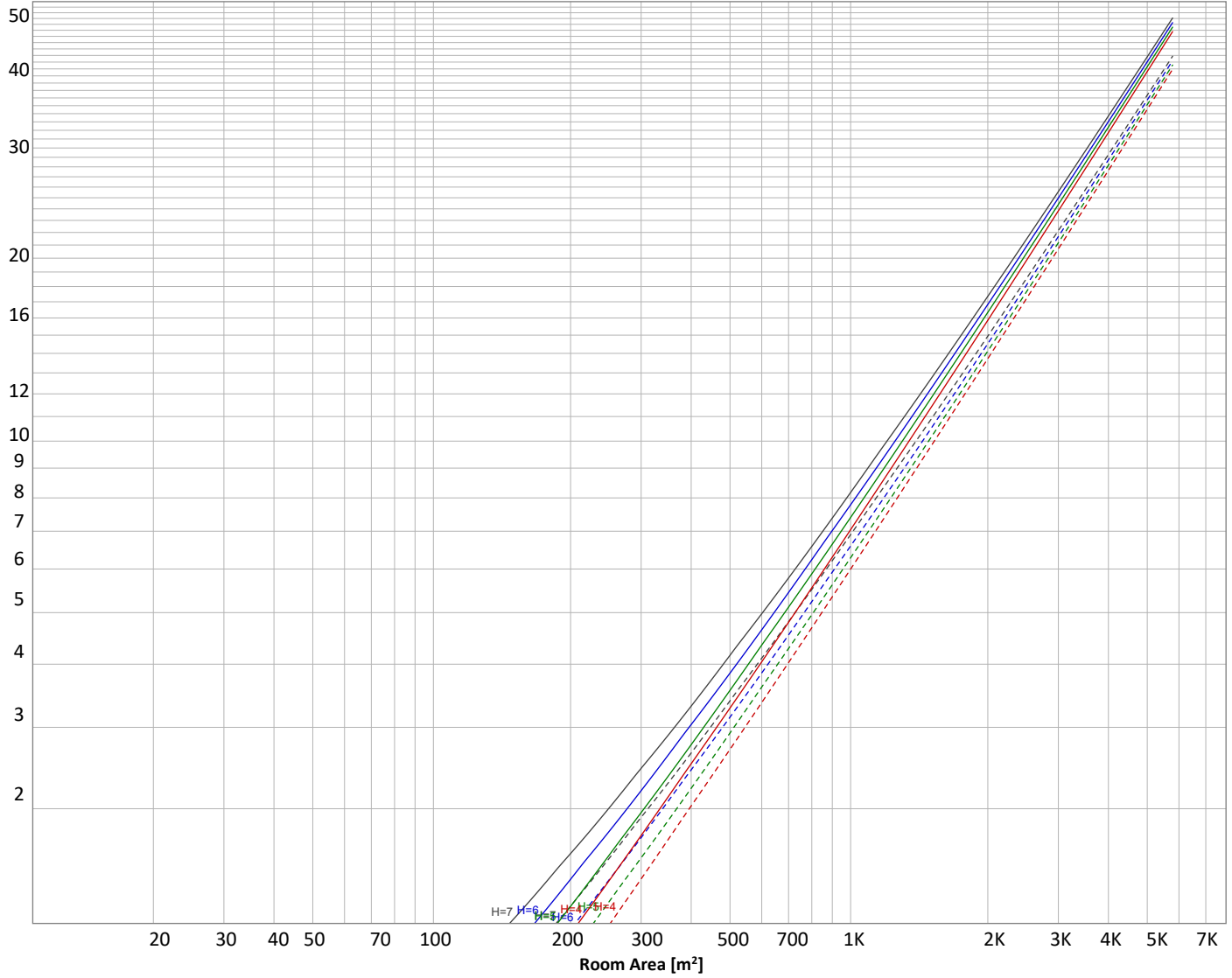
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 14898 lm				
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) Wall reflectance	Floor reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50	30
E <sub>work</sub> = 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°
453 lm	1405 lm	2405 lm	3303 lm	3574 lm	2532 lm	974 lm	171 lm	36,7 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
3,78 lm	4,02 lm	5,67 lm	6,78 lm	7,01 lm	6,55 lm	5,50 lm	3,86 lm	1,39 lm

# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](#)

