

# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](#)

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

36 planes – 10°  
5°  
2,64 m  
110,6 W – PF 0,96 – DPF 0,96  
230 V – 0,499 A  
50 Hz  
Lamp stabilized in 15 min 2 sec – 2,0%

## Tested Light Source

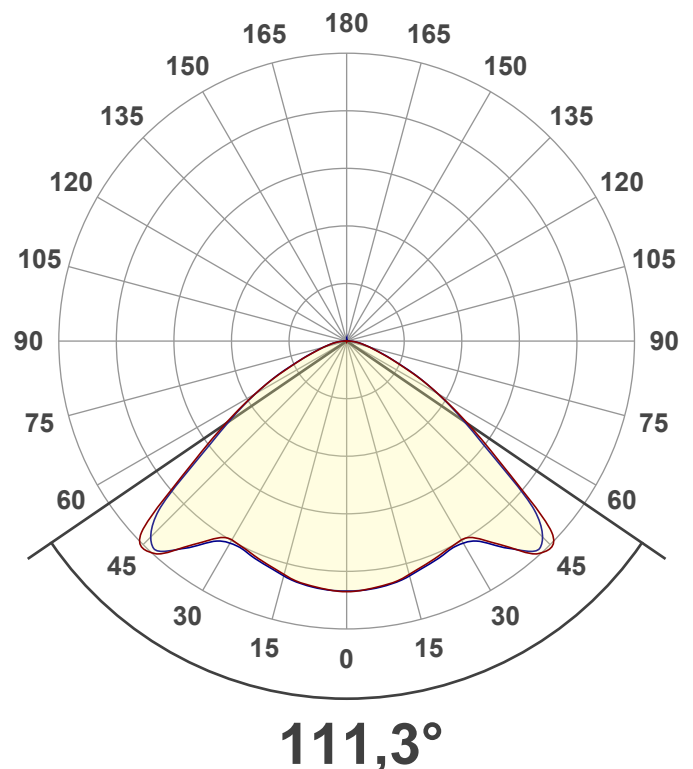
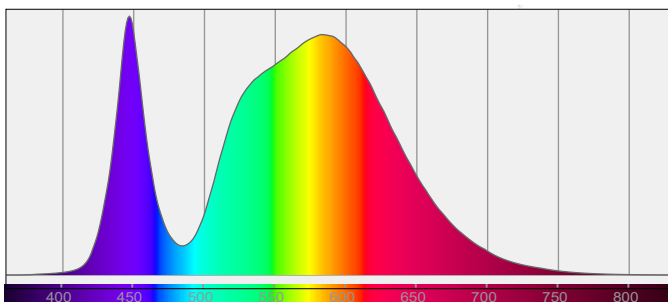
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

812737-4000K-120W  
812737-4000K-120W – Dutchfulfillment  
LED HIGHBAY ARGOS | 0-10V | 200W/150W/120W | 120° | CCT SWITCH

## 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

16558 lm – 0,14% / 99,86%  
150 lm/W  
6058 cd – 111,3°  
CCT = 4000 K / 4109 K  
CRI 71,9  
 $R_f$  73,9 –  $R_g$  94,6  
Duv 0,0028 – SDCM 3,0  
SVM 0 – PstLM 0,15



# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

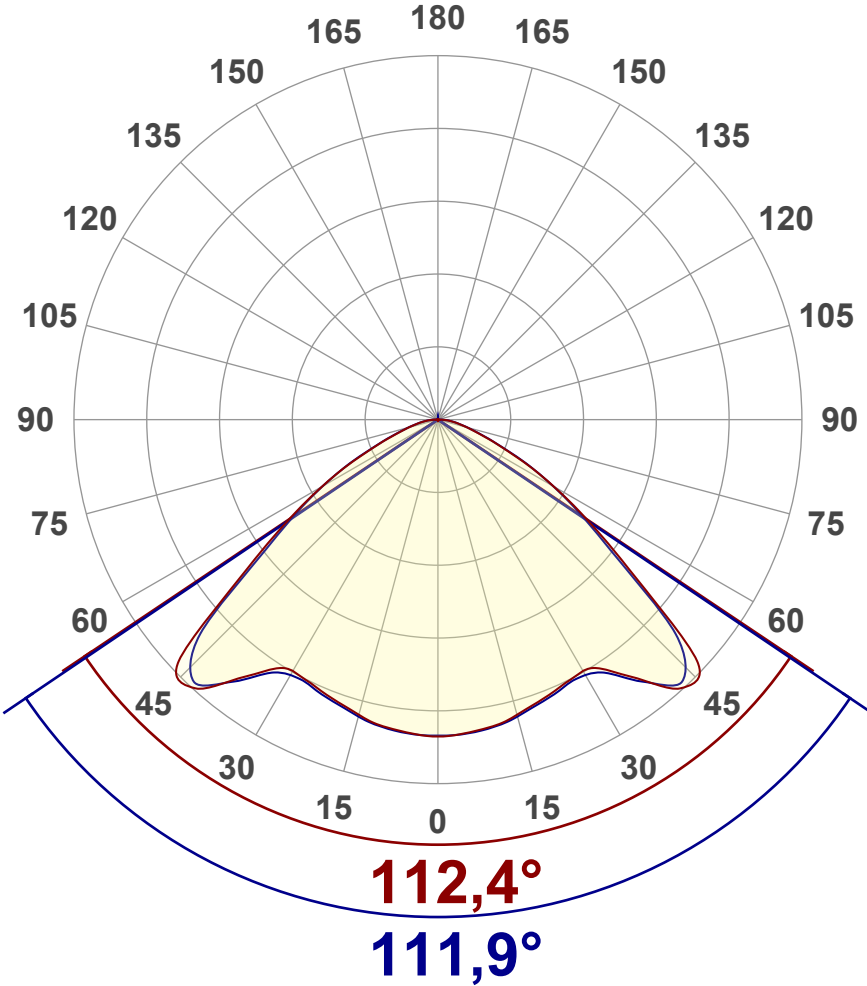
Measurement tracking No. and Link: [VT250924-000379](https://www.viso-systems.com/VT250924-000379)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	16558 lm
Lumen Up% / Down%	0,14% / 99,86%
Peak Intensity	6058 cd
Beam Angle (50%)	111,3°
Beam Angle (90%)	111,9°
Beam Angle (10%)	110,1°

