

# Light Measurement Report

Print date: 14-4-2025

Measurement date and time: 3-4-2025 09:17:08 – Measurement no. VFR-250403-0546-MS

Measurement tracking No. and Link: [VT250403-000105](#)

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°  
12,10 m  
76,4 W – PF 0,97 – DPF 0,97  
230 V – 0,342 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

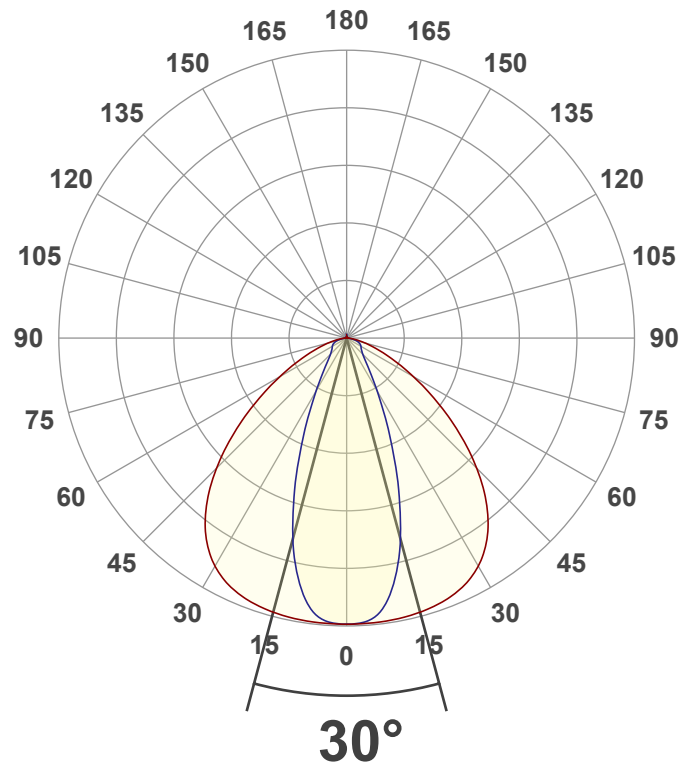
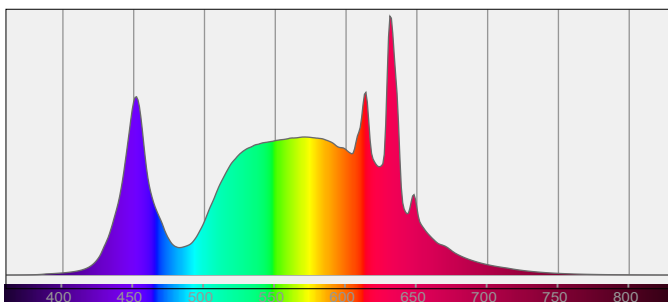
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

810764-4000K  
810764-4000K – Dutchfulfillment  
LICHTLIJN MODULE | JUPITER | 43-80W | 30° | 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

12049 lm – 1,06% / 98,94%  
158 lm/W  
9430 cd – 30°  
CCT = 4000 K / 4054 K  
CRI 83,9  
 $R_f$  83,6 –  $R_g$  99,0  
Duv 0,0028 – SDCM 2,4  
SVM 0,03 – PstLM 0,02



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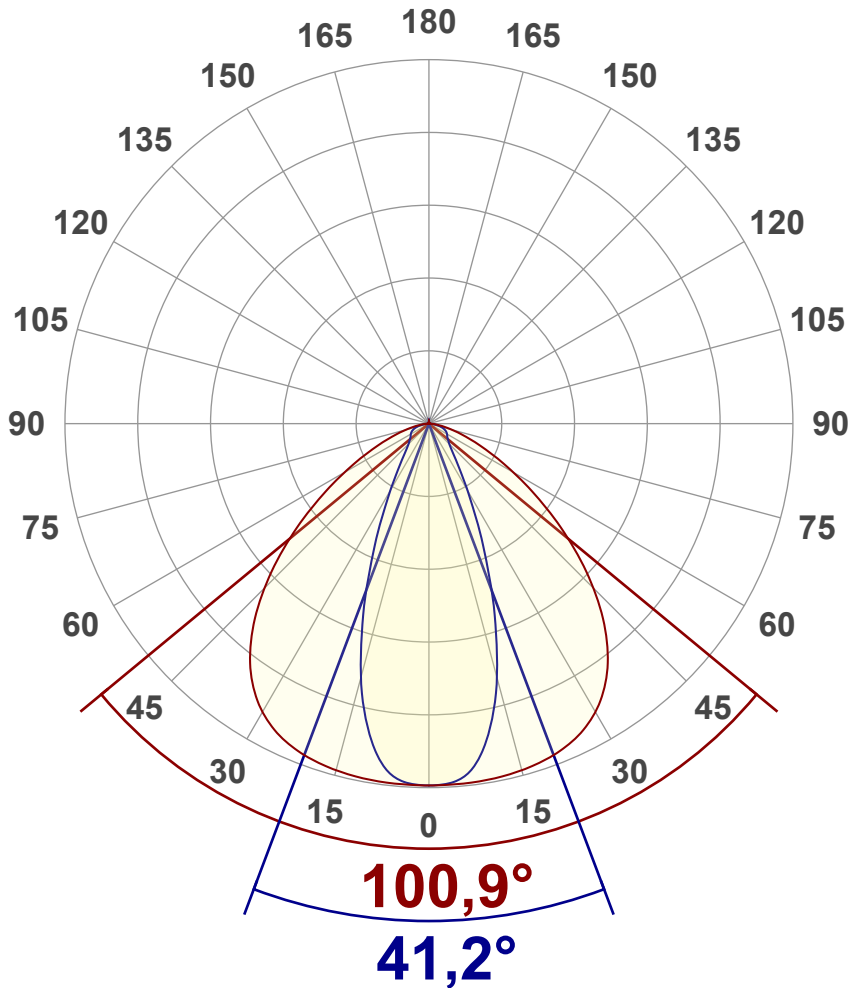
Measurement tracking No. and Link: [VT250403-000105](https://www.viso-systems.com/VT250403-000105)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



