

# Light Measurement Report

Print date: 5-9-2025

Measurement date and time: 5-9-2025 13:49:00 – Measurement no. VFR-250905-2986-MS

Measurement tracking No. and Link: [VT250905-003263](#)

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°  
12,10 m  
76,7 W – PF 0,98 – DPF 0,98  
230 V – 0,341 A  
50 Hz  
Lamp stabilized in 15 min 1 sec – 2,0%

## Tested Light Source

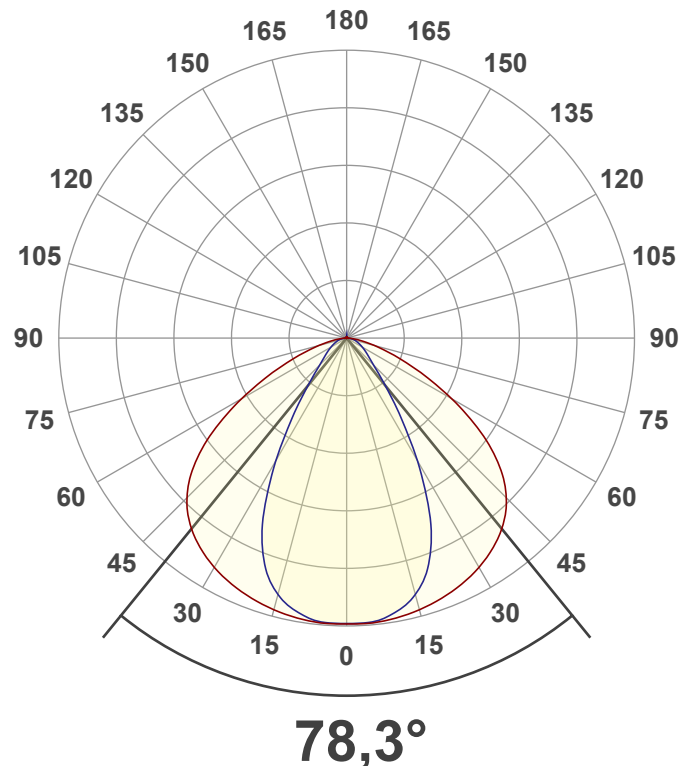
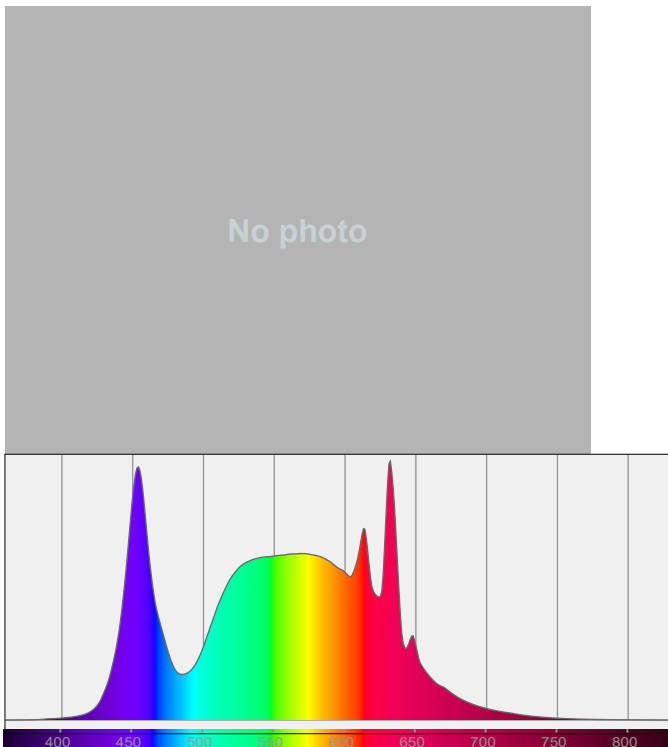
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

813772-4500K  
813772-4500K – Dutchfulfillment  
LICHTLIJN MODULE | JUPITER | 65-80W | 60° | 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

13222 lm – 1,01% / 98,99%  
172 lm/W  
7709 cd – 78,3°  
CCT = 4500 K / 4554 K  
CRI 84,4  
 $R_f$  83,5 –  $R_g$  97,3  
Duv 0,0033 – SDCM 3,1  
SVM 0,01 – PstLM 0,01



