

# Light Measurement Report

Print date: 4-7-2025

Measurement date and time: 4-7-2025 09:32:44 – Measurement no. VFR-250704-1926-MS

Measurement tracking No. and Link: [VT250704-003877](#)

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

72 planes – 5°  
5°  
2,79 m  
25,5 W – PF 0,88 – DPF 0,99  
230 V – 0,127 A  
50 Hz  
Lamp stabilized in 15 min 2 sec – 2,0%

## Tested Light Source

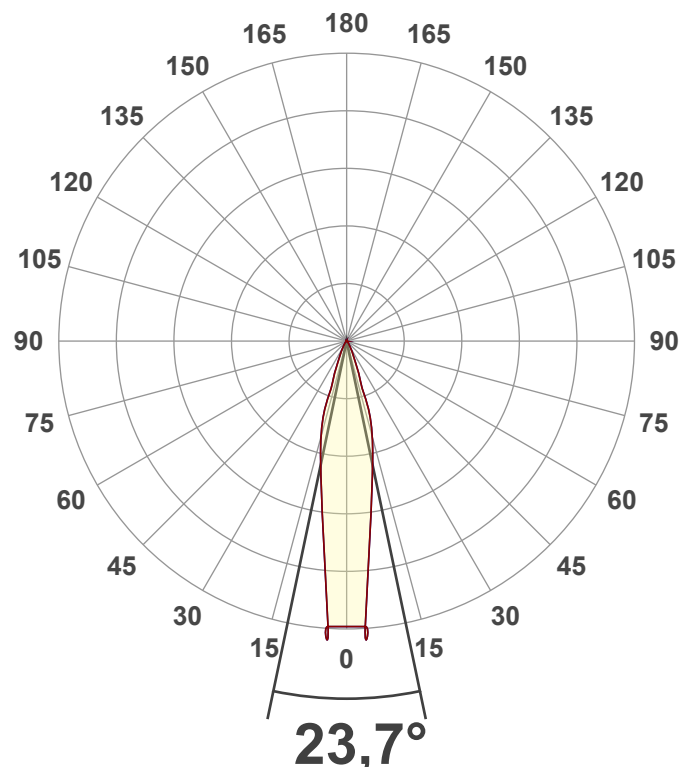
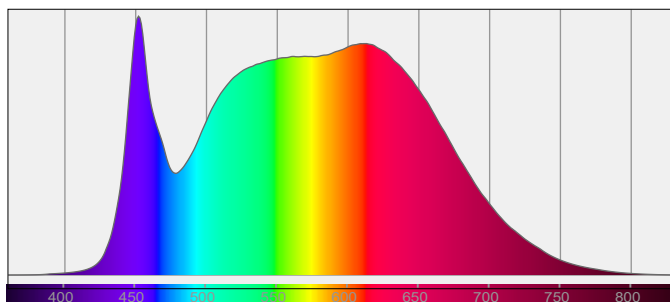
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

812034-4000K-25W  
812034-4000K-25W – Dutchfulfillment  
3-FASE RAILSPOT | ZOOMABLE | WATT SWITCH | CCT-SWITCH | ZWART

## 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

1713 lm – 0,08% / 99,92%  
67 lm/W  
8247 cd – 23,7°  
CCT = 4000 K / 4216 K  
CRI 91,6  
 $R_f$  90,5 –  $R_g$  96,7  
Duv 0,0062 – SDCM 6,4  
SVM 0,03 – PstLM 0,11



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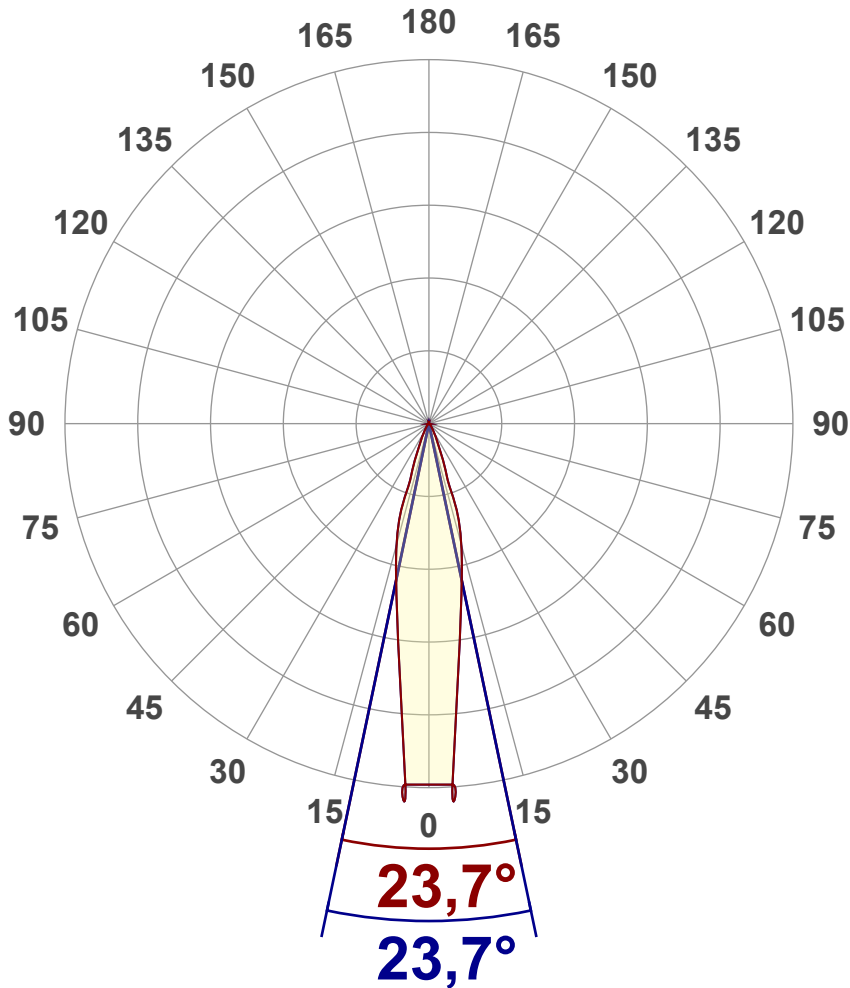
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Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