## Cut-off Angle

Average 2,5%	171,7°
--------------	--------

## Field Angle

Average 10%	146,7°
-------------	--------

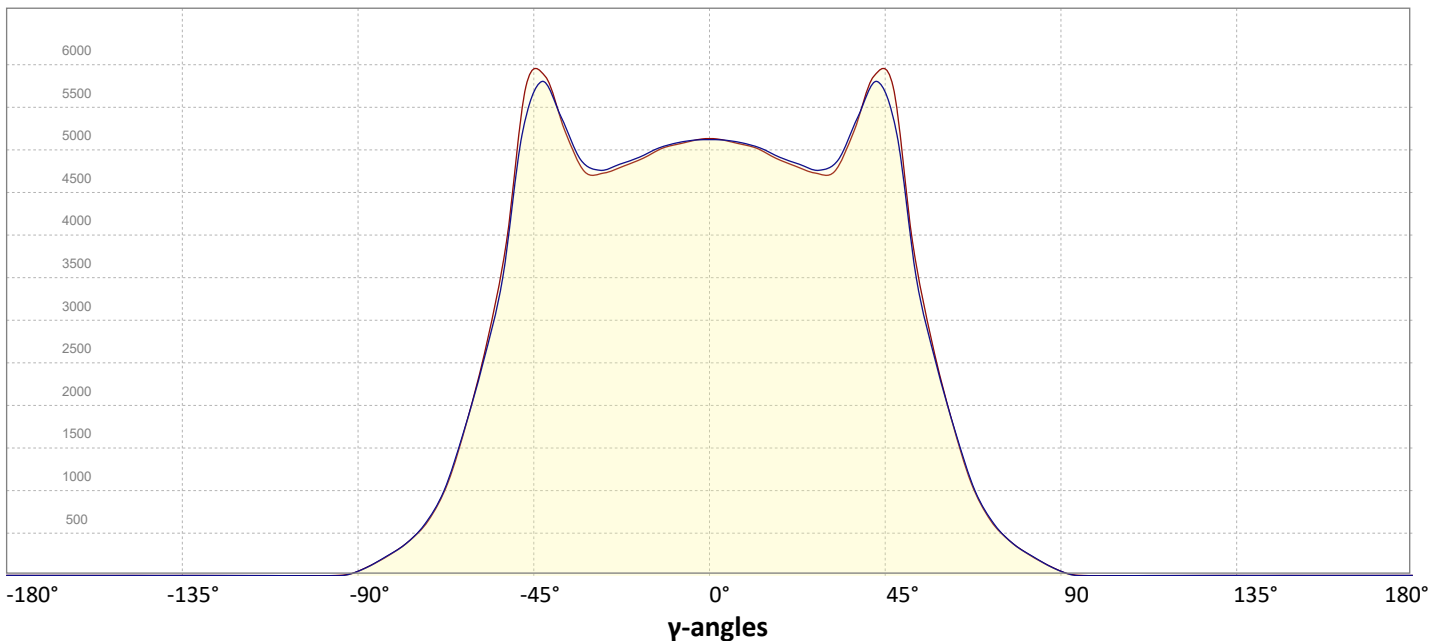
## Intensity Ratio

In 120° cone	87,1%
In 90° cone	57,1%

**C000-C180**

**C090-C270**

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



# Light Measurement Report

Print date: 24-9-2025

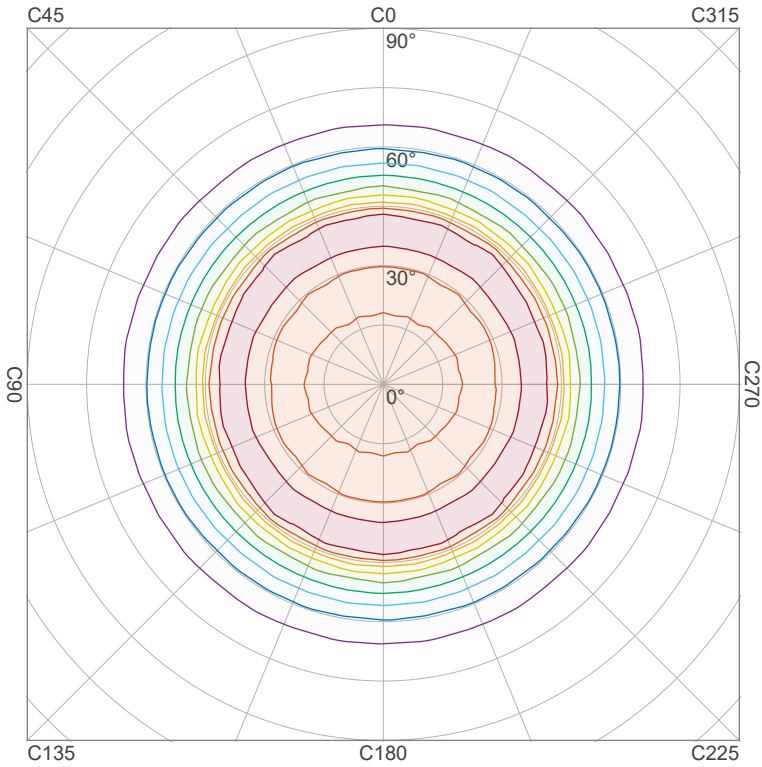
Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](https://www.viso-systems.com/VT250924-000379)