Operator:



## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	453 lm	3,0%
10-20°	1405 lm	9,4%
20-30°	2405 lm	16,1%
30-40°	3303 lm	22,2%
40-50°	3574 lm	24,0%
50-60°	2532 lm	17,0%
60-70°	974 lm	6,5%
70-80°	171 lm	1,1%
80-90°	37 lm	0,2%
90-100°	4 lm	0,0%
100-110°	4 lm	0,0%
110-120°	6 lm	0,0%
120-130°	7 lm	0,0%
130-140°	7 lm	0,0%
140-150°	7 lm	0,0%
150-160°	5 lm	0,0%
160-170°	4 lm	0,0%
170-180°	1 lm	0,0%
<b>Total</b>	<b>14898 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	5293 cd
Intensity, 90°	9 cd
Intensity, 0°	4697 cd

### Zonal Lumen summary

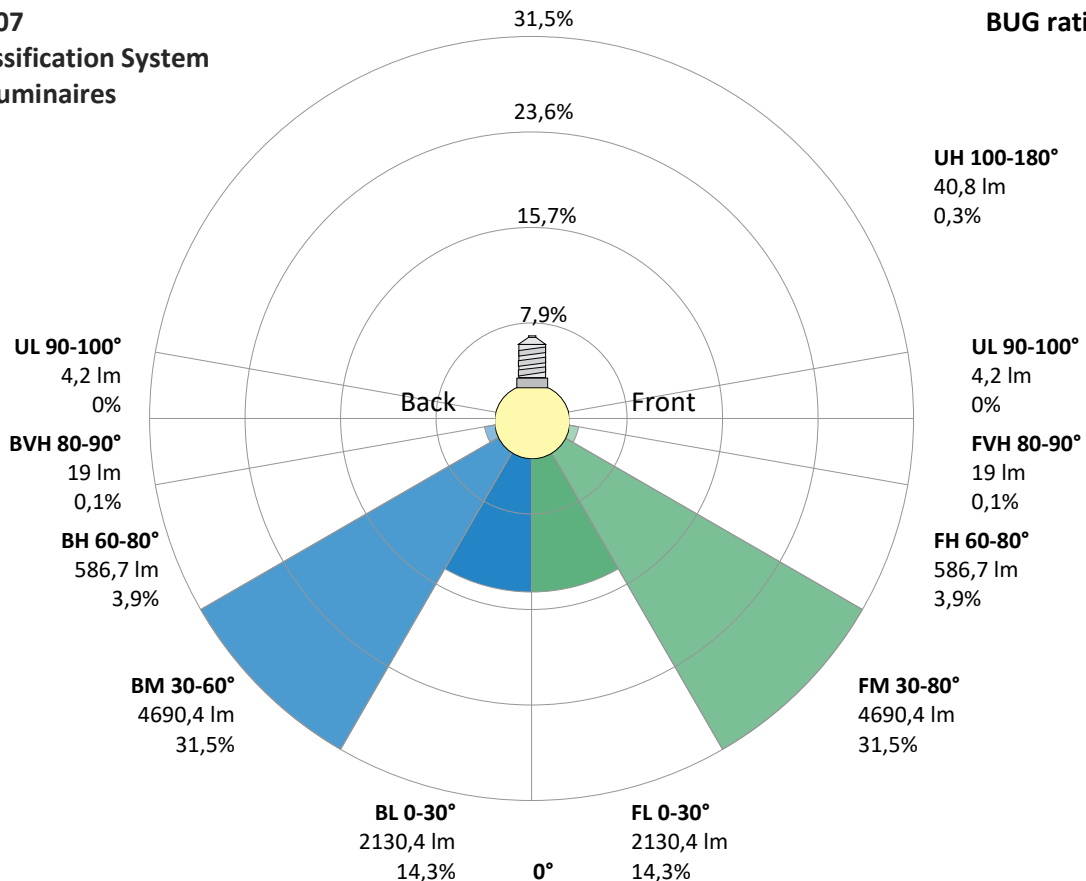
Zone (γ)	Lumen	% Total
0-30°	4263 lm	28,6%
0-40°	7566 lm	50,8%
0-60°	13672 lm	91,8%
60-90°	1181 lm	7,9%
70-100°	211 lm	1,4%
90-120°	13 lm	0,1%
0-90°	14853 lm	99,7%
90-180°	45 lm	0,3%
0-180°	14898 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2130 lm	14,3%
Medium(30-60°)	4690 lm	31,5%
High(60-80°)	587 lm	3,9%
Very high(80-90°)	19 lm	0,1%
<b>Back light</b>		
Low(0-30°)	2130 lm	14,3%
Medium(30-60°)	4690 lm	31,5%
High(60-80°)	587 lm	3,9%
Very high(80-90°)	19 lm	0,1%
<b>Uplight</b>		
Low(90-100°)	4 lm	0,0%
High(100-180°)	41 lm	0,3%