### Main Values

Output (total Lumen)	1713 lm
Lumen Up% / Down%	0,08% / 99,92%
Peak Intensity	8247 cd
Beam Angle (50%)	23,7°
Beam Angle (90%)	23,7°
Beam Angle (10%)	23,7°

### Cut-off Angle

Average 2,5%	61,7°
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### Field Angle

Average 10%	43,5°
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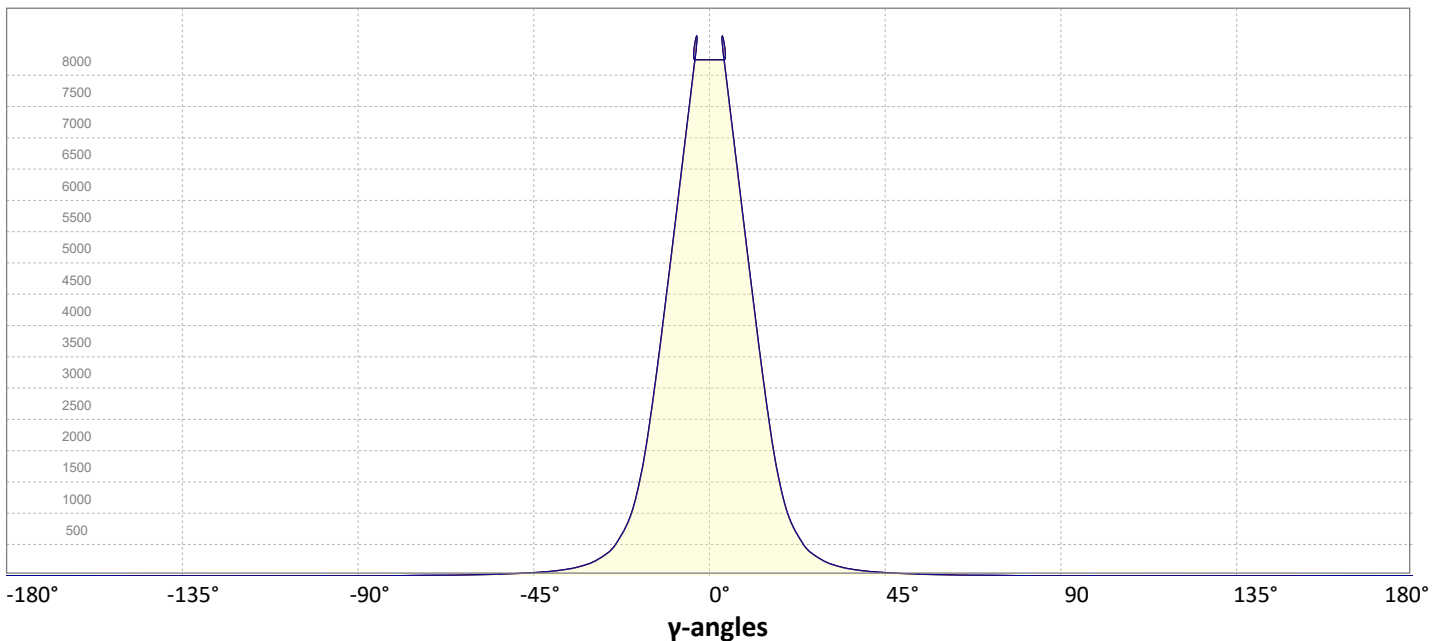
### Intensity Ratio