Operator:



## Iso-intensity Diagram (Iso-candela)

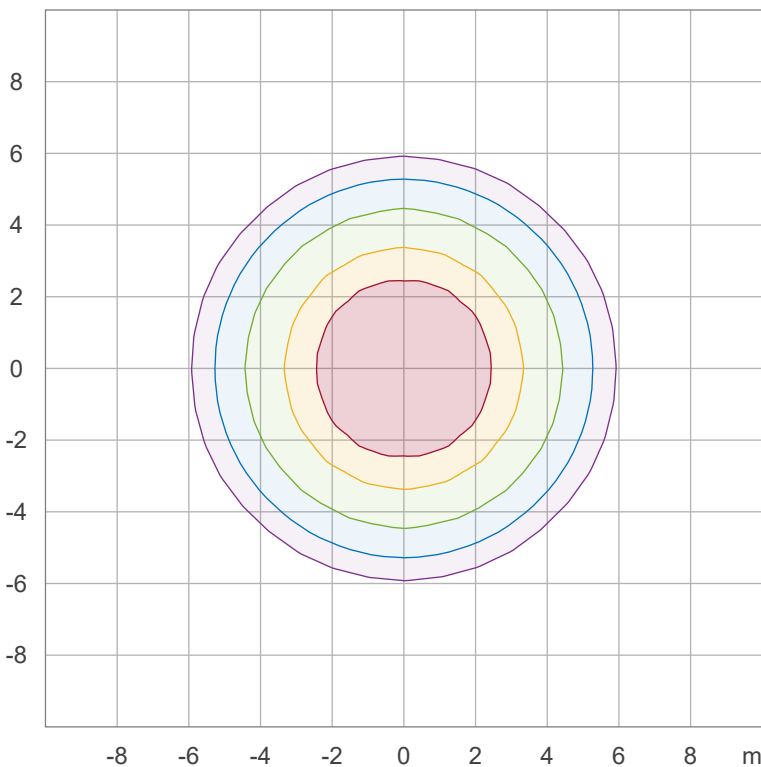


90 %	5449,0 cd
80 %	4843,6 cd
70 %	4238,1 cd
60 %	3632,7 cd
50 %	3027,2 cd
40 %	2421,8 cd
30 %	1816,3 cd
20 %	1210,9 cd
10 %	605,4 cd

Peak intensity: 6054,5 cd

Number of c-planes: 36

## Iso-illuminance Diagram (Iso-lux)



50,0 %	284,7 lx
30,0 %	170,8 lx
10,0 %	56,9 lx
5,0 %	28,5 lx
3,0 %	17,1 lx

Peak illuminance: 569,4 lx

Mounting height: 3,0 m

Number of c-planes: 36

# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](#)

Operator:



## Color details

Correlated Color Temperature, Target CCT = 4000 K  
 Correlated Color Temperature, Measured CCT = 4109 K  
 Color Rendering Index CRI 71,9  
 Color Rendering Index, R9 (red component) R9 = -28,1  
 Color Rendering TM30-18 R<sub>f</sub> 73,9 – R<sub>g</sub> 94,6  
 Color Quality Scale CQS = 72,1

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 = 0,0028  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

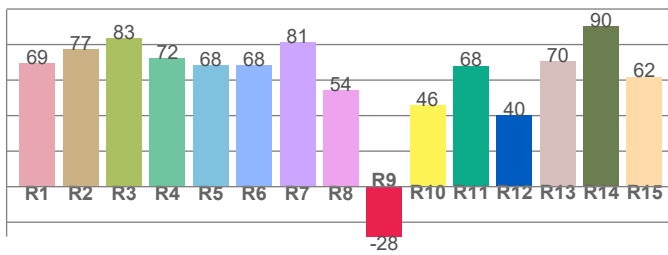
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



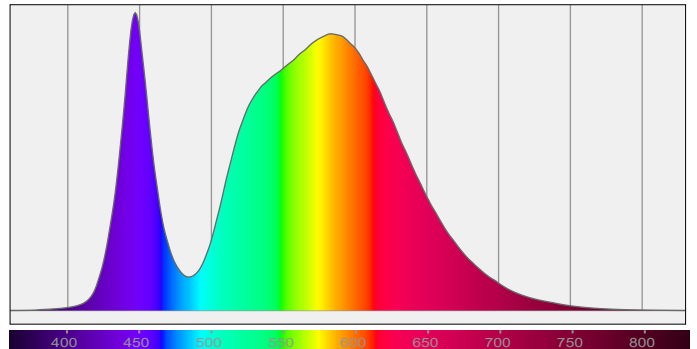
### Color Rendering Index per reference color (CIE 1995)