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

**BUG rating B3 U2 G1**



# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](#)

Operator:

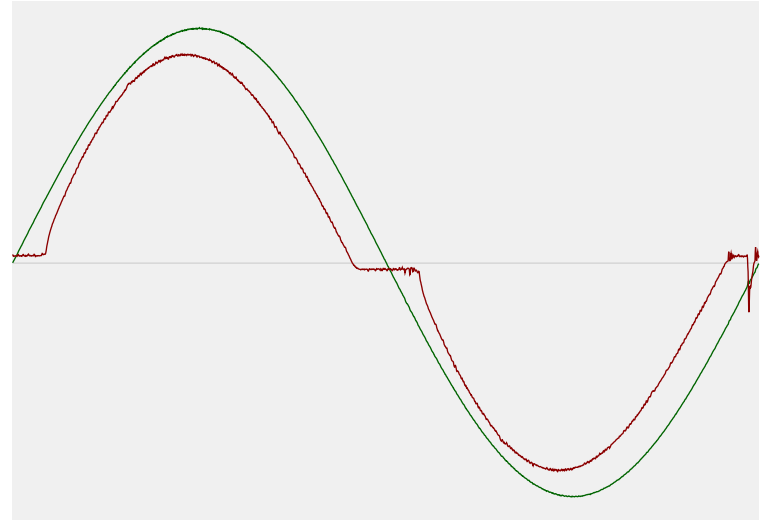


## Power Details

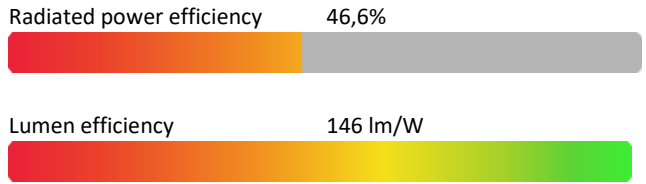
### Input Power

Power feed to light source	102,1 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,452 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	103,86 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,98
Total harmonic distortion of the current	15,83%
Total harmonic distortion of the voltage	0,09%