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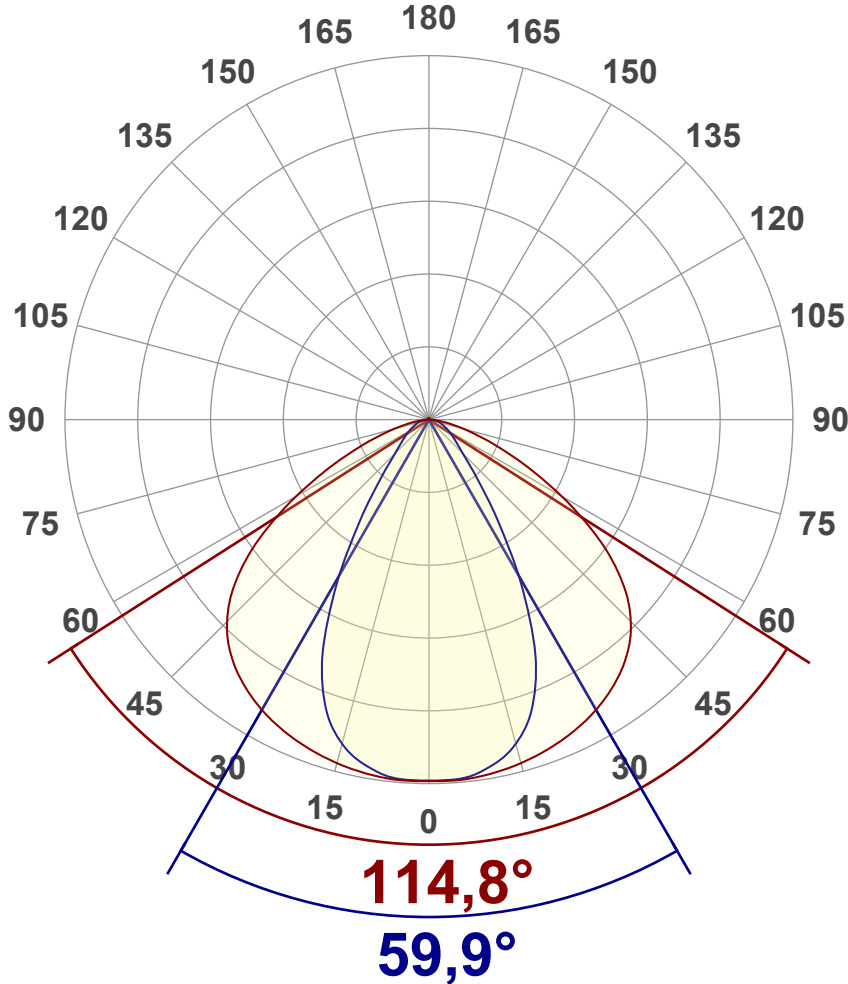
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	13222 lm
Lumen Up% / Down%	1,01% / 98,99%
Peak Intensity	7709 cd
Beam Angle (50%)	78,3°
Beam Angle (90%)	59,9°
Beam Angle (10%)	107,3°

## Cut-off Angle

Average 2,5%	158,3°
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## Field Angle

Average 10%	119,1°
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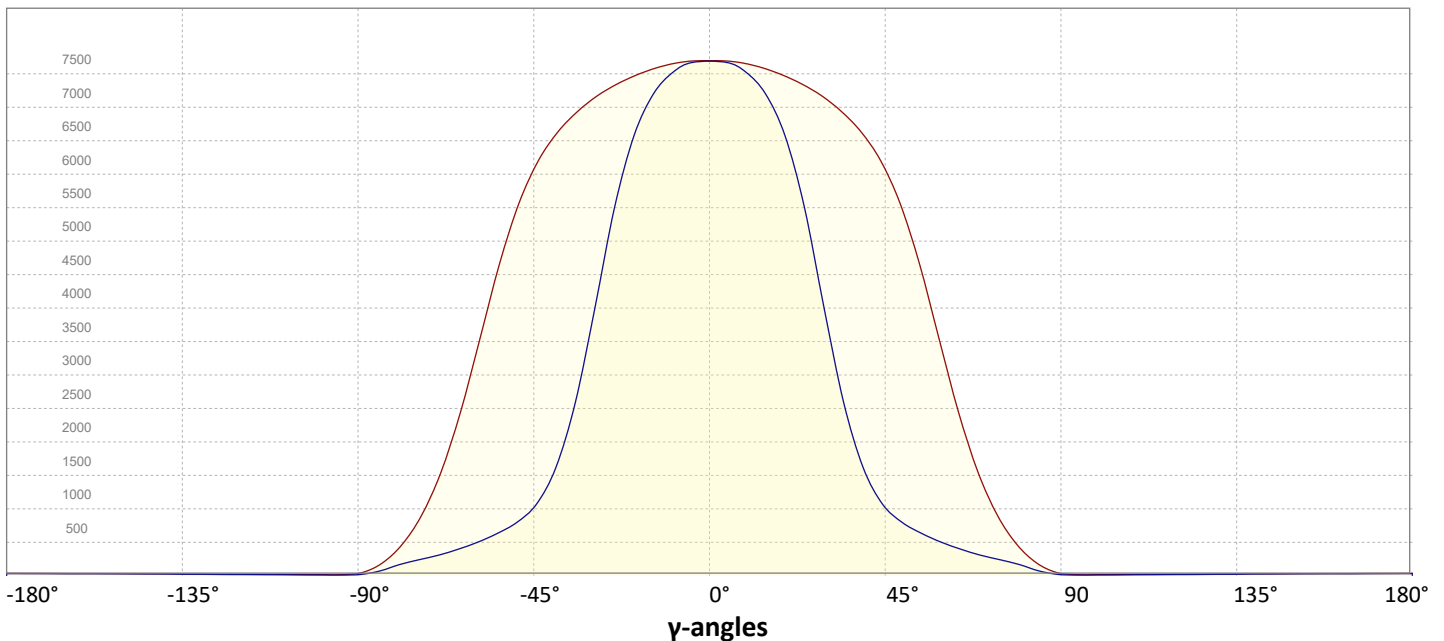
## Intensity Ratio