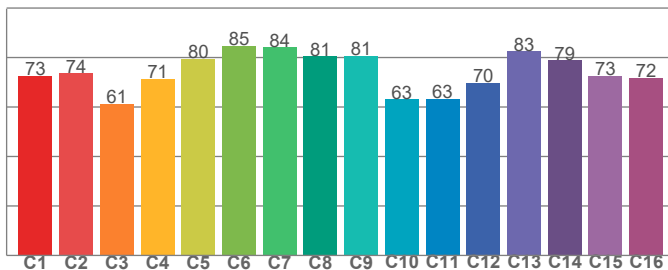
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
69,3	77,4	83,4	72,3	68,5	68,2	81,4	54,4	-28,1	45,9	68,1	40,0	70,4	90,4	61,8

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



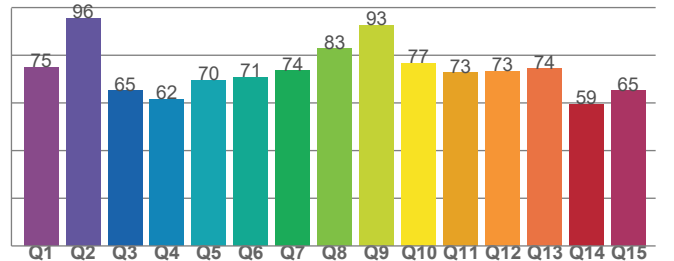
### TM30-18 Rf-values per hue bin



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
72,6	73,6	61,3	71,5	79,6	84,8	84,1	80,6	80,7	63,1	63,4	69,8	82,6	78,8	72,7	71,9

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
75,1	95,6	65,2	61,6	69,5	70,7	73,5	82,7	92,7	76,6	72,7	73,2	74,4	59,4	65,2

# Light Measurement Report

Print date: 24-9-2025

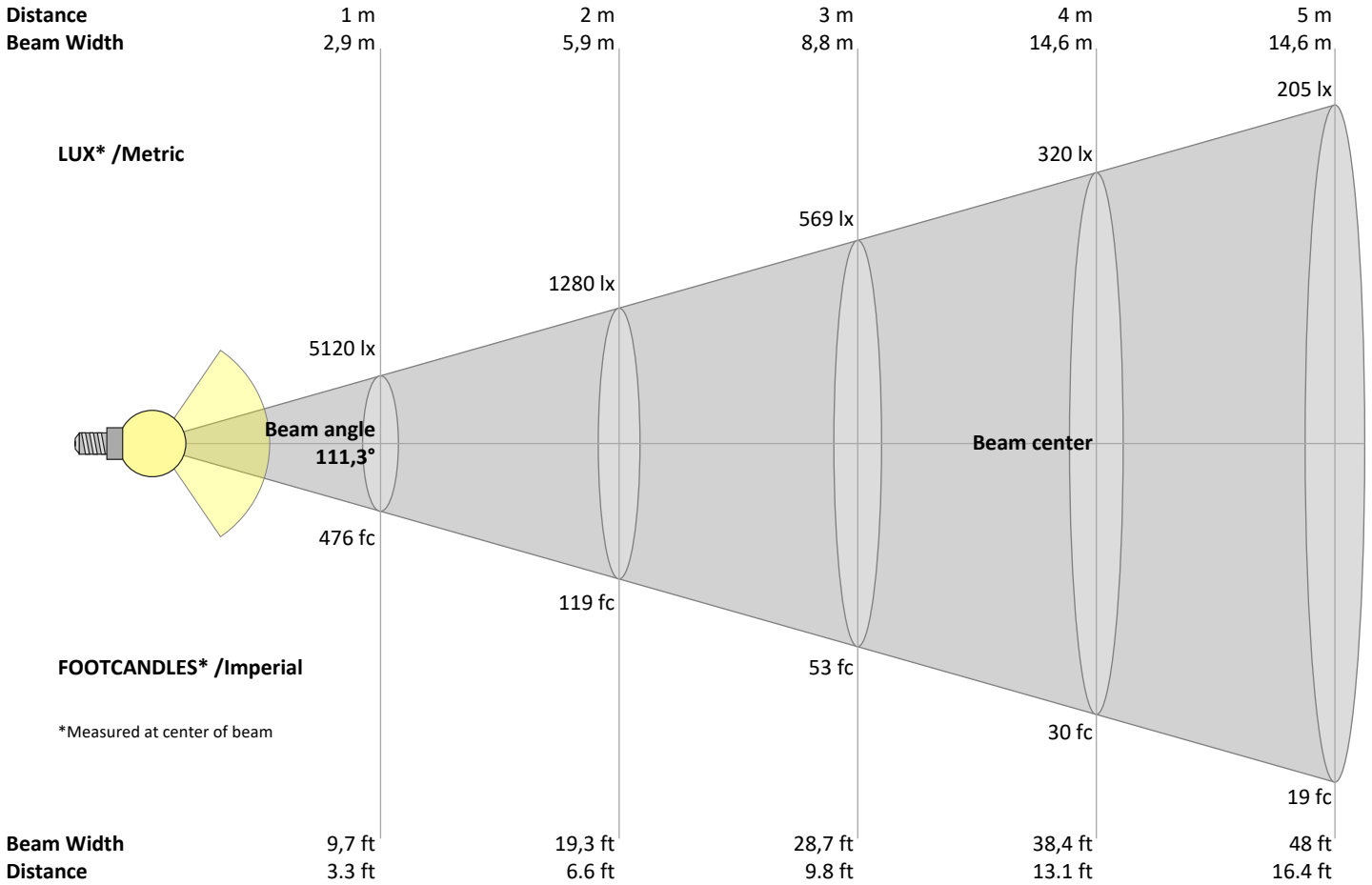
Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](https://www.viso-systems.com/VT250924-000379)