### 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	5953 K
CCT shift	+47 K
CCT end	6000 K

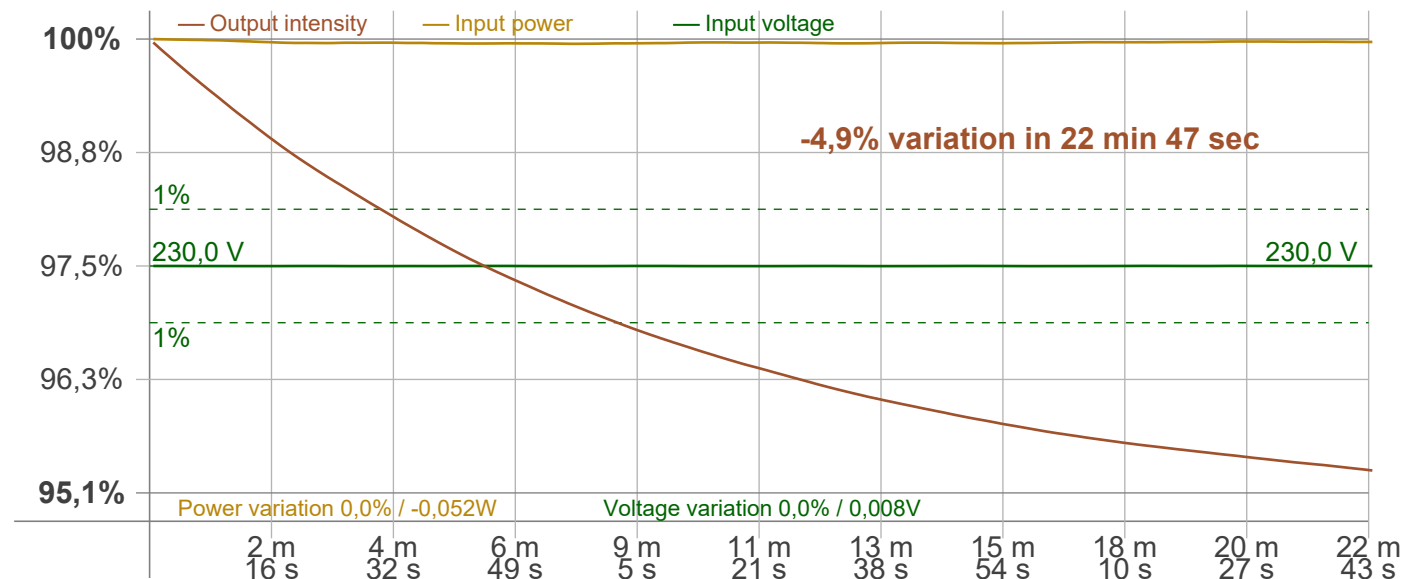
### Warmup Result

Total warmup time	Lamp stabilized in 22 min 47 sec
Warmup variation	-4,9%

### Output Change

Output start	15655 lm
Output change	-757 lm
Output end	14898 lm

### Stabilization Curve



# Light Measurement Report

Print date: 16-1-2025

Measurement date and time: 16-1-2025 14:42:15 – Measurement no. VFR-250116-3005-MS

Measurement tracking No. and Link: [VT250116-008157](https://www.viso-systems.com/VT250116-008157)

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 Hz  
 Percent Flicker 99,96 %  
 Flicker index 0,35

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

JA8/10 40 Hz 0,16 %  
 JA8/10 90 Hz 0,75 %  
 JA8/10 200 Hz 109,2 %  
 JA8/10 400 Hz 102,21 %  
 JA8/10 1000 Hz 101,23 %

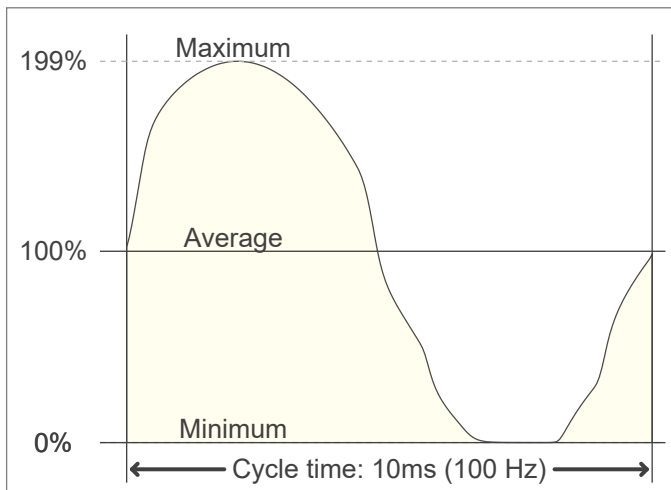
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,09  
 SVM value (80 < F < 2000 Hz) 4,21

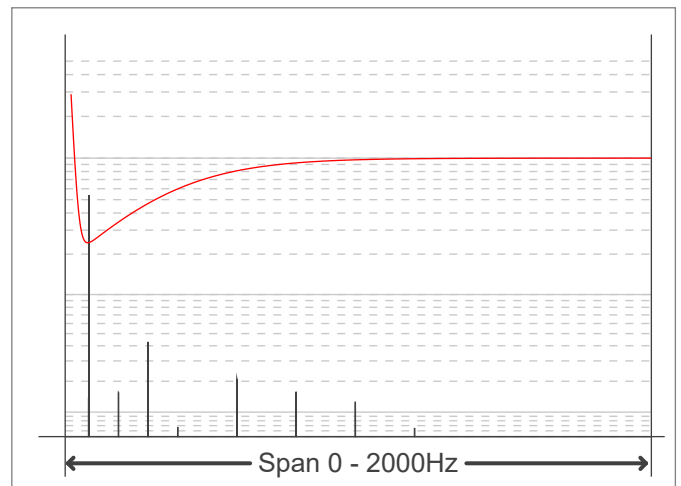
### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,03

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