In 120° cone	89,6%
In 90° cone	72,4%

**C000-C180**

**C090-C270**

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



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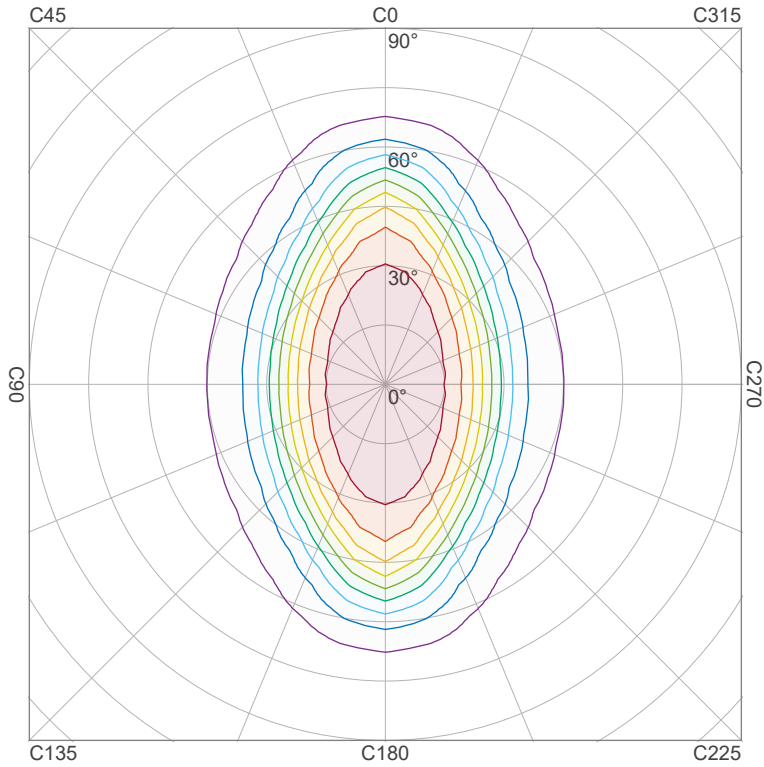
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## Iso-intensity Diagram (Iso-candela)

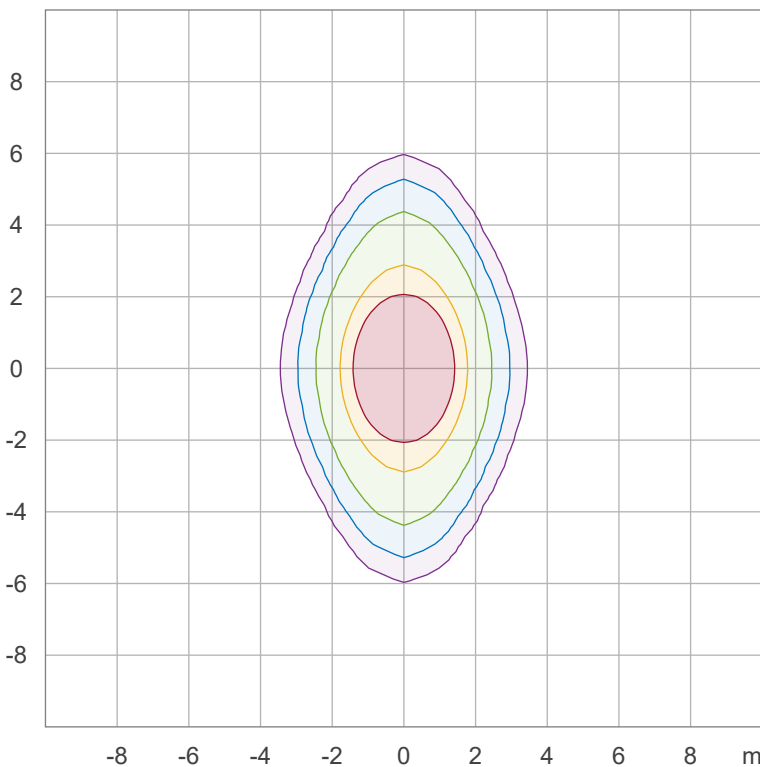


90 %	6931,9 cd
80 %	6161,7 cd
70 %	5391,5 cd
60 %	4621,3 cd
50 %	3851,1 cd
40 %	3080,9 cd
30 %	2310,6 cd
20 %	1540,4 cd
10 %	770,2 cd

Peak intensity: 7702,2 cd

Number of c-planes: 36

## Iso-illuminance Diagram (Iso-lux)



50,0 %	427,8 lx
30,0 %	256,7 lx
10,0 %	85,6 lx
5,0 %	42,8 lx
3,0 %	25,7 lx

Peak illuminance: 855,5 lx

Mounting height: 3,0 m

Number of c-planes: 36

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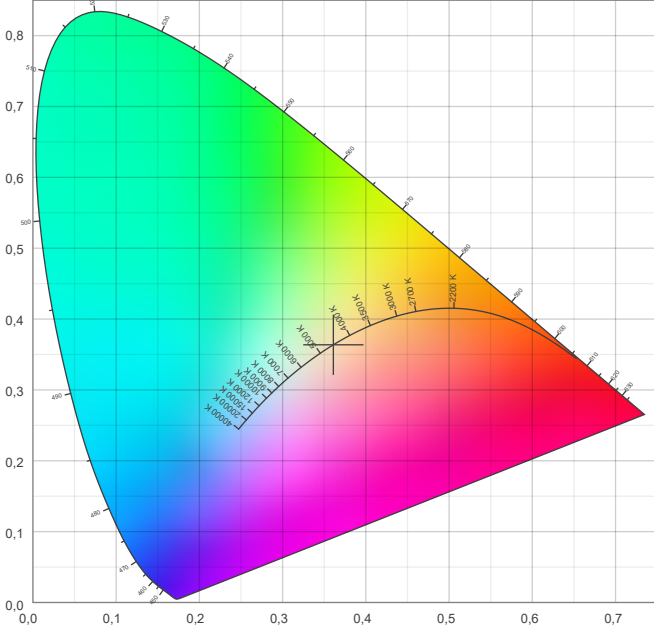