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
5120	1280	569	320	205	142	104	80	63	51	42	36	30	26	23	20	18	16	14	13	lux
475,7	118,9	52,9	29,7	19	13,2	9,7	7,4	5,9	4,8	3,9	3,3	2,8	2,4	2,1	1,9	1,6	1,5	1,3	1,2	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
5120	5098	5043	4949	4846	4761	4738	5029	5602	5790	4648	3208	2194	1387	825	502	307	167	59	9	cd
100%	100%	98%	97%	95%	93%	93%	98%	109%	113%	91%	63%	43%	27%	16%	10%	6%	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
5120	5104	5060	4978	4880	4803	4810	5086	5553	5551	4496	3090	2170	1408	838	507	308	169	59	6	cd
100%	100%	99%	97%	95%	94%	94%	99%	108%	108%	88%	60%	42%	27%	16%	10%	6%	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
5120	5098	5043	4949	4846	4761	4738	5029	5602	5790	4648	3208	2194	1387	825	502	307	167	59	9	cd
100%	100%	98%	97%	95%	93%	93%	98%	109%	113%	91%	63%	43%	27%	16%	10%	6%	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
5120	5104	5060	4978	4880	4803	4810	5086	5553	5551	4496	3090	2170	1408	838	507	308	169	59	6	cd
100%	100%	99%	97%	95%	94%	94%	99%	108%	108%	88%	60%	42%	27%	16%	10%	6%	3%	1%	0%	of 0°val

# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](https://www.viso-systems.com/VT250924-000379)

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	32,4	33,6	32,6	33,9	34,1	32,3	33,5	32,5	33,8	34,0
	3H	32,7	33,9	33,1	34,2	34,4	32,7	33,9	33,1	34,2	34,4
	4H	32,9	34,0	33,3	34,3	34,5	32,8	34,0	33,2	34,3	34,5
	6H	33,0	34,0	33,3	34,3	34,7	33,0	34,0	33,3	34,3	34,7
	8H	33,0	34,0	33,4	34,3	34,7	33,0	34,0	33,4	34,3	34,7
	12H	33,1	34,0	33,4	34,3	34,8	33,0	34,0	33,4	34,3	34,8
4H	2H	32,6	33,7	33,0	34,0	34,2	32,5	33,7	32,9	33,9	34,2
	3H	33,2	34,1	33,5	34,4	34,9	33,2	34,1	33,5	34,4	34,9
	4H	33,3	34,2	33,7	34,6	35,1	33,3	34,1	33,7	34,6	35,1
	6H	33,5	34,3	34,0	34,6	35,0	33,5	34,3	34,0	34,6	35,0
	8H	33,5	34,3	34,0	34,6	35,0	33,5	34,3	34,0	34,6	35,0
	12H	33,6	34,2	34,1	34,6	35,1	33,6	34,2	34,1	34,6	35,1
8H	4H	33,3	34,1	33,9	34,5	34,8	33,3	34,1	33,8	34,5	34,8
	6H	33,6	34,2	34,1	34,6	35,2	33,6	34,2	34,1	34,6	35,2
	8H	33,8	34,2	34,3	34,8	35,4	33,8	34,2	34,3	34,8	35,4
	12H	33,9	34,3	34,5	34,8	35,4	33,9	34,3	34,5	34,8	35,4
12H	4H	33,3	33,9	33,8	34,4	34,8	33,3	33,9	33,8	34,4	34,8
	6H	33,6	34,1	34,2	34,6	35,3	33,6	34,1	34,2	34,6	35,3
	8H	33,8	34,2	34,4	34,7	35,3	33,8	34,2	34,4	34,7	35,3

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

S = 1.0H	0,4 / -0,4	0,4 / -0,4
S = 1.5H	1,1 / -1,2	1,0 / -1,1
S = 2.0H	2,3 / -2,2	2,1 / -2,1

## 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	110	105	102	98	107	103	100	96	99	96	93	95	93	90	91	90	88	86
2	100	93	86	81	98	91	85	80	87	82	78	84	80	76	81	78	75	73
3	92	82	74	68	89	80	73	67	77	71	66	74	69	65	72	67	64	62
4	84	72	64	57	82	71	63	57	69	62	56	66	60	55	64	59	55	53
5	77	65	56	49	75	63	55	49	61	54	48	59	53	48	57	52	47	45
6	71	58	49	43	69	57	49	42	55	48	42	53	47	42	52	46	41	39
7	66	52	43	37	64	51	43	37	50	42	37	48	42	37	47	41	36	34
8	61	47	39	33	59	47	39	33	45	38	33	44	37	32	43	37	32	30
9	57	43	35	29	55	43	35	29	41	34	29	40	34	29	39	33	29	27
10	53	40	32	26	52	39	31	26	38	31	26	37	31	26	36	30	26	24

# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](https://www.viso-systems.com/VT250924-000379)

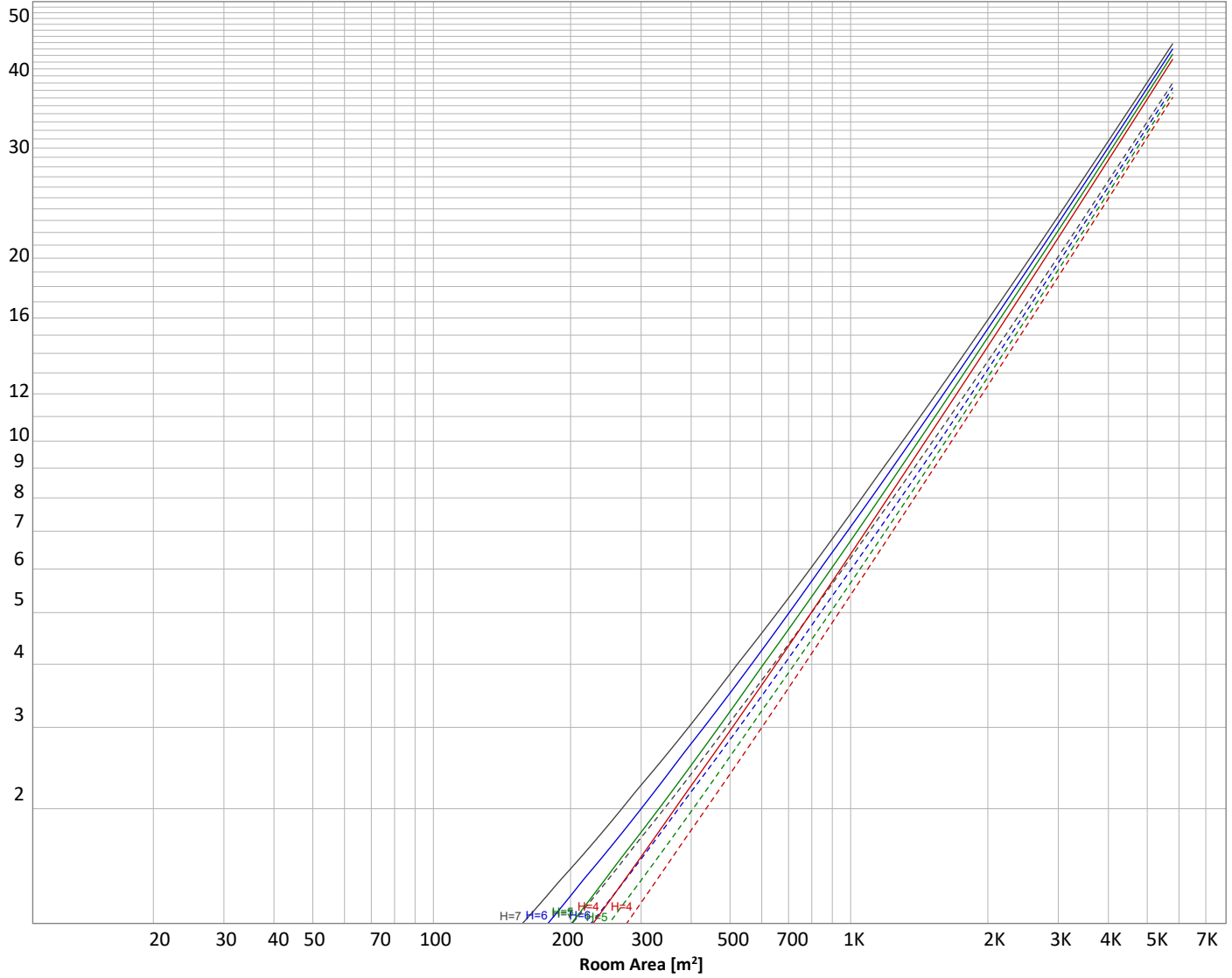
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 16558 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°
485 lm	1403 lm	2211 lm	3202 lm	4310 lm	2809 lm	1388 lm	542 lm	185 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
10,3 lm	0,919 lm	1,90 lm	2,52 lm	2,44 lm	2,12 lm	1,63 lm	1,01 lm	0,354 lm

# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](#)

Operator:



## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	485 lm	2,9%
10-20°	1403 lm	8,5%
20-30°	2211 lm	13,4%
30-40°	3202 lm	19,3%
40-50°	4310 lm	26,0%
50-60°	2809 lm	17,0%
60-70°	1388 lm	8,4%
70-80°	542 lm	3,3%
80-90°	185 lm	1,1%
90-100°	10 lm	0,1%
100-110°	1 lm	0,0%
110-120°	2 lm	0,0%
120-130°	3 lm	0,0%
130-140°	2 lm	0,0%
140-150°	2 lm	0,0%
150-160°	2 lm	0,0%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
<b>Total</b>	<b>16558 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	6058 cd
Intensity, 90°	59 cd
Intensity, 0°	5120 cd