In 120° cone	99,0%
In 90° cone	96,7%

**C000-C180**

**C090-C270**

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



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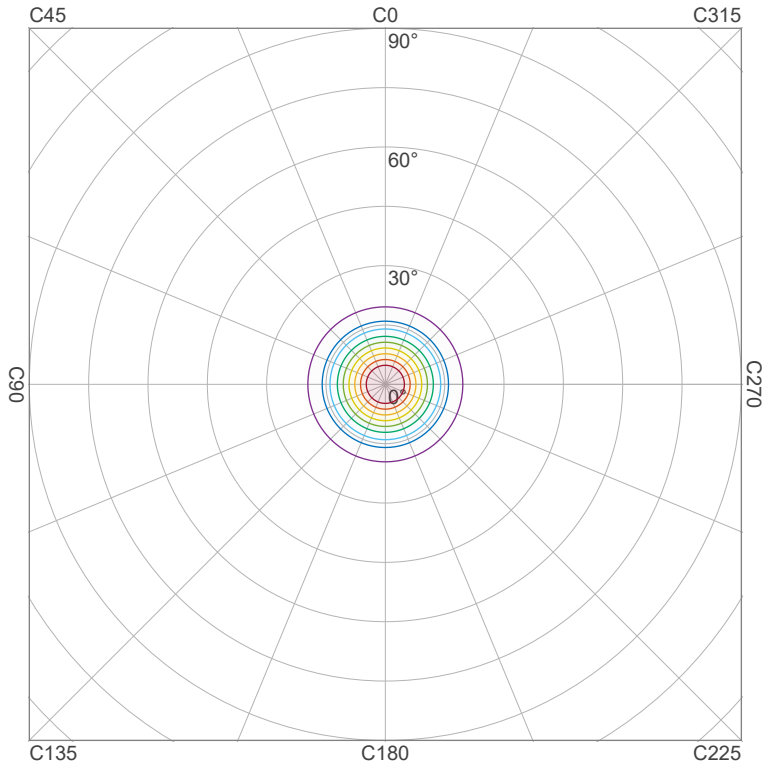
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## Iso-intensity Diagram (Iso-candela)

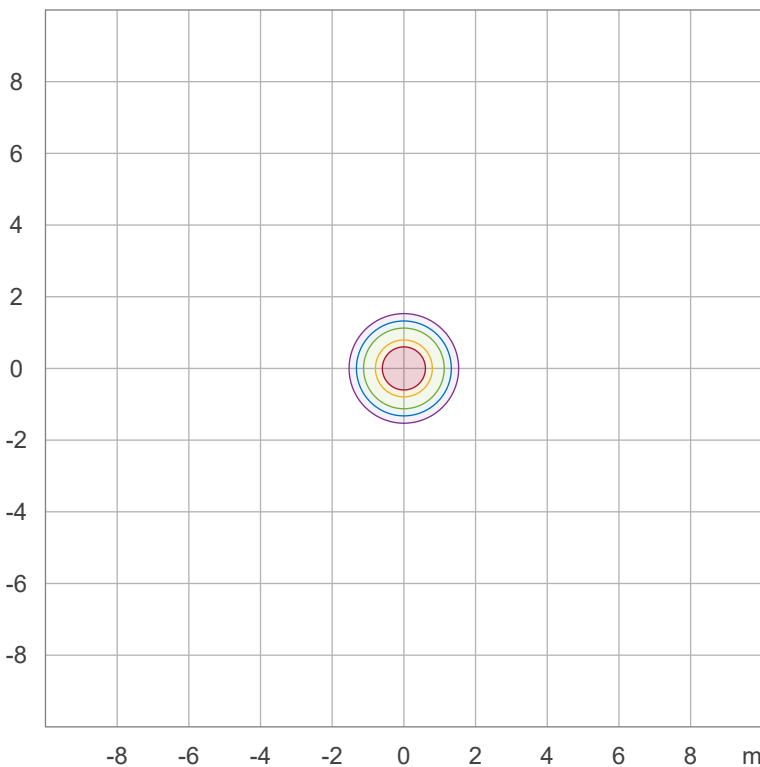


90 %	7422,2 cd
80 %	6597,5 cd
70 %	5772,8 cd
60 %	4948,1 cd
50 %	4123,4 cd
40 %	3298,8 cd
30 %	2474,1 cd
20 %	1649,4 cd
10 %	824,7 cd

Peak intensity: 8246,9 cd

Number of c-planes: 72

## Iso-illuminance Diagram (Iso-lux)



50,0 %	458,2 lx
30,0 %	274,9 lx
10,0 %	91,6 lx
5,0 %	45,8 lx
3,0 %	27,5 lx

Peak illuminance: 916,3 lx

Mounting height: 3,0 m

Number of c-planes: 72

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## Color details

Correlated Color Temperature, Target CCT = 4000 K  
 Correlated Color Temperature, Measured CCT = 4216 K  
 Color Rendering Index CRI 91,6  
 Color Rendering Index, R9 (red component) R9 = 59,6  
 Color Rendering TM30-18 R<sub>f</sub> 90,5 – R<sub>g</sub> 96,7  
 Color Quality Scale CQS = 92,0

MacAdam Steps SDCM = 6,4  
 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 = 0,0062  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

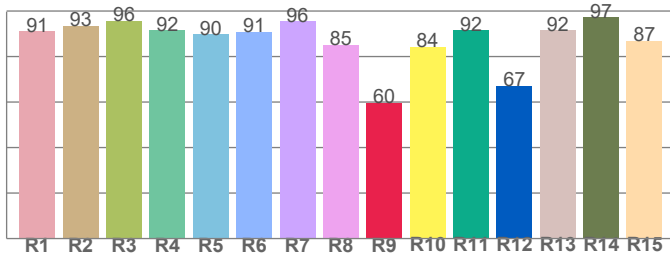
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