## Color details

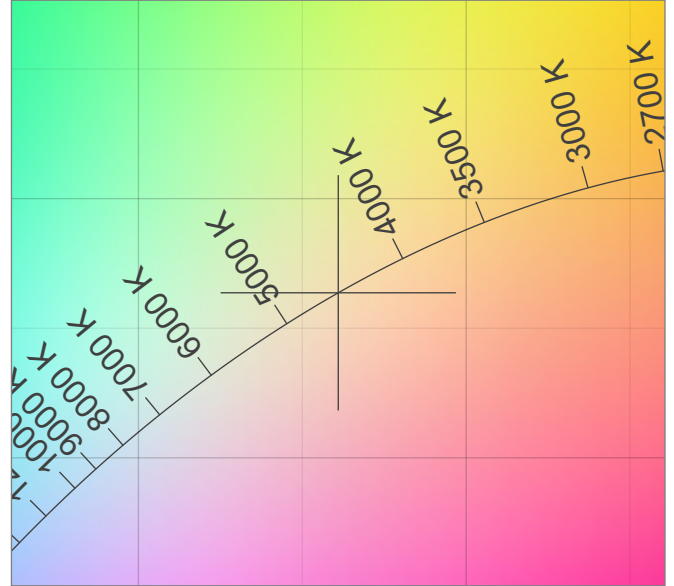
Correlated Color Temperature, Target CCT = 4500 K  
 Correlated Color Temperature, Measured CCT = 4554 K  
 Color Rendering Index CRI 84,4  
 Color Rendering Index, R9 (red component) R9 = 33,2  
 Color Rendering TM30-18 R<sub>f</sub> 83,5 – R<sub>g</sub> 97,3  
 Color Quality Scale CQS = 83,2

MacAdam Steps SDCM = 3,1  
 Color coordinates CIE 1931 (x;y) = (0,361;0,364)  
 Color coordinate CIEs 1960 (u;v) = (0,217;0,329)  
 Color deviation from BBL Duv = 0,0033  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,217;0,493)

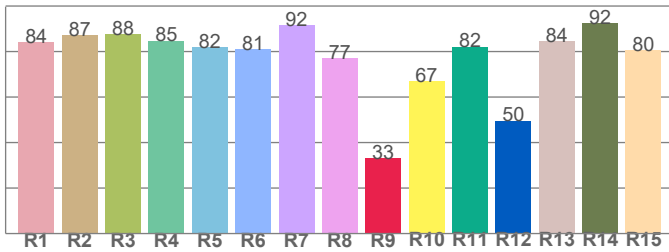
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



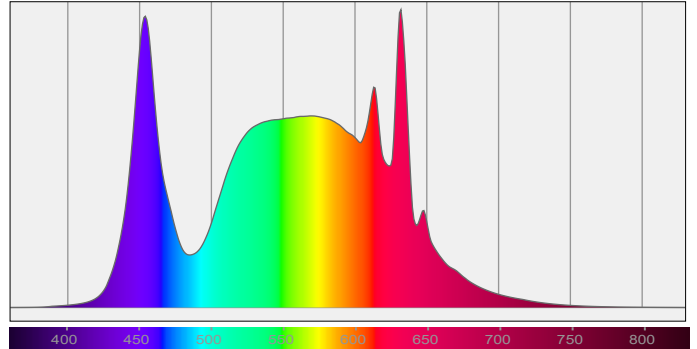
### Color Rendering Index per reference color (CIE 1995)



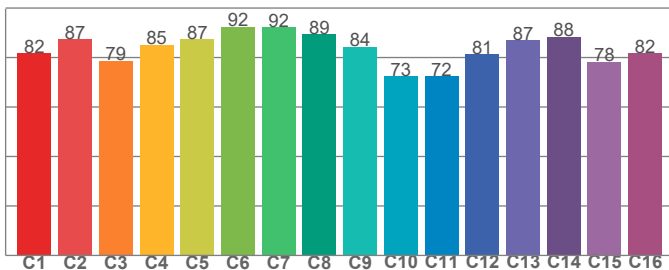
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84,0	87,1	87,6	84,7	81,9	81,0	91,6	77,1	33,2	66,9	82,0	49,7	84,4	92,5	80,5

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



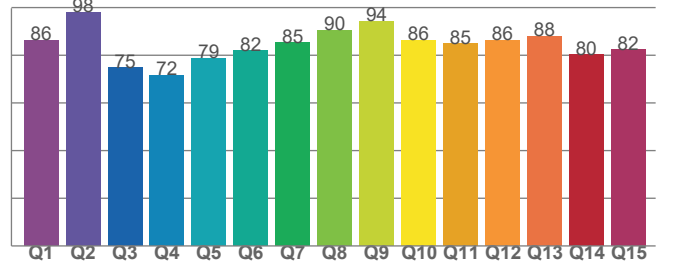
### TM30-18 R<sub>f</sub>-values per hue bin



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
81,8	87,5	78,8	85,1	87,4	92,5	92,3	89,4	84,3	72,5	72,5	81,4	87,1	88,4	78,3	81,7

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
86,3	98,1	74,8	71,5	78,9	81,8	85,2	90,4	94,3	86,3	84,8	86,4	87,9	80,3	82,3