### Zonal Lumen summary

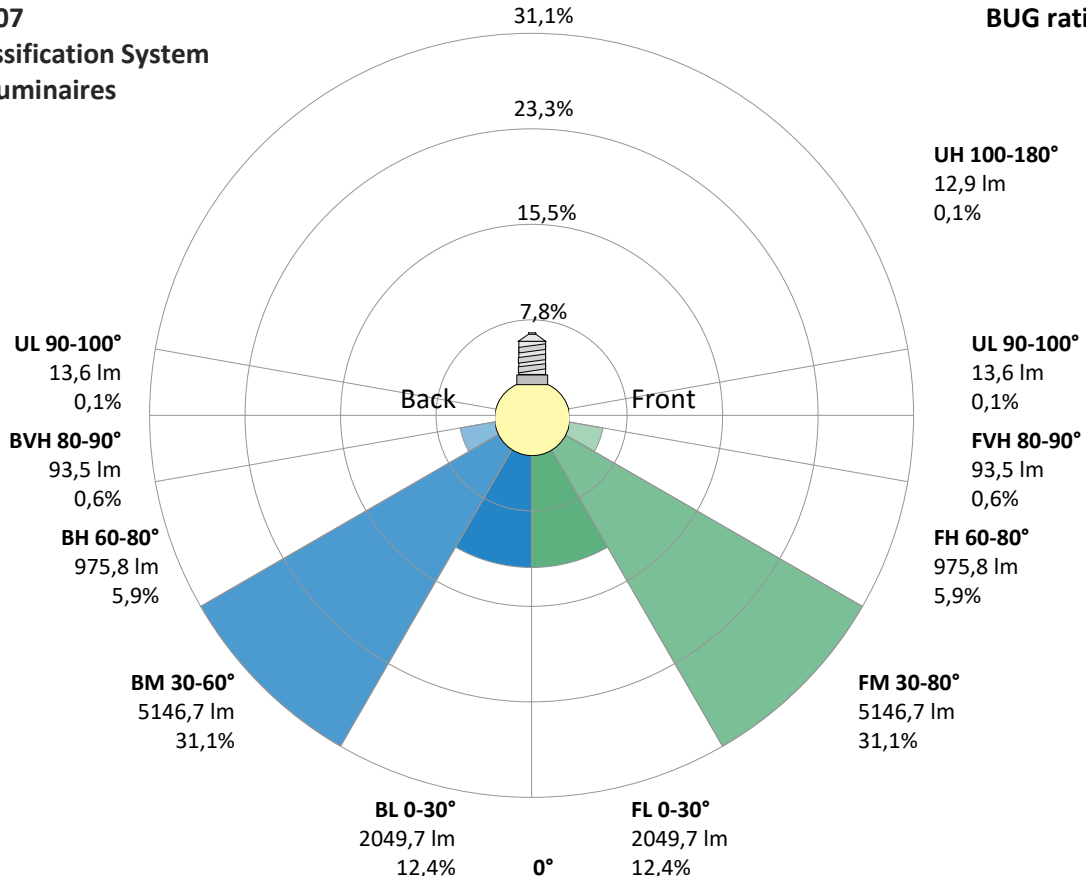
Zone (γ)	Lumen	% Total
0-30°	4099 lm	24,8%
0-40°	7301 lm	44,1%
0-60°	14420 lm	87,1%
60-90°	2115 lm	12,8%
70-100°	737 lm	4,5%
90-120°	13 lm	0,1%
0-90°	16535 lm	99,9%
90-180°	23 lm	0,1%
0-180°	16558 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2050 lm	12,4%
Medium(30-60°)	5147 lm	31,1%
High(60-80°)	976 lm	5,9%
Very high(80-90°)	94 lm	0,6%
<b>Back light</b>		
Low(0-30°)	2050 lm	12,4%
Medium(30-60°)	5147 lm	31,1%
High(60-80°)	976 lm	5,9%
Very high(80-90°)	94 lm	0,6%
<b>Uplight</b>		
Low(90-100°)	14 lm	0,1%
High(100-180°)	13 lm	0,1%

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

**BUG rating B4 U2 G1**



# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](#)

Operator:

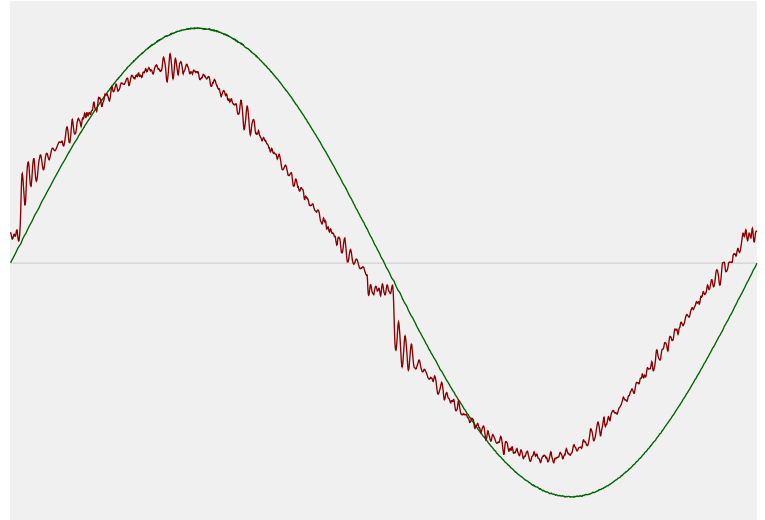


## Power Details

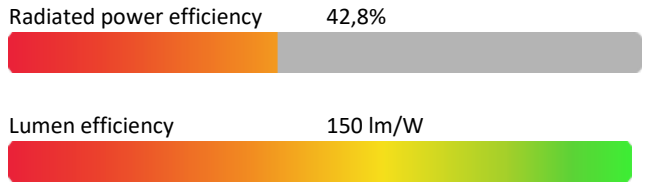
### Input Power

Power feed to light source	110,6 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,499 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	114,78 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,96
Total harmonic distortion of the current	5,13%
Total harmonic distortion of the voltage	0,07%