### Main Values

Output (total Lumen)	12049 lm
Lumen Up% / Down%	1,06% / 98,94%
Peak Intensity	9430 cd
Beam Angle (50%)	30°
Beam Angle (90%)	41,2°
Beam Angle (10%)	96,5°

### Cut-off Angle

Average 2,5%	157,5°
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### Field Angle

Average 10%	107°
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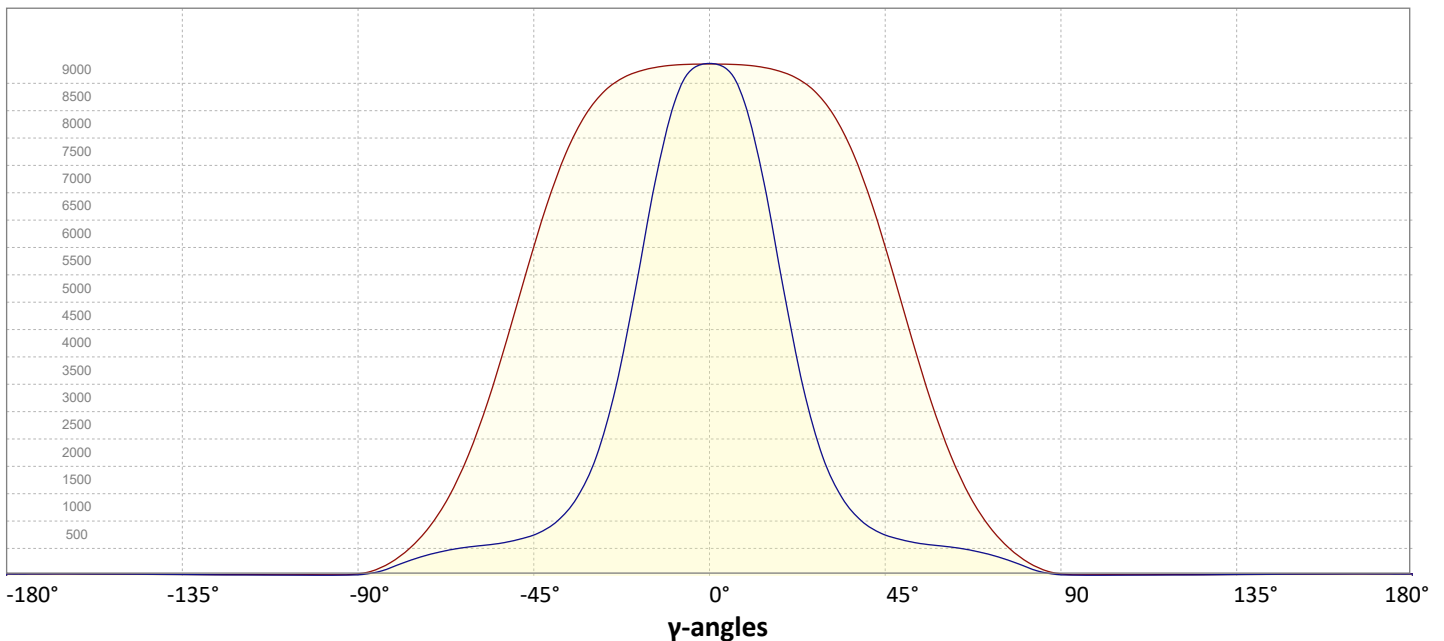
### Intensity Ratio