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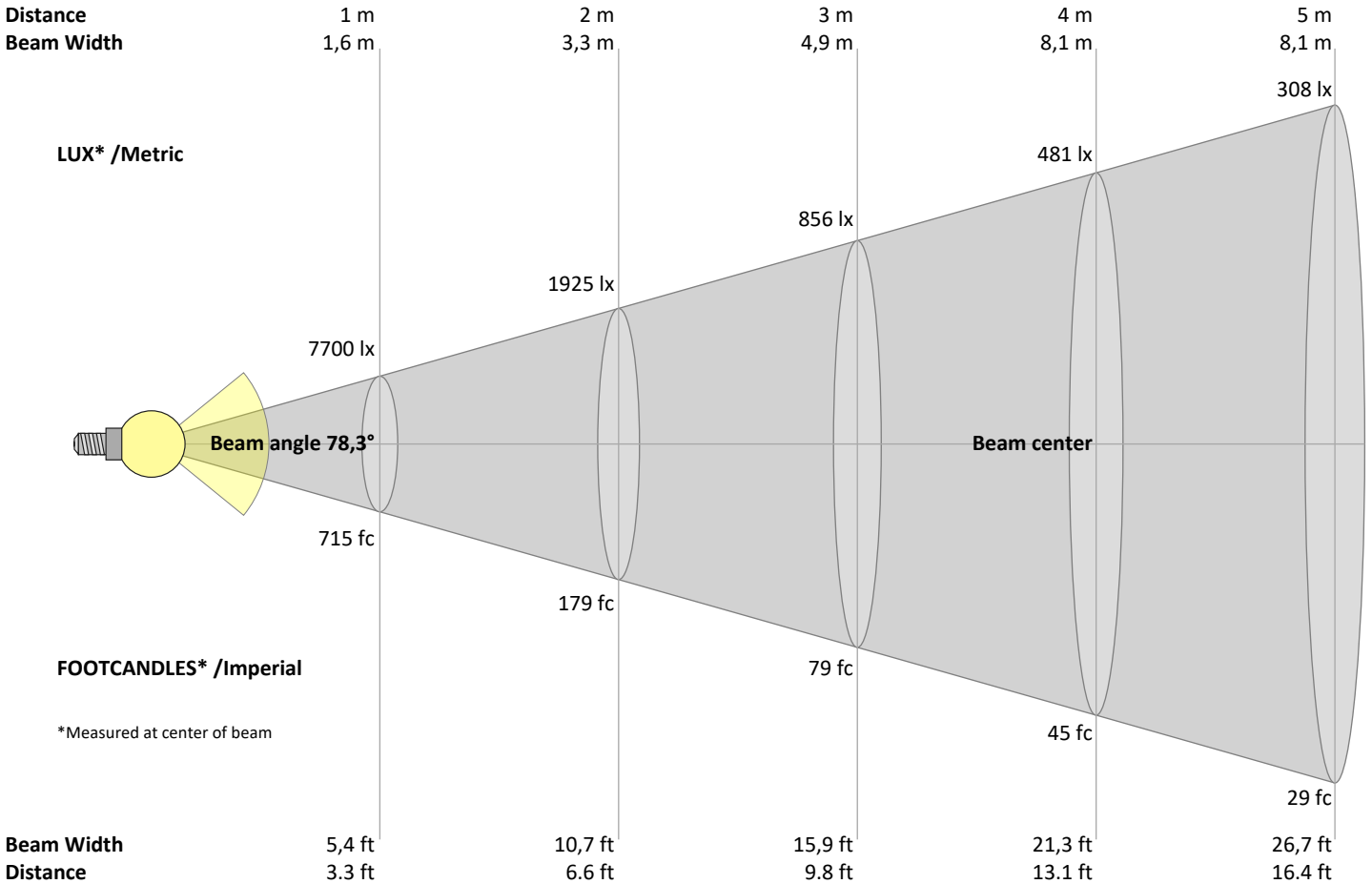
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## Beam Details



### 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
7700	1925	856	481	308	214	157	120	95	77	64	53	46	39	34	30	27	24	21	19	lux
715,3	178,8	79,5	44,7	28,6	19,9	14,6	11,2	8,8	7,2	5,9	5	4,2	3,6	3,2	2,8	2,5	2,2	2	1,8	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
7700	7684	7640	7559	7446	7300	7112	6863	6530	6050	5345	4385	3272	2222	1386	791	396	156	42	17	cd
100%	100%	99%	98%	97%	95%	92%	89%	85%	79%	69%	57%	43%	29%	18%	10%	5%	2%	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
7700	7650	7480	7117	6430	5297	3814	2463	1544	1031	775	615	488	385	299	230	155	66	18	10	cd
100%	99%	97%	92%	84%	69%	50%	32%	20%	13%	10%	8%	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
7700	7684	7640	7559	7446	7300	7112	6863	6530	6050	5345	4385	3272	2222	1386	791	396	156	42	17	cd
100%	100%	99%	98%	97%	95%	92%	89%	85%	79%	69%	57%	43%	29%	18%	10%	5%	2%	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
7700	7650	7480	7117	6430	5297	3814	2463	1544	1031	775	615	488	385	299	230	155	66	18	10	cd
100%	99%	97%	92%	84%	69%	50%	32%	20%	13%	10%	8%	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	28,4	29,4	28,6	29,6	29,9	20,2	21,2	20,4	21,5	21,7
	3H	29,2	30,2	29,6	30,5	30,7	20,9	21,9	21,3	22,2	22,4
	4H	29,4	30,4	29,9	30,7	31,0	21,3	22,3	21,7	22,5	22,8
	6H	29,6	30,5	30,0	30,8	31,2	21,7	22,6	22,1	22,9	23,3
	8H	29,7	30,5	30,0	30,8	31,2	21,9	22,7	22,2	23,0	23,4
	12H	29,6	30,4	30,0	30,8	31,2	22,0	22,8	22,3	23,1	23,6
4H	2H	28,1	29,1	28,5	29,4	29,6	20,7	21,7	21,1	22,0	22,3
	3H	29,1	29,9	29,5	30,3	30,7	21,6	22,4	22,0	22,8	23,2
	4H	29,4	30,1	29,8	30,5	31,1	22,0	22,8	22,5	23,2	23,8
	6H	29,6	30,3	30,1	30,7	31,0	22,5	23,3	23,0	23,6	24,0
	8H	29,6	30,3	30,1	30,7	31,0	22,7	23,4	23,2	23,8	24,1
	12H	29,6	30,2	30,1	30,6	31,1	22,8	23,4	23,4	23,8	24,3
8H	4H	29,3	29,9	29,8	30,3	30,7	22,3	22,9	22,8	23,3	23,7
	6H	29,5	30,0	30,1	30,5	31,0	22,9	23,4	23,4	23,8	24,4
	8H	29,6	30,0	30,2	30,6	31,2	23,2	23,6	23,7	24,1	24,7
	12H	29,7	30,0	30,3	30,5	31,1	23,3	23,7	23,9	24,2	24,8
12H	4H	29,2	29,8	29,7	30,2	30,7	22,3	22,8	22,8	23,2	23,7
	6H	29,5	29,9	30,1	30,5	31,1	23,0	23,4	23,5	23,9	24,5
	8H	29,6	29,9	30,2	30,5	31,1	23,2	23,6	23,8	24,1	24,7