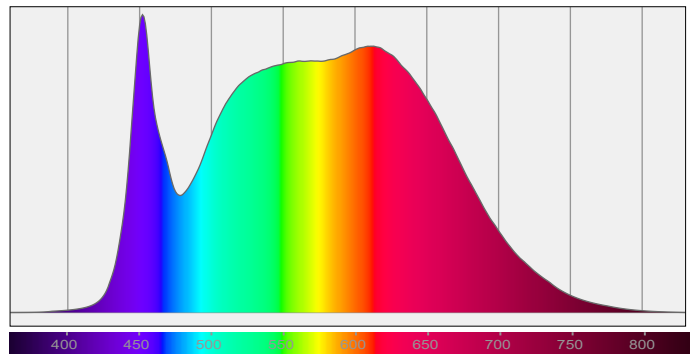
### Color Rendering Index per reference color (CIE 1995)



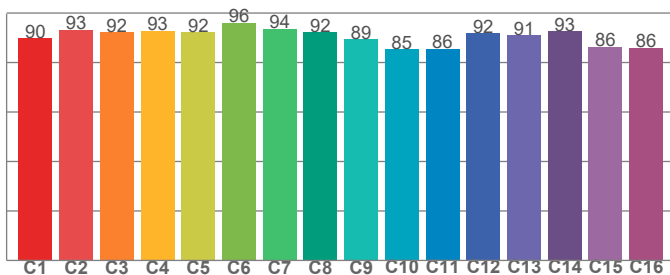
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
91,0	93,5	95,7	91,6	89,7	90,8	95,6	85,3	59,6	84,3	91,6	67,1	91,5	97,4	86,9

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



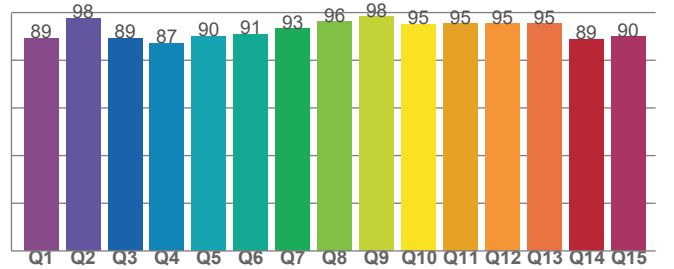
### TM30-18 R<sub>f</sub>-values per hue bin



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
89,7	93,3	92,2	92,8	92,3	96,0	93,6	92,3	89,3	85,4	85,5	91,9	91,1	92,6	86,4	86,0

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
89,3	97,7	89,1	87,3	90,1	90,9	93,2	96,1	98,3	95,2	95,3	95,4	95,3	88,9	89,8

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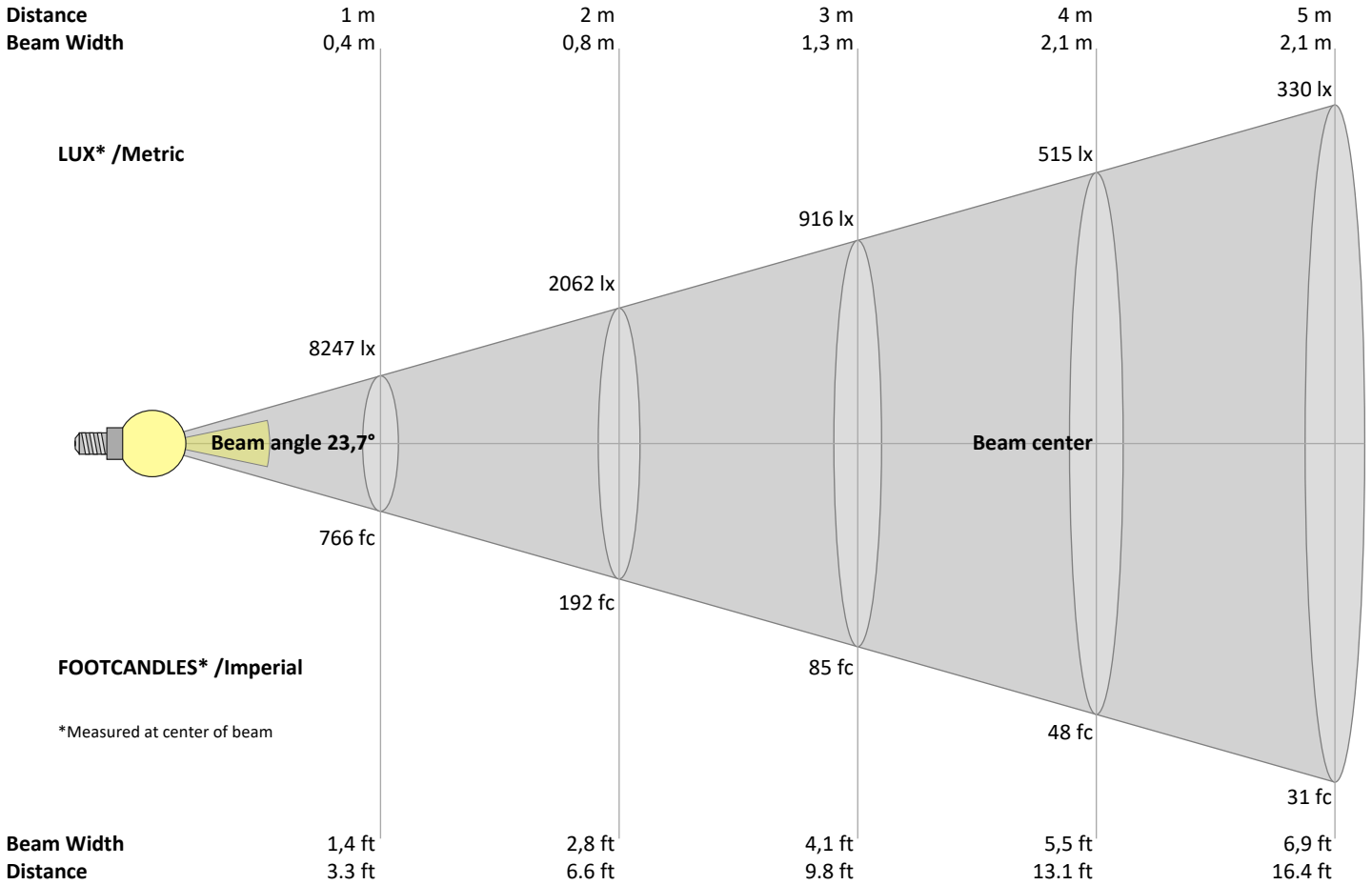
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## Beam Details