In 120° cone	88,6%
In 90° cone	72,5%

**C000-C180**

**C090-C270**

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



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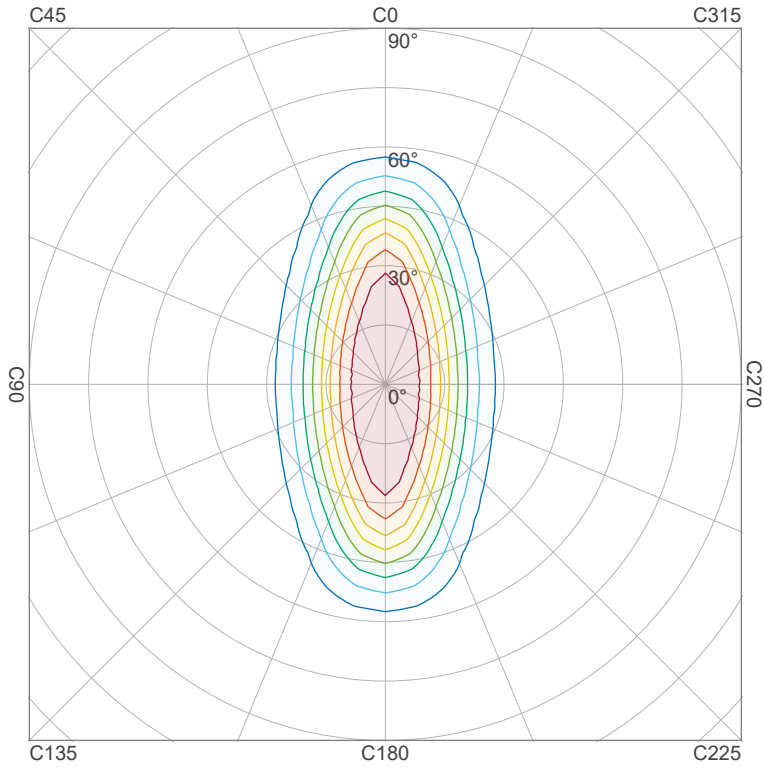
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## Iso-intensity Diagram (Iso-candela)

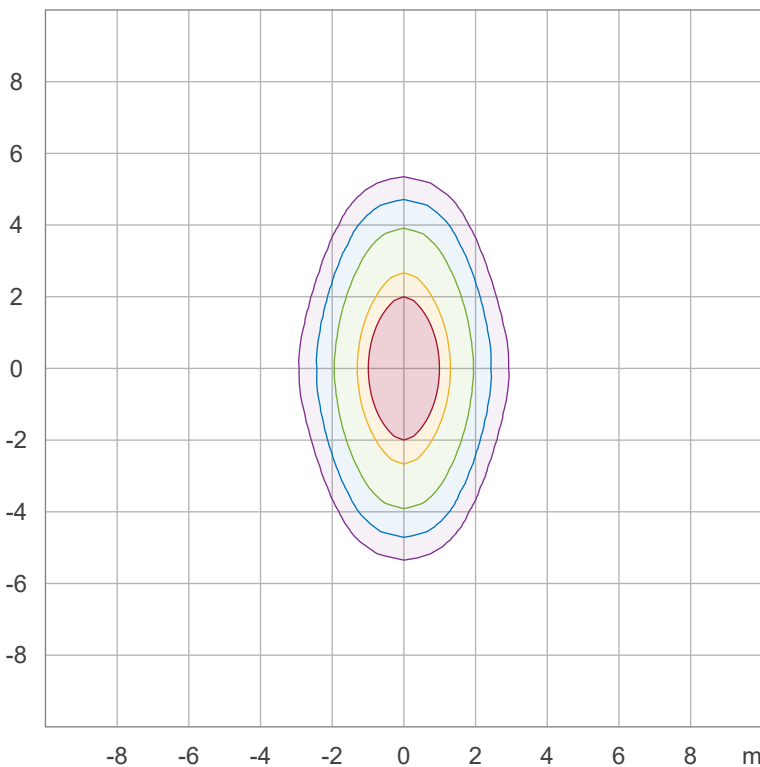


90 %	8466,8 cd
80 %	7526,0 cd
70 %	6585,3 cd
60 %	5644,5 cd
50 %	4703,8 cd
40 %	3763,0 cd
30 %	2822,3 cd
20 %	1881,5 cd
10 %	940,8 cd

Peak intensity: 9407,6 cd

Number of c-planes: 44

## Iso-illuminance Diagram (Iso-lux)



50,0 %	522,4 lx
30,0 %	313,4 lx
10,0 %	104,5 lx
5,0 %	52,2 lx
3,0 %	31,3 lx

Peak illuminance: 1044,8 lx

Mounting height: 3,0 m

Number of c-planes: 44

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## Color details

Correlated Color Temperature, Target CCT = 4000 K  
 Correlated Color Temperature, Measured CCT = 4054 K  
 Color Rendering Index CRI 83,9  
 Color Rendering Index, R9 (red component) R9 = 37,1  
 Color Rendering TM30-18 R<sub>f</sub> 83,6 – R<sub>g</sub> 99,0  
 Color Quality Scale CQS = 83,6

MacAdam Steps SDCM = 2,4  
 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)

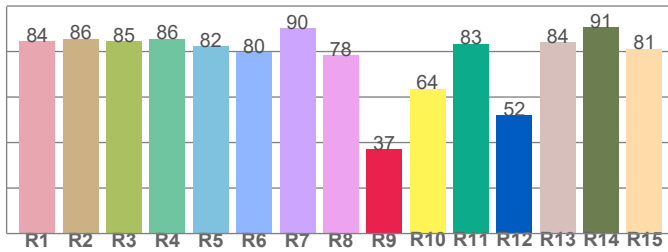
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



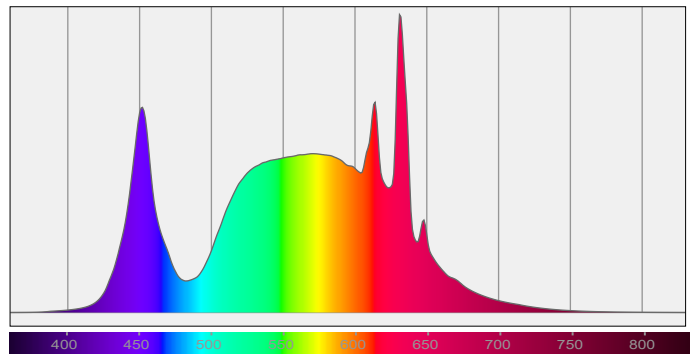
### Color Rendering Index per reference color (CIE 1995)



