

# Light Measurement Report

Print date: 25-4-2025

Measurement date and time: 25-4-2025 10:12:41 – Measurement no. VFR-250425-0922-MS

Measurement tracking No. and Link: [VT250425-009584](#)

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

12 planes – 30°  
5°  
12,10 m  
41,3 W – PF 0,97 – DPF 0,98  
230 V – 0,184 A  
50 Hz  
Lamp stabilized in 15 min 0 sec – 2,0%

## Tested Light Source

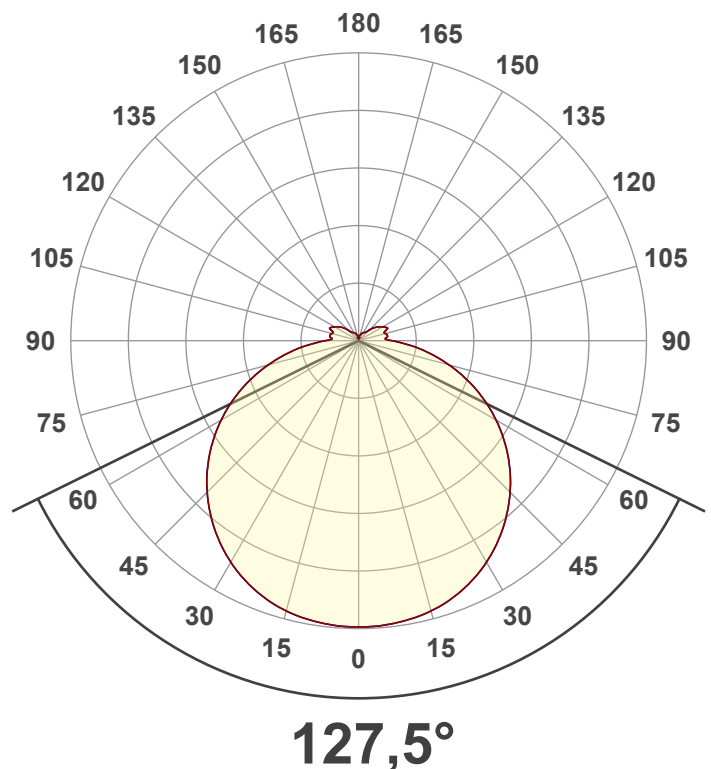
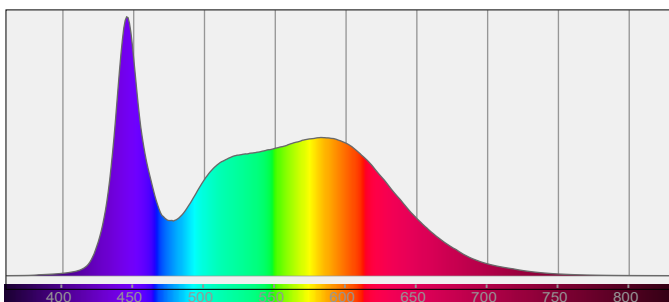
Product Name  
Item No. and Manufacturer  
Product Description (line 1)  
SWITCH

810306-5000K  
810306-5000K – Dutchfulfillment  
LED FRAME PANEEL | EDGE LIT | 120x30 | 40W | UGR<23 | ZWART | CCT

## 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

3626 lm – 12,01% / 87,99%  
88 lm/W  
914 cd – 127,5°  
CCT = 5000 K / 5541 K  
CRI 83,3  
 $R_f$  82,9 –  $R_g$  98,8  
Duv -0,0008 – SDCM 7,6  
SVM 0,01 – PstLM 0,01