### 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
8247	2062	916	515	330	229	168	129	102	82	68	57	49	42	37	32	29	25	23	21	lux
766,2	191,5	85,1	47,9	30,6	21,3	15,6	12	9,5	7,7	6,3	5,3	4,5	3,9	3,4	3	2,7	2,4	2,1	1,9	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
8247	8247	8111	7092	6073	5054	4035	3054	2303	1552	1088	789	516	406	296	226	179	136	114	92	cd
100%	100%	98%	86%	74%	61%	49%	37%	28%	19%	13%	10%	6%	5%	4%	3%	2%	2%	1%	1%	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
8247	8247	8111	7092	6073	5054	4035	3054	2303	1552	1088	789	516	406	296	226	179	136	114	92	cd
100%	100%	98%	86%	74%	61%	49%	37%	28%	19%	13%	10%	6%	5%	4%	3%	2%	2%	1%	1%	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
8247	8247	8111	7092	6073	5054	4035	3054	2303	1552	1088	789	516	406	296	226	179	136	114	92	cd
100%	100%	98%	86%	74%	61%	49%	37%	28%	19%	13%	10%	6%	5%	4%	3%	2%	2%	1%	1%	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
8247	8247	8111	7092	6073	5054	4035	3054	2303	1552	1088	789	516	406	296	226	179	136	114	92	cd
100%	100%	98%	86%	74%	61%	49%	37%	28%	19%	13%	10%	6%	5%	4%	3%	2%	2%	1%	1%	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	14,9	15,4	15,0	15,6	15,7	14,9	15,4	15,0	15,6	15,7
	3H	15,0	15,6	15,4	15,8	16,0	15,0	15,6	15,4	15,8	16,0
	4H	15,1	15,7	15,5	15,9	16,2	15,1	15,7	15,5	15,9	16,2
	6H	15,2	15,7	15,5	16,0	16,3	15,2	15,7	15,5	16,0	16,3
	8H	15,2	15,6	15,5	16,0	16,3	15,2	15,6	15,5	16,0	16,3
	12H	15,1	15,6	15,5	15,9	16,3	15,1	15,6	15,5	15,9	16,3
4H	2H	14,8	15,4	15,2	15,6	15,9	14,8	15,4	15,2	15,6	15,9
	3H	15,3	15,7	15,6	16,1	16,5	15,3	15,7	15,6	16,1	16,5
	4H	15,4	15,8	15,8	16,2	16,7	15,4	15,8	15,8	16,2	16,7
	6H	15,4	15,9	15,9	16,2	16,6	15,4	15,9	15,9	16,2	16,6
	8H	15,4	15,8	15,9	16,1	16,5	15,4	15,8	15,9	16,1	16,5
	12H	15,3	15,6	15,8	16,0	16,5	15,3	15,6	15,8	16,0	16,5
8H	4H	15,4	15,8	15,9	16,1	16,5	15,4	15,8	15,9	16,1	16,5
	6H	15,4	15,7	15,9	16,2	16,7	15,4	15,7	15,9	16,2	16,7
	8H	15,5	15,7	16,0	16,2	16,8	15,5	15,7	16,0	16,2	16,8
	12H	15,4	15,6	16,0	16,1	16,7	15,4	15,6	16,0	16,1	16,7
12H	4H	15,3	15,6	15,8	16,0	16,5	15,3	15,6	15,8	16,0	16,5
	6H	15,5	15,7	16,0	16,2	16,8	15,5	15,7	16,0	16,2	16,8
	8H	15,4	15,6	16,0	16,1	16,7	15,4	15,6	16,0	16,1	16,7