### 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	4012 K
CCT shift	-12 K
CCT end	4000 K

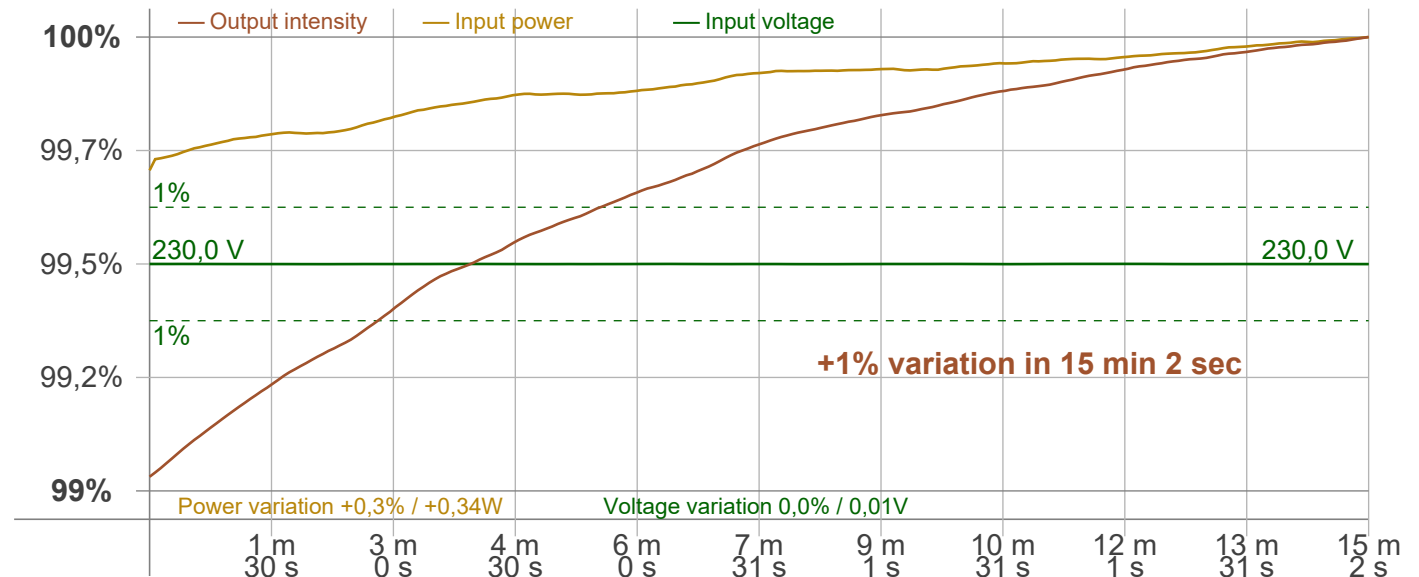
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	+1,0%

### Output Change

Output start	16386 lm
Output change	+171 lm
Output end	16558 lm

## Stabilization Curve



# Light Measurement Report

Print date: 24-9-2025

Measurement date and time: 24-9-2025 11:44:00 – Measurement no. VFR-250924-3326-MS

Measurement tracking No. and Link: [VT250924-000379](https://www.viso-systems.com/VT250924-000379)

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: 500 Hz  
 Percent Flicker: 0,5 %  
 Flicker index: 0

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

JA8/10 40 Hz: 0,29 %  
 JA8/10 90 Hz: 0,3 %  
 JA8/10 200 Hz: 0,37 %  
 JA8/10 400 Hz: 0,37 %  
 JA8/10 1000 Hz: 0,5 %

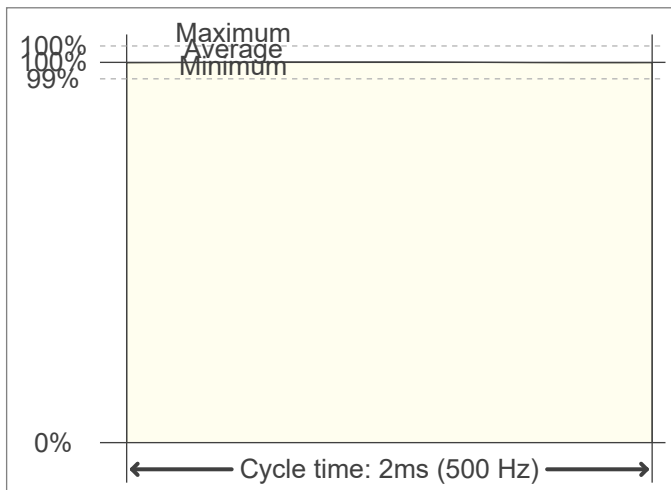
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

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

Perception metric, Assist Mp: 0,06

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



### Flicker FFT (flicker curve in frequency domain)



### IEEE 1789 Frequency/modulation plot