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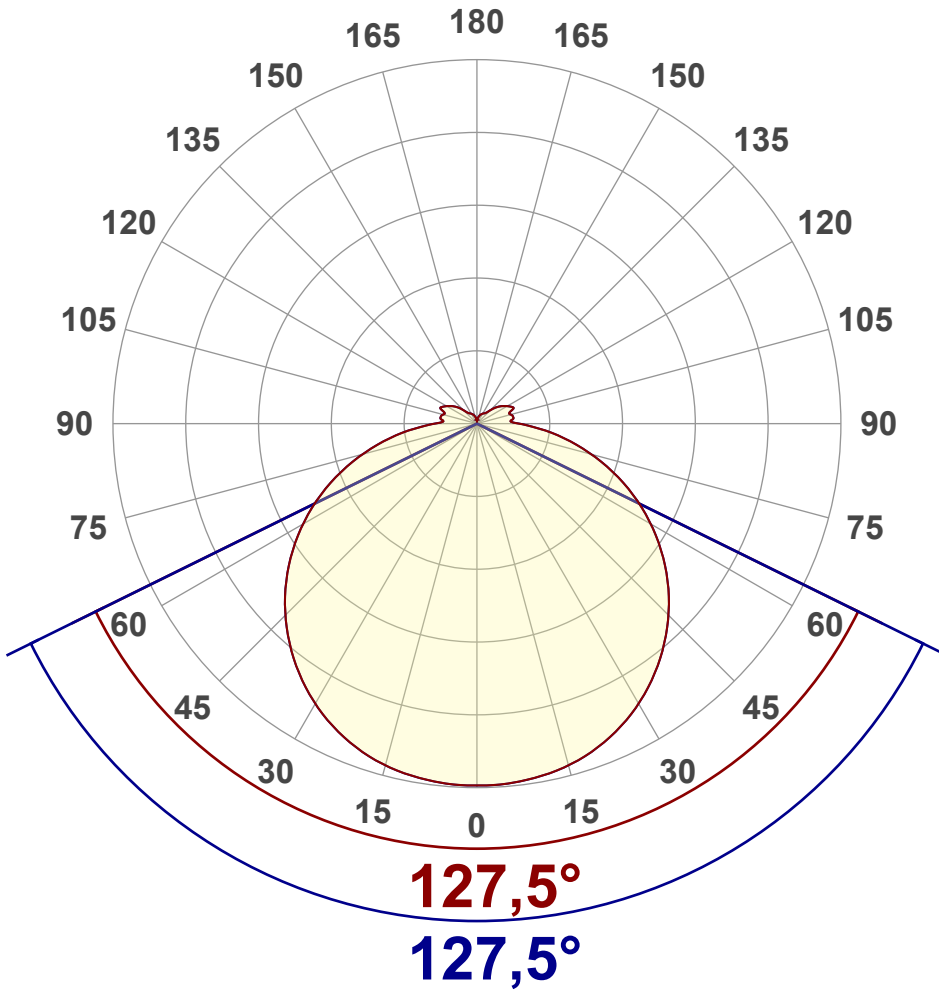
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Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	3626 lm
Lumen Up% / Down%	12,01% / 87,99%
Peak Intensity	914 cd
Beam Angle (50%)	127,5°
Beam Angle (90%)	127,5°
Beam Angle (10%)	127,5°

## Cut-off Angle

Average 2,5%	319,5°
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## Field Angle

Average 10%	237,1°
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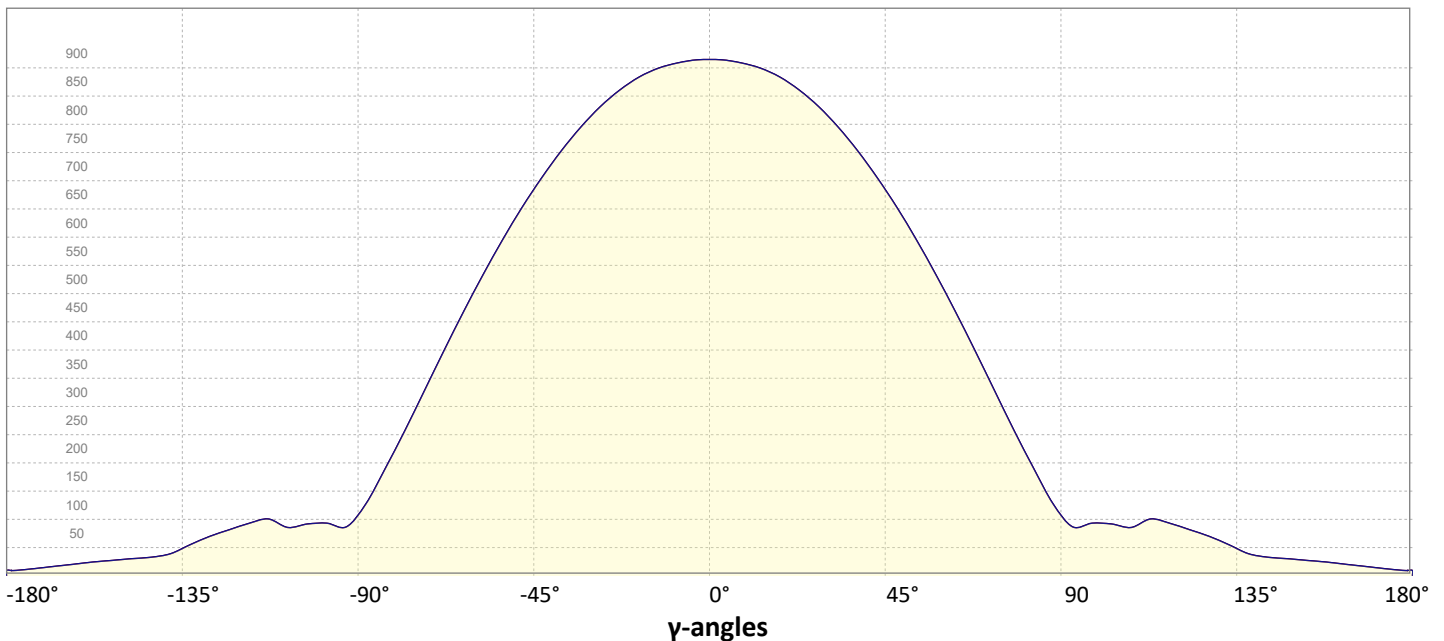
## Intensity Ratio