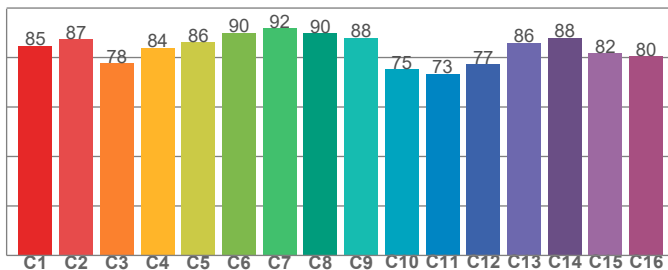
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84,5	85,7	84,6	85,6	82,3	79,6	90,3	78,3	37,1	63,7	83,5	52,0	84,0	90,5	81,2

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



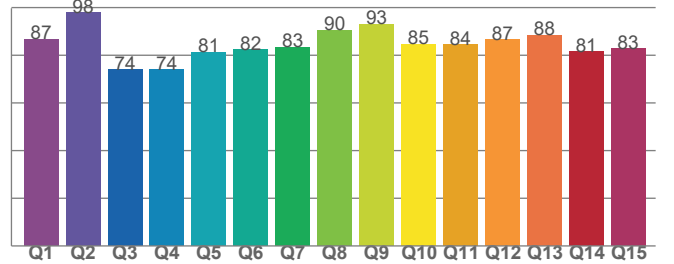
### TM30-18 Rf-values per hue bin



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
84,8	87,4	77,8	83,9	86,2	90,0	91,9	89,7	88,0	75,3	73,5	77,4	86,0	88,0	81,8	80,5

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
86,7	97,8	73,9	73,9	81,2	82,4	83,4	90,5	93,1	84,7	84,4	86,6	88,5	81,4	82,7

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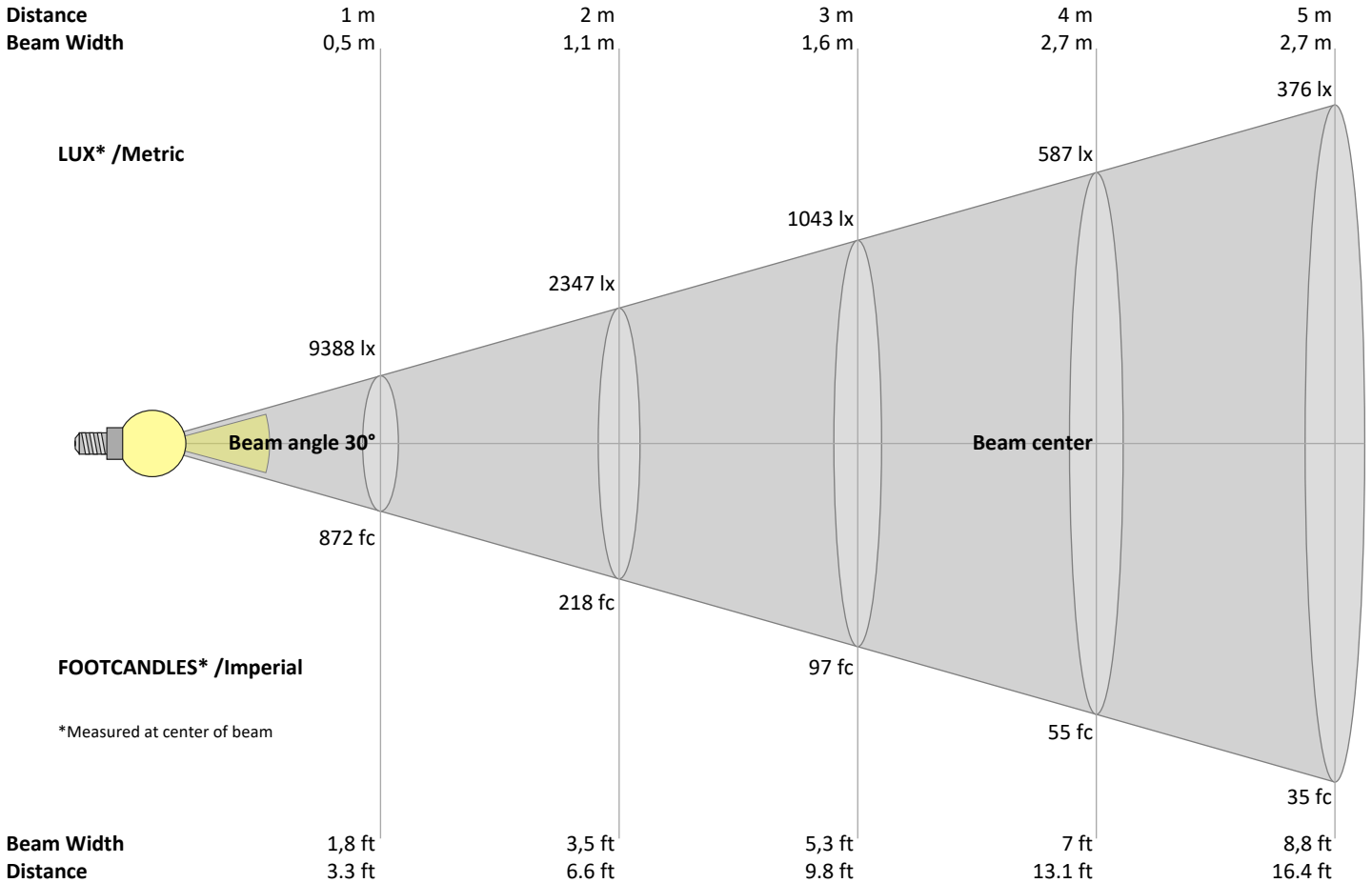
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## Beam Details