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

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

## 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	115	113	111	109	112	111	109	107	107	105	104	103	102	101	99	99	98	96
2	111	107	104	101	109	105	103	100	102	100	98	99	98	96	97	95	94	93
3	107	102	99	96	105	101	98	95	99	96	93	96	94	92	94	92	91	89
4	104	98	94	91	102	97	93	90	95	92	89	93	91	88	92	89	87	86
5	101	95	90	87	99	94	90	87	92	89	86	91	88	85	89	87	85	83
6	98	91	87	84	96	91	87	84	89	86	83	88	85	83	87	84	82	81
7	95	88	84	81	94	88	84	81	87	83	80	86	82	80	85	82	80	79
8	92	86	81	79	91	85	81	78	84	81	78	83	80	78	82	80	77	77
9	90	83	79	76	89	83	79	76	82	78	76	81	78	76	81	78	75	75
10	88	81	77	74	87	81	77	74	80	76	74	79	76	74	79	76	74	73

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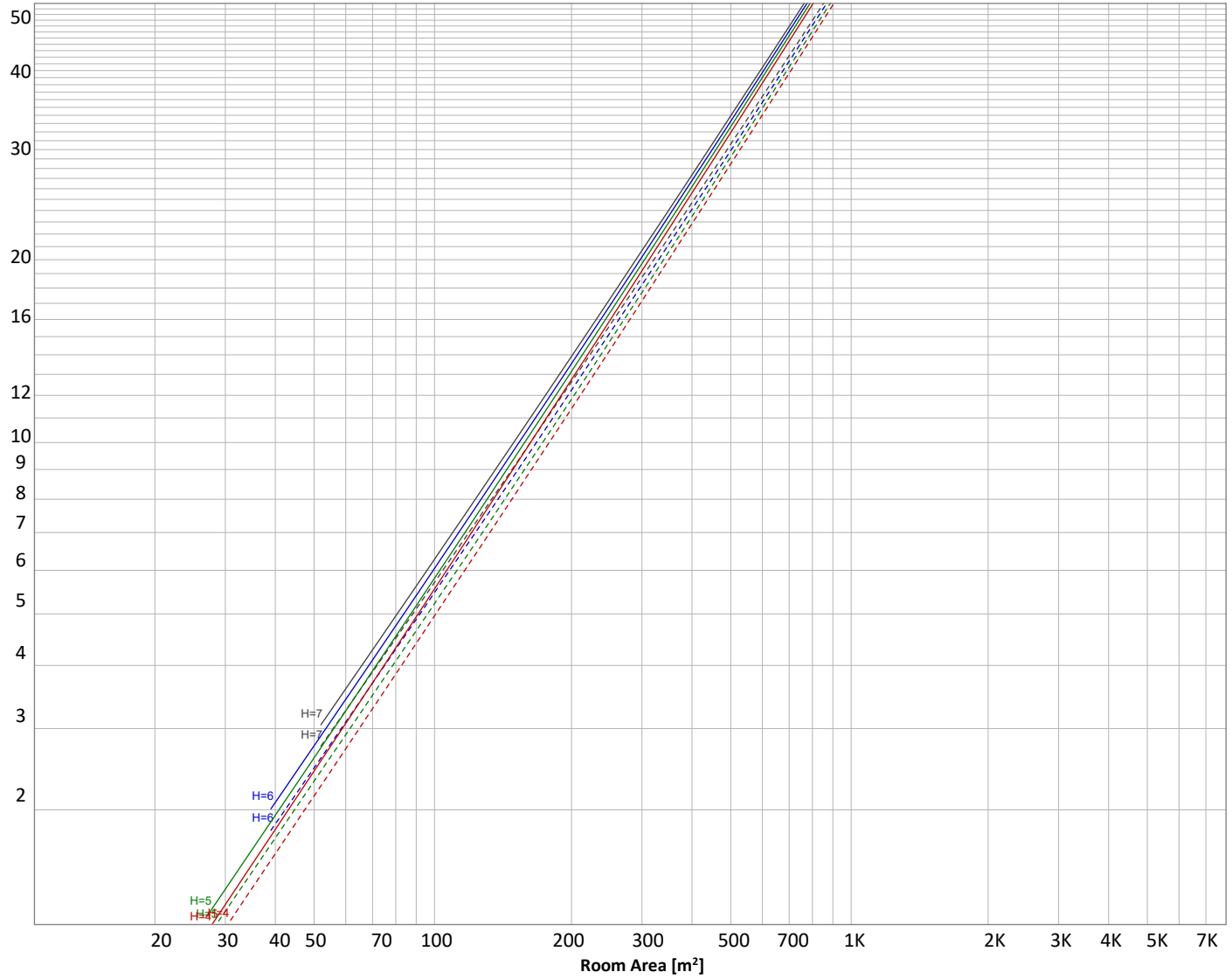
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 1713 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°
672 lm	653 lm	228 lm	81,3 lm	40,1 lm	22,2 lm	9,83 lm	5,44 lm	0,304 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,000 lm	0,000 lm	0,005 lm	0,001 lm	0,088 lm	0,184 lm	0,449 lm	0,540 lm	0,153 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	672 lm	39,2%
10-20°	653 lm	38,1%
20-30°	228 lm	13,3%
30-40°	81 lm	4,7%
40-50°	40 lm	2,3%
50-60°	22 lm	1,3%
60-70°	10 lm	0,6%
70-80°	5 lm	0,3%
80-90°	0 lm	0,0%
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°	0 lm	0,0%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
<b>Total</b>	<b>1713 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	8247 cd
Intensity, 90°	0 cd
Intensity, 0°	8247 cd