In 120° cone	62,3%
In 90° cone	40,9%

**C000-C180**

**C090-C270**

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



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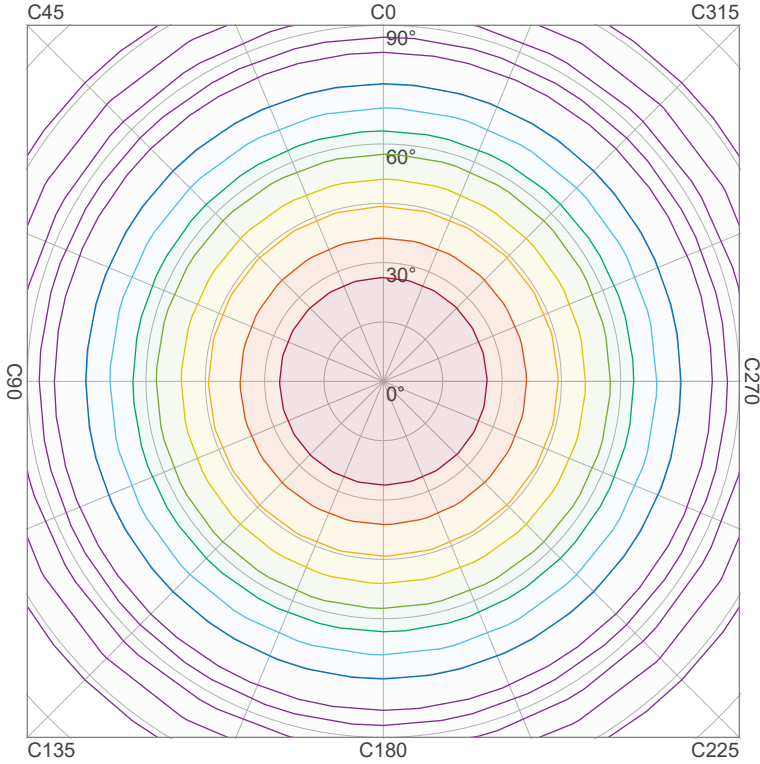
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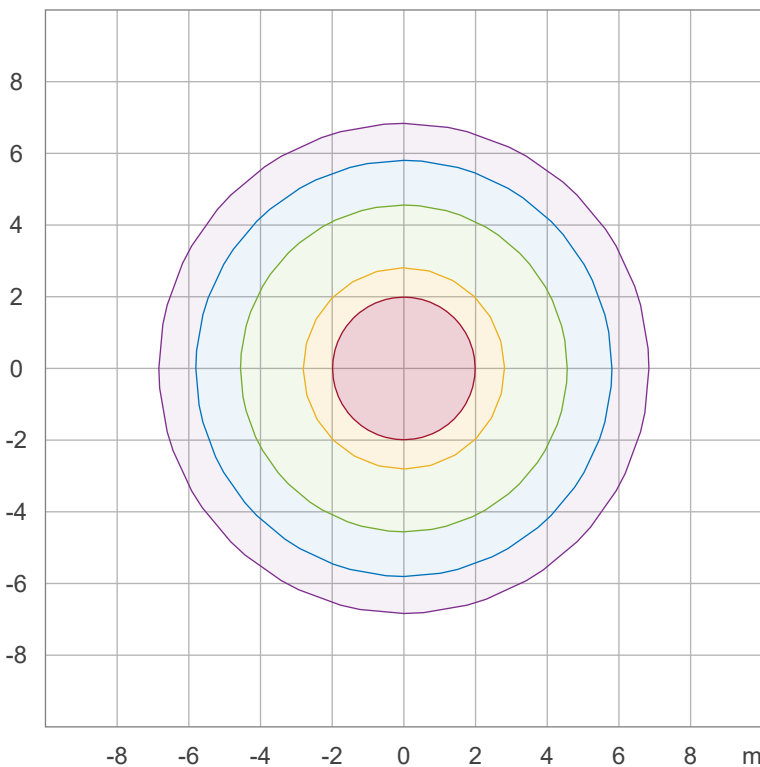
## Iso-intensity Diagram (Iso-candela)