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

S = 1.0H	0,6 / -0,8	0,8 / -0,7
S = 1.5H	2,0 / -2,3	1,6 / -0,9
S = 2.0H	3,3 / -3,6	2,2 / -1,4

## 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	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	86	83	87	84	81	84	81	79	77
3	95	87	80	75	93	85	79	74	82	77	73	79	75	71	77	73	70	68
4	89	79	71	66	87	77	70	65	75	69	64	73	67	63	70	66	62	60
5	83	72	64	58	81	71	63	58	68	62	57	67	61	57	65	60	56	54
6	77	66	58	52	75	65	57	52	63	56	52	61	56	51	60	55	51	49
7	72	60	53	47	71	60	52	47	58	52	47	57	51	46	55	50	46	44
8	68	56	48	43	66	55	48	43	54	47	43	53	47	42	51	46	42	40
9	64	52	44	40	62	51	44	39	50	44	39	49	43	39	48	43	39	37
10	60	48	41	36	59	48	41	36	47	40	36	46	40	36	45	40	36	34

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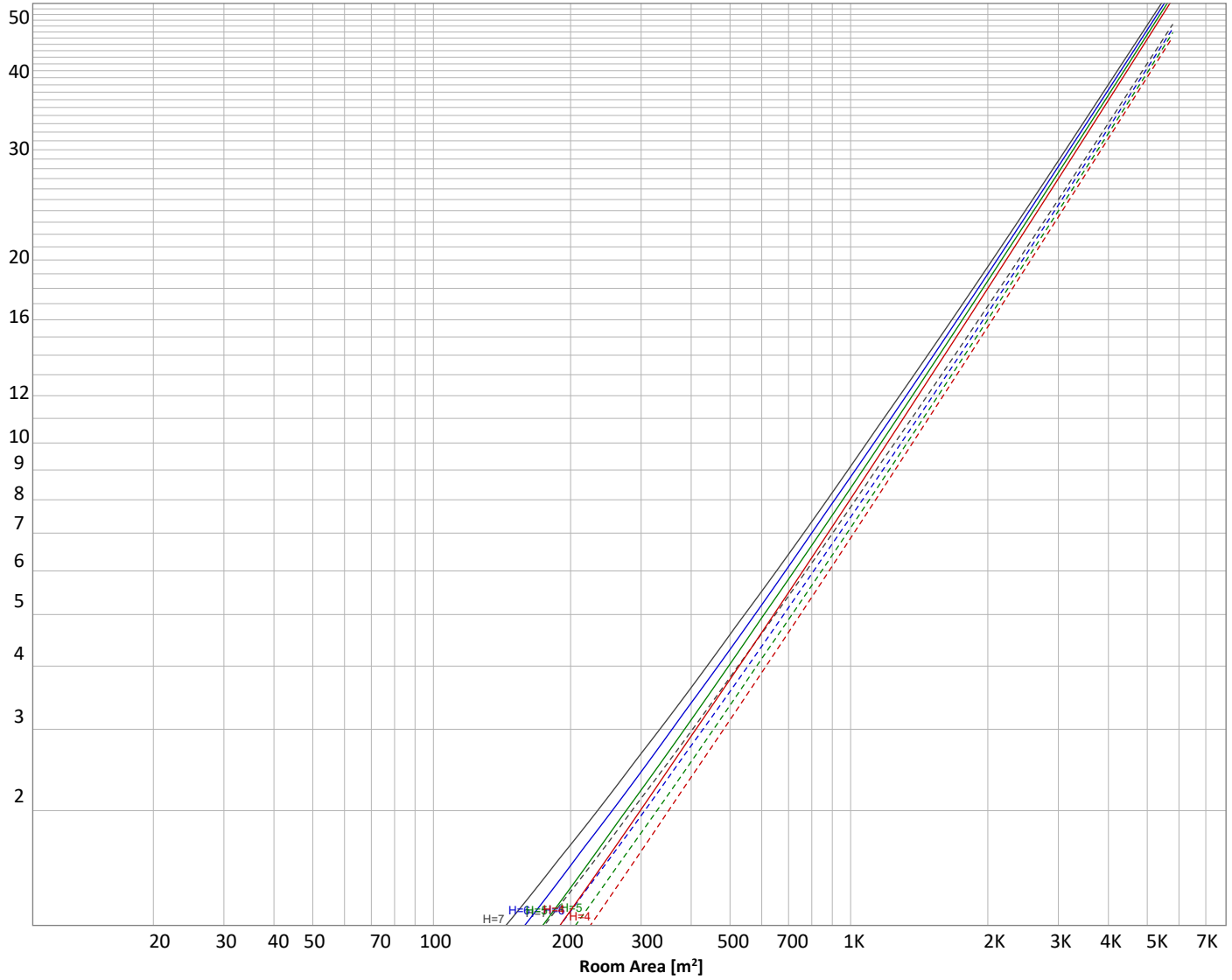
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 13222 lm			
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%)
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	Wall reflectance
E <sub>work</sub> = Average lux on work area =	100 lx	—————	50	30
				Floor reflectance
				20

### Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
729 lm	2071 lm	2900 lm	2756 lm	2048 lm	1340 lm	768 lm	369 lm	105 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
16,8 lm	17,0 lm	18,6 lm	19,4 lm	19,1 lm	17,3 lm	13,8 lm	8,97 lm	3,14 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	729 lm	5,5%
10-20°	2071 lm	15,7%
20-30°	2900 lm	21,9%
30-40°	2756 lm	20,8%
40-50°	2048 lm	15,5%
50-60°	1340 lm	10,1%
60-70°	768 lm	5,8%
70-80°	369 lm	2,8%
80-90°	105 lm	0,8%
90-100°	17 lm	0,1%
100-110°	17 lm	0,1%
110-120°	19 lm	0,1%
120-130°	19 lm	0,1%
130-140°	19 lm	0,1%
140-150°	17 lm	0,1%
150-160°	14 lm	0,1%
160-170°	9 lm	0,1%
170-180°	3 lm	0,0%
<b>Total</b>	<b>13222 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	7709 cd
Intensity, 90°	42 cd
Intensity, 0°	7700 cd

### Zonal Lumen summary

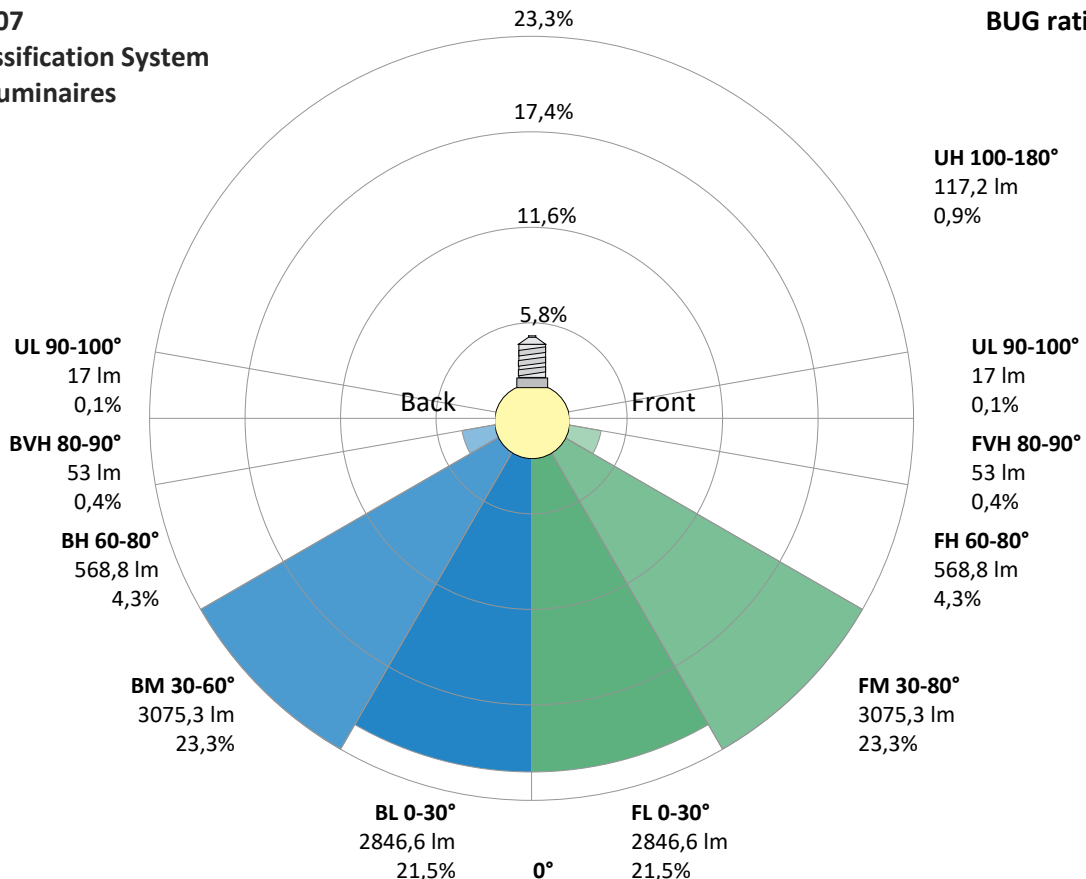
Zone (γ)	Lumen	% Total
0-30°	5700 lm	43,1%
0-40°	8456 lm	64,0%
0-60°	11845 lm	89,6%
60-90°	1242 lm	9,4%
70-100°	491 lm	3,7%
90-120°	52 lm	0,4%
0-90°	13088 lm	99,0%
90-180°	134 lm	1,0%
0-180°	13222 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	2847 lm	21,5%
Medium(30-60°)	3075 lm	23,3%
High(60-80°)	569 lm	4,3%
Very high(80-90°)	53 lm	0,4%
<b>Back light</b>		
Low(0-30°)	2847 lm	21,5%
Medium(30-60°)	3075 lm	23,3%
High(60-80°)	569 lm	4,3%
Very high(80-90°)	53 lm	0,4%
<b>Uplight</b>		
Low(90-100°)	17 lm	0,1%
High(100-180°)	117 lm	0,9%