### Zonal Lumen summary

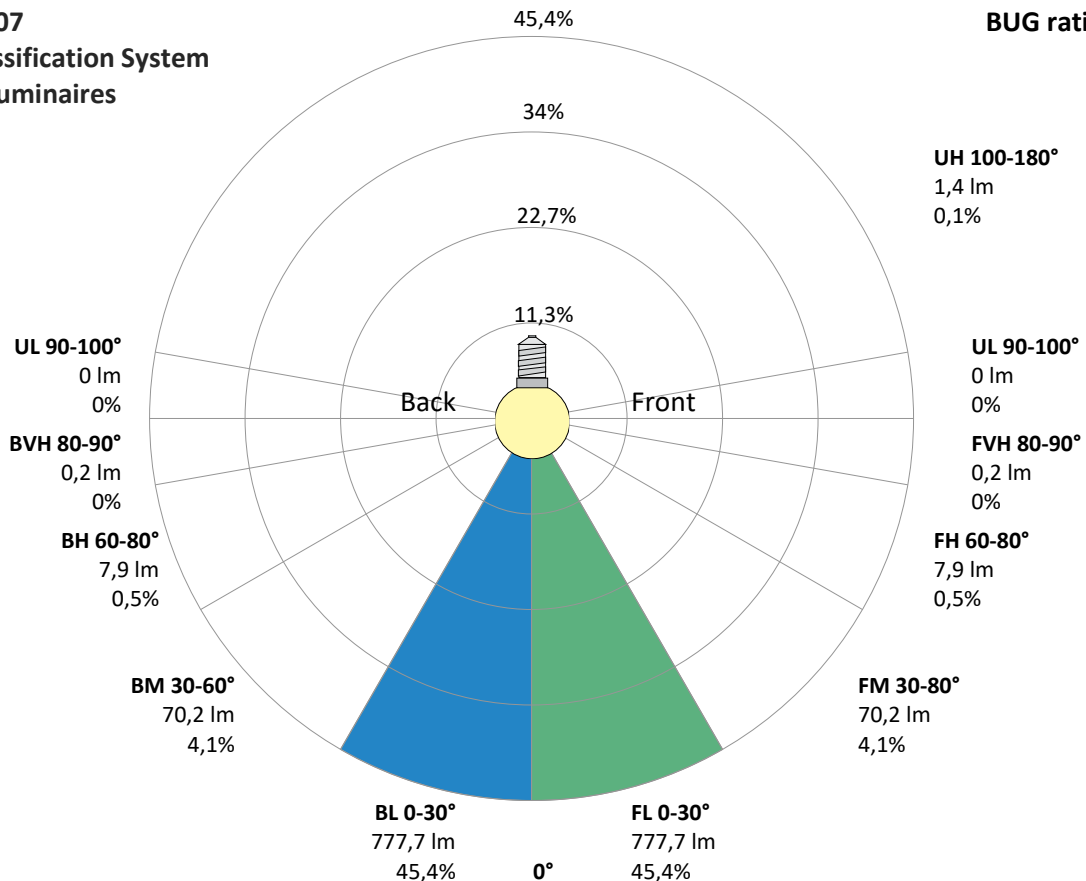
Zone (γ)	Lumen	% Total
0-30°	1553 lm	90,6%
0-40°	1634 lm	95,4%
0-60°	1696 lm	99,0%
60-90°	16 lm	0,9%
70-100°	6 lm	0,3%
90-120°	0 lm	0,0%
0-90°	1712 lm	99,9%
90-180°	1 lm	0,1%
0-180°	1713 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	778 lm	45,4%
Medium(30-60°)	70 lm	4,1%
High(60-80°)	8 lm	0,5%
Very high(80-90°)	0 lm	0,0%
<b>Back light</b>		
Low(0-30°)	778 lm	45,4%
Medium(30-60°)	70 lm	4,1%
High(60-80°)	8 lm	0,5%
Very high(80-90°)	0 lm	0,0%
<b>Uplight</b>		
Low(90-100°)	0 lm	0,0%
High(100-180°)	1 lm	0,1%

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

**BUG rating B2 U1 G0**



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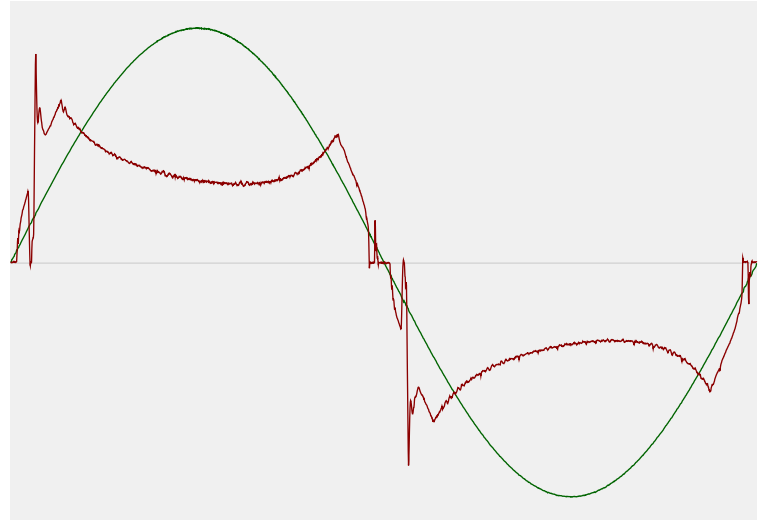