### 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
9388	2347	1043	587	376	261	192	147	116	94	78	65	56	48	42	37	32	29	26	23	lux
872,2	218,1	96,9	54,5	34,9	24,2	17,8	13,6	10,8	8,7	7,2	6,1	5,2	4,5	3,9	3,4	3	2,7	2,4	2,2	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
9388	9346	9324	9269	9161	8954	8578	7970	7097	5997	4782	3591	2546	1708	1084	639	330	134	43	20	cd
100%	100%	99%	99%	98%	95%	91%	85%	76%	64%	51%	38%	27%	18%	12%	7%	4%	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
9388	9153	8345	6776	4861	3185	2022	1335	953	752	647	580	538	489	417	318	194	75	20	11	cd
100%	97%	89%	72%	52%	34%	22%	14%	10%	8%	7%	6%	6%	5%	4%	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
9388	9346	9324	9269	9161	8954	8578	7970	7097	5997	4782	3591	2546	1708	1084	639	330	134	43	20	cd
100%	100%	99%	99%	98%	95%	91%	85%	76%	64%	51%	38%	27%	18%	12%	7%	4%	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
9388	9153	8345	6776	4861	3185	2022	1335	953	752	647	580	538	489	417	318	194	75	20	11	cd
100%	97%	89%	72%	52%	34%	22%	14%	10%	8%	7%	6%	6%	5%	4%	3%	2%	1%	0%	0%	of 0°val

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## 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	27,9	28,8	28,1	29,1	29,3	18,0	19,0	18,2	19,3	19,5
	3H	28,7	29,7	29,1	30,0	30,2	19,5	20,5	19,9	20,7	21,0
	4H	29,0	30,0	29,4	30,2	30,5	20,2	21,1	20,6	21,4	21,7
	6H	29,2	30,1	29,6	30,4	30,8	20,7	21,5	21,0	21,8	22,2
	8H	29,3	30,1	29,6	30,4	30,8	20,8	21,6	21,1	21,9	22,4
	12H	29,3	30,1	29,6	30,4	30,9	20,8	21,6	21,2	22,0	22,4
4H	2H	27,6	28,6	28,0	28,8	29,1	19,0	20,0	19,4	20,2	20,5
	3H	28,6	29,4	29,0	29,8	30,2	20,6	21,3	20,9	21,7	22,2
	4H	29,0	29,7	29,4	30,1	30,7	21,2	22,0	21,7	22,4	22,9
	6H	29,2	30,0	29,8	30,3	30,7	21,8	22,5	22,3	22,8	23,2
	8H	29,3	30,0	29,9	30,4	30,8	21,9	22,5	22,4	22,9	23,3
	12H	29,4	29,9	29,9	30,3	30,8	21,9	22,5	22,4	22,9	23,4
8H	4H	28,9	29,5	29,4	29,9	30,3	21,6	22,2	22,1	22,6	23,0
	6H	29,2	29,7	29,7	30,2	30,7	22,2	22,7	22,7	23,1	23,7
	8H	29,4	29,8	29,9	30,3	31,0	22,4	22,8	22,9	23,4	24,0
	12H	29,5	29,8	30,1	30,3	30,9	22,5	22,8	23,1	23,4	24,0
12H	4H	28,8	29,4	29,4	29,8	30,3	21,6	22,1	22,1	22,6	23,1
	6H	29,2	29,6	29,8	30,2	30,8	22,3	22,7	22,8	23,2	23,9
	8H	29,3	29,7	29,9	30,2	30,8	22,5	22,8	23,1	23,4	24,0

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

S = 1.0H	0,8 / -0,7	0,5 / -0,4
S = 1.5H	2,0 / -1,8	0,8 / -0,6
S = 2.0H	3,4 / -2,8	1,0 / -0,8

## 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	106	106	106	101	101	101	99	
1	111	107	104	101	108	105	102	99	100	98	96	96	94	92	93	91	90	88
2	103	96	91	86	100	94	89	85	91	87	83	88	84	81	85	82	79	77
3	96	87	81	75	93	86	80	75	83	77	73	80	76	72	77	74	71	69
4	89	79	72	67	87	78	71	66	76	70	65	73	68	64	71	67	63	61
5	83	73	65	60	81	72	65	59	70	63	59	68	62	58	66	61	57	55
6	78	67	59	54	76	66	59	54	64	58	53	63	57	53	61	56	52	50
7	73	62	54	49	72	61	54	49	60	53	49	58	53	48	57	52	48	46
8	69	58	50	45	68	57	50	45	56	49	45	54	49	44	53	48	44	43
9	65	54	47	42	64	53	46	42	52	46	41	51	45	41	50	45	41	39
10	62	50	43	39	61	50	43	39	49	43	38	48	42	38	47	42	38	37