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

**BUG rating B4 U3 G1**



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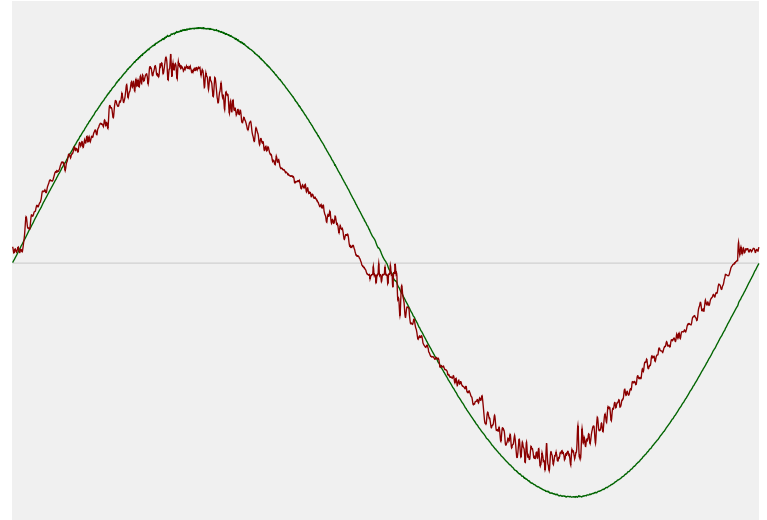


## Power Details

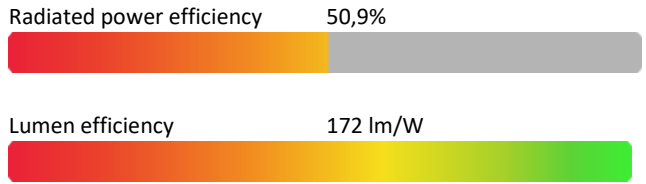
### Input Power

Power feed to light source	76,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,341 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	78,51 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,98
Total harmonic distortion of the current	9,53%
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	4500 K
CCT shift	+0 K
CCT end	4500 K

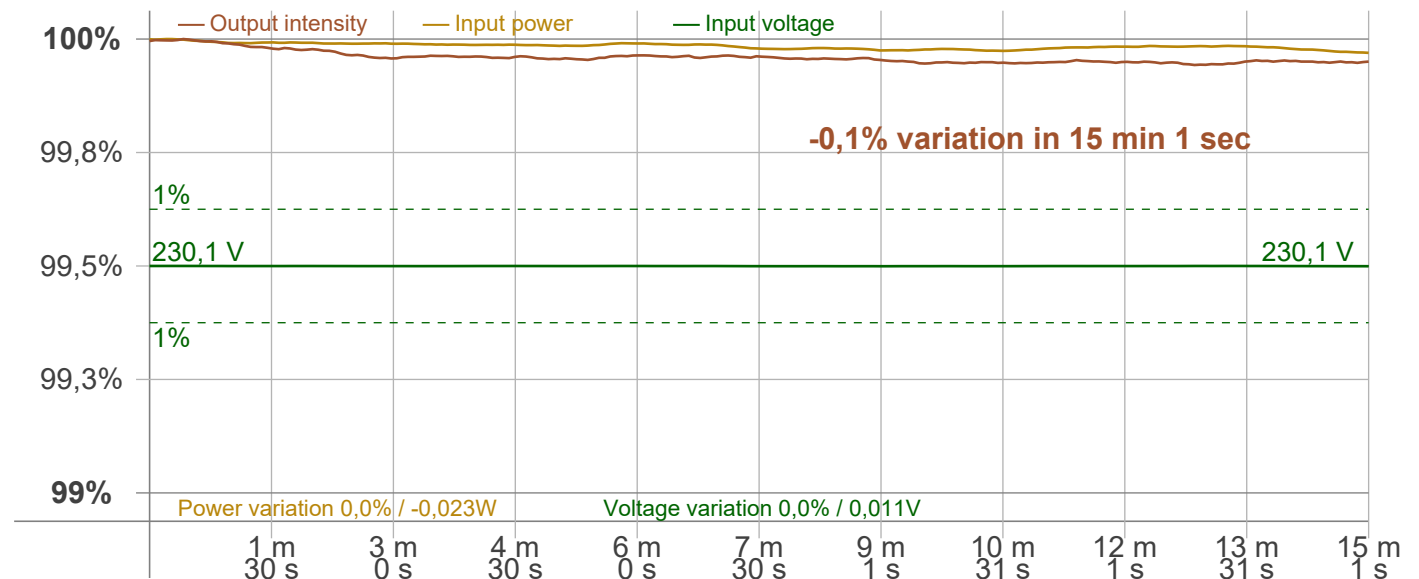
### Warmup Result

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

### Output Change

Output start	13227 lm
Output change	-6 lm
Output end	13222 lm

### Stabilization Curve



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Measurement tracking No. and Link: [VT250905-003263](#)

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 100,5 Hz  
 Percent Flicker 0,19 %  
 Flicker index 0

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

JA8/10 40 Hz 0,01 %  
 JA8/10 90 Hz 0,02 %  
 JA8/10 200 Hz 0,16 %  
 JA8/10 400 Hz 0,16 %  
 JA8/10 1000 Hz 0,17 %

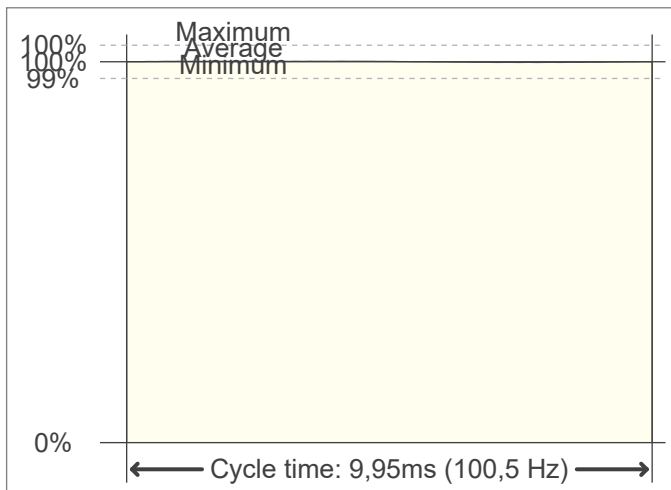
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,01  
 SVM value (80 < F < 2000 Hz) 0,01

### 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