## Power Details

### Input Power

Power feed to light source	25,5 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,127 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	29,14 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,88
Total harmonic distortion of the current	53,97%
Total harmonic distortion of the voltage	0,12%

### Input Power Curve



### Efficiency

Radiated power efficiency	22,3%
Lumen efficiency	67 lm/W

## Stabilization Details

### Warmup Conditions

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

### Color Temperature Change

CCT start	3999 K
CCT shift	+1 K
CCT end	4000 K

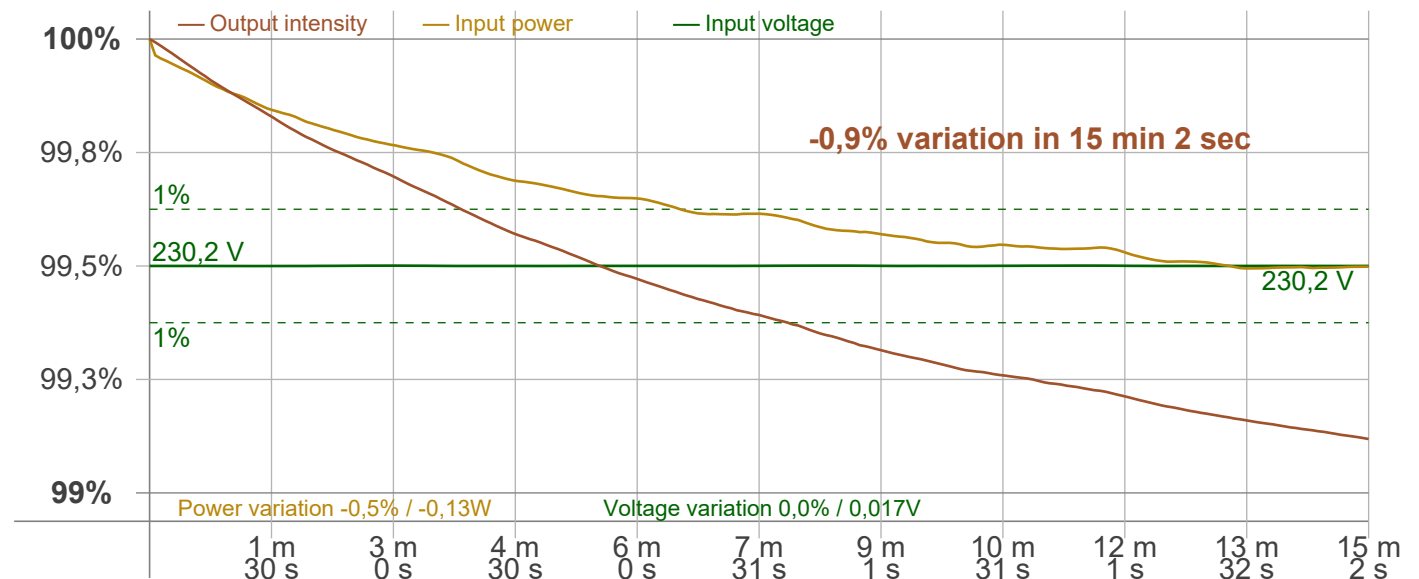
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	-0,9%

### Output Change

Output start	1729 lm
Output change	-15 lm
Output end	1713 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 40000 samples/s

**Measurement time**  
 PstLM 180 sec  
 All other indices 1,2 sec

### Flicker indices according to Illuminating Engineering Society (IES)

Flicker frequency 99,75 Hz  
 Percent Flicker 1,03 %  
 Flicker index 0

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

JA8/10 40 Hz n/a %  
 JA8/10 90 Hz n/a %  
 JA8/10 200 Hz n/a %  
 JA8/10 400 Hz n/a %  
 JA8/10 1000 Hz n/a %

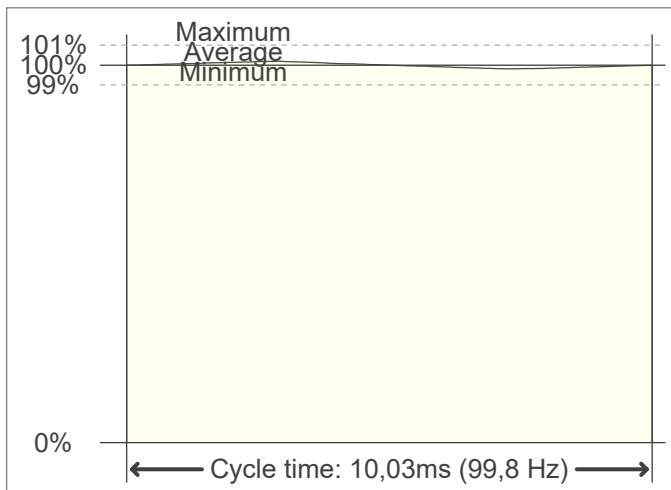
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,11  
 SVM value (80 < F < 2000 Hz) 0,03

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

Perception metric, Assist Mp n/a

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



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



### IEEE 1789 Frequency/modulation plot