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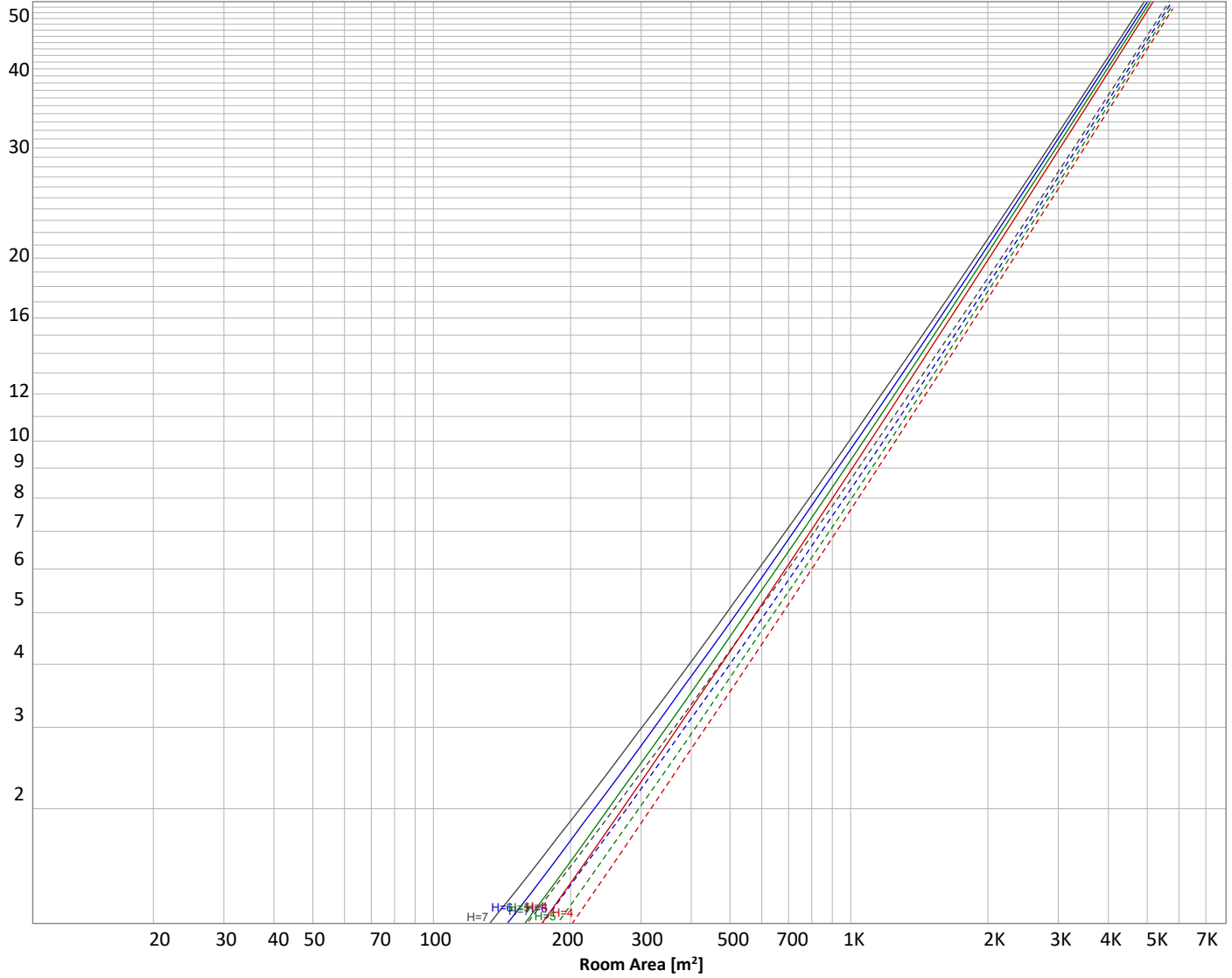
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 12049 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°
875 lm	2231 lm	2552 lm	2184 lm	1662 lm	1168 lm	747 lm	393 lm	110 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
17,1 lm	15,9 lm	17,0 lm	18,0 lm	17,8 lm	16,5 lm	13,3 lm	8,69 lm	2,99 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	875 lm	7,3%
10-20°	2231 lm	18,5%
20-30°	2552 lm	21,2%
30-40°	2184 lm	18,1%
40-50°	1662 lm	13,8%
50-60°	1168 lm	9,7%
60-70°	747 lm	6,2%
70-80°	393 lm	3,3%
80-90°	110 lm	0,9%
90-100°	17 lm	0,1%
100-110°	16 lm	0,1%
110-120°	17 lm	0,1%
120-130°	18 lm	0,1%
130-140°	18 lm	0,1%
140-150°	17 lm	0,1%
150-160°	13 lm	0,1%
160-170°	9 lm	0,1%
170-180°	3 lm	0,0%
<b>Total</b>	<b>12049 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	9430 cd
Intensity, 90°	43 cd
Intensity, 0°	9388 cd

### Zonal Lumen summary

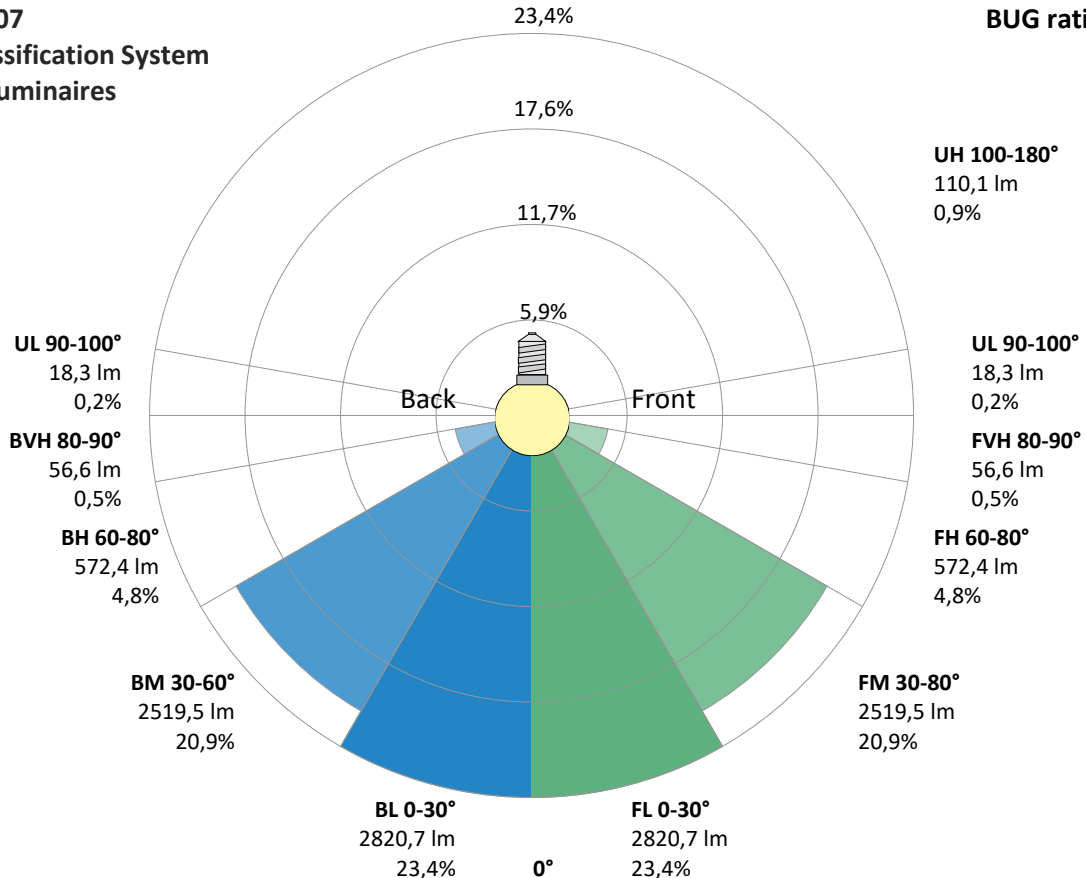
Zone (γ)	Lumen	% Total
0-30°	5657 lm	47,0%
0-40°	7841 lm	65,1%
0-60°	10671 lm	88,6%
60-90°	1250 lm	10,4%
70-100°	520 lm	4,3%
90-120°	50 lm	0,4%
0-90°	11921 lm	98,9%
90-180°	127 lm	1,1%
0-180°	12049 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2821 lm	23,4%
Medium(30-60°)	2520 lm	20,9%
High(60-80°)	572 lm	4,8%
Very high(80-90°)	57 lm	0,5%
<b>Back light</b>		
Low(0-30°)	2821 lm	23,4%
Medium(30-60°)	2520 lm	20,9%
High(60-80°)	572 lm	4,8%
Very high(80-90°)	57 lm	0,5%
<b>Uplight</b>		
Low(90-100°)	18 lm	0,2%
High(100-180°)	110 lm	0,9%

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

BUG rating B4 U3 G1



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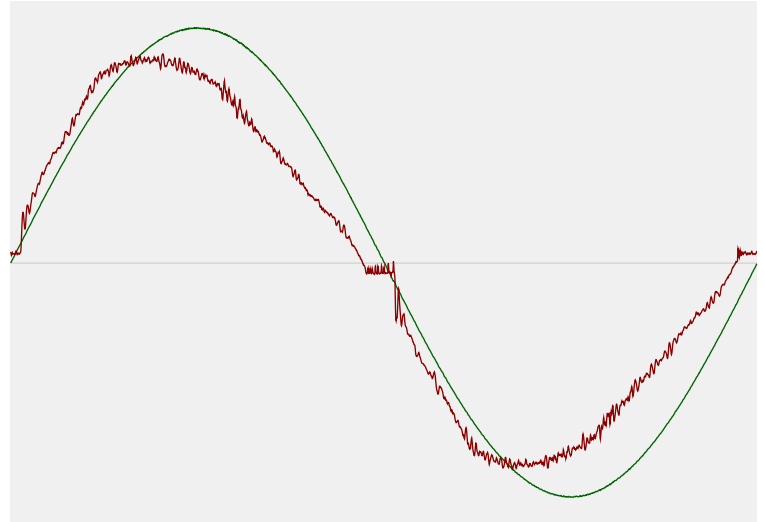


## Power Details

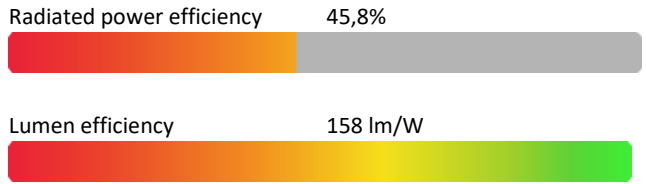
### Input Power

Power feed to light source	76,4 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,342 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	78,72 VA
Displacement factor of AC power feed	0,97
Power factor of AC current feed	0,97
Total harmonic distortion of the current	10,03%
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	4003 K
CCT shift	-3 K
CCT end	4000 K

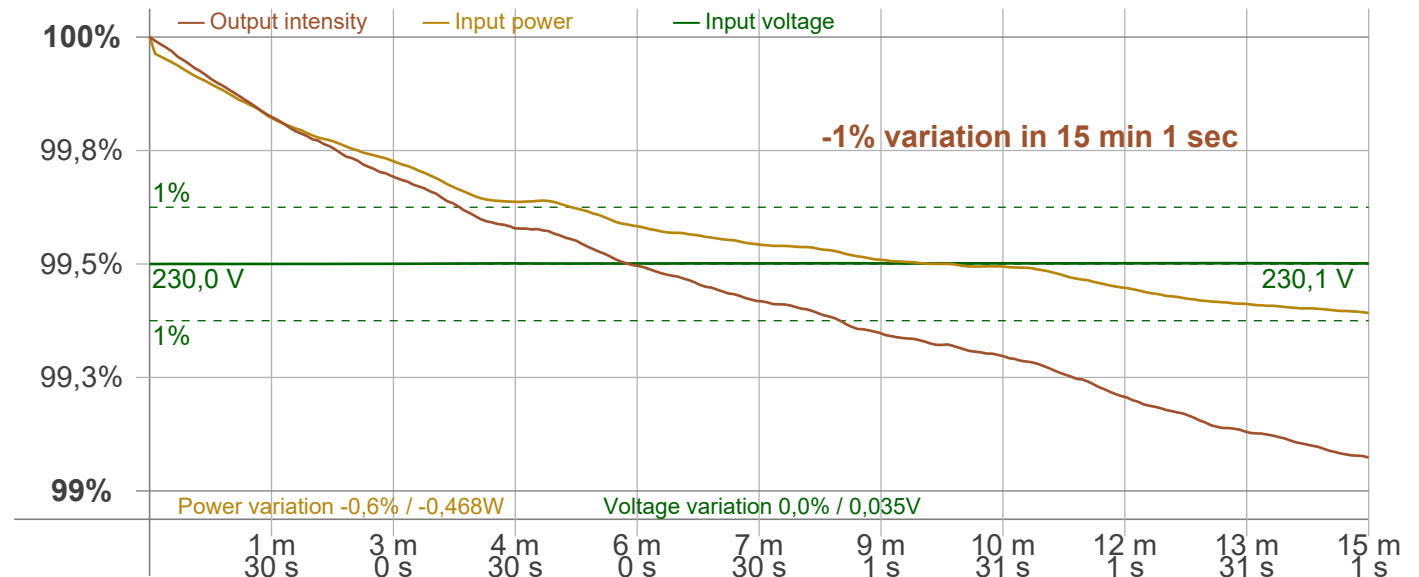
### Warmup Result

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

### Output Change

Output start	12162 lm
Output change	-113 lm
Output end	12049 lm

### Stabilization Curve



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## 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 0,85 %  
 Flicker index 0

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

JA8/10 40 Hz 0,03 %  
 JA8/10 90 Hz 0,03 %  
 JA8/10 200 Hz 0,84 %  
 JA8/10 400 Hz 0,84 %  
 JA8/10 1000 Hz 0,85 %

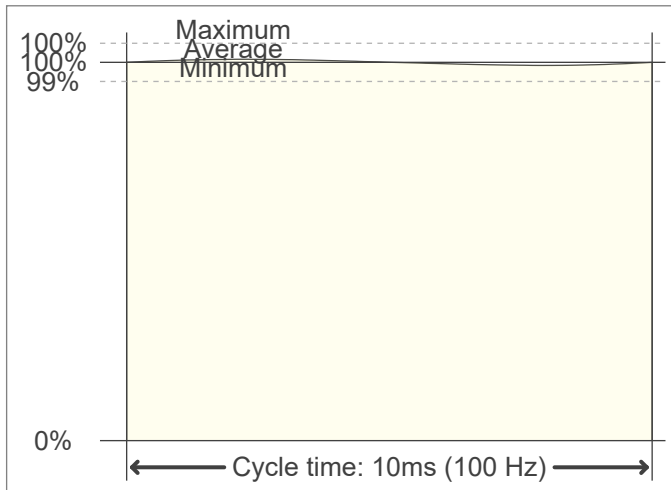
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,02  
 SVM value (80 < F < 2000 Hz) 0,03

### 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