90 %	822,8 cd
80 %	731,4 cd
70 %	640,0 cd
60 %	548,6 cd
50 %	457,1 cd
40 %	365,7 cd
30 %	274,3 cd
20 %	182,9 cd
10 %	91,4 cd

Peak intensity: 914,3 cd  
Number of c-planes: 12

## Iso-illuminance Diagram (Iso-lux)



50,0 %	50,8 lx
30,0 %	30,5 lx
10,0 %	10,2 lx
5,0 %	5,1 lx
3,0 %	3,0 lx

Peak illuminance: 101,6 lx  
Mounting height: 3,0 m  
Number of c-planes: 12

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## Color details

Correlated Color Temperature, Target CCT = 5000 K  
 Correlated Color Temperature, Measured CCT = 5541 K  
 Color Rendering Index CRI 83,3  
 Color Rendering Index, R9 (red component) R9 = 8,2  
 Color Rendering TM30-18 R<sub>f</sub> 82,9 – R<sub>g</sub> 98,8  
 Color Quality Scale CQS = 80,9

MacAdam Steps  
 Color coordinates CIE 1931 (x;y) = (0,345;0,352)  
 Color coordinate CIEs 1960 (u;v) = (0,211;0,323)  
 Color deviation from BBL Duv = -0,0008  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,211;0,485)

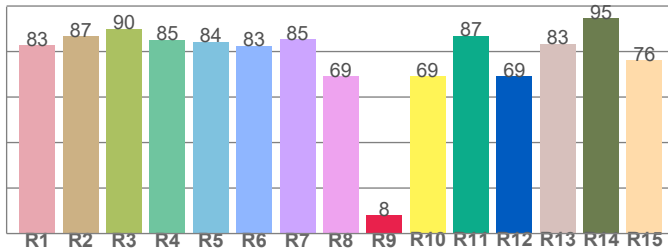
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



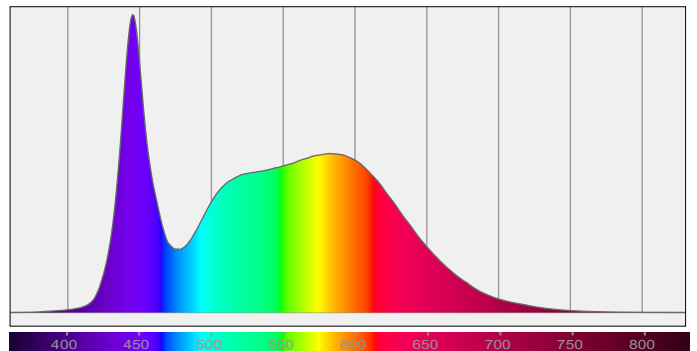
### Color Rendering Index per reference color (CIE 1995)



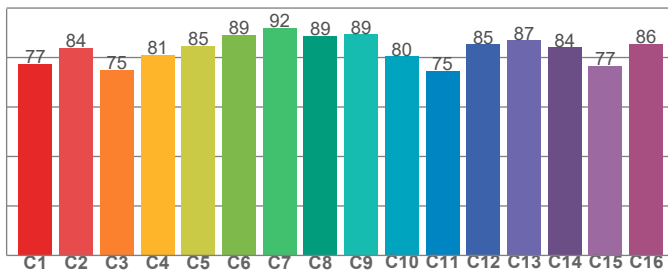
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
82,8	86,7	90,0	85,2	84,4	82,6	85,4	69,2	8,2	69,1	86,8	69,0	83,4	94,6	76,2

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



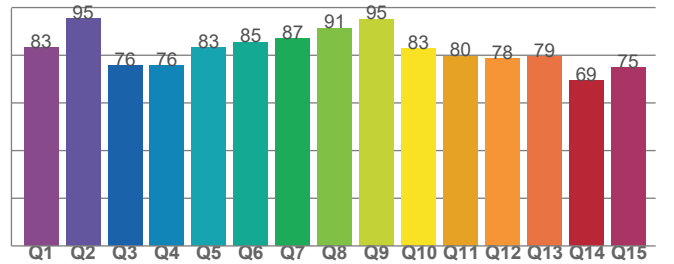
### TM30-18 R<sub>f</sub>-values per hue bin



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
77,4	83,9	75,0	81,1	84,7	89,2	92,1	88,8	89,4	80,4	74,6	85,4	87,0	84,2	76,7	85,6

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
83,2	95,3	75,6	75,6	83,1	85,5	86,9	91,2	95,1	82,8	79,6	78,5	79,3	69,3	74,8

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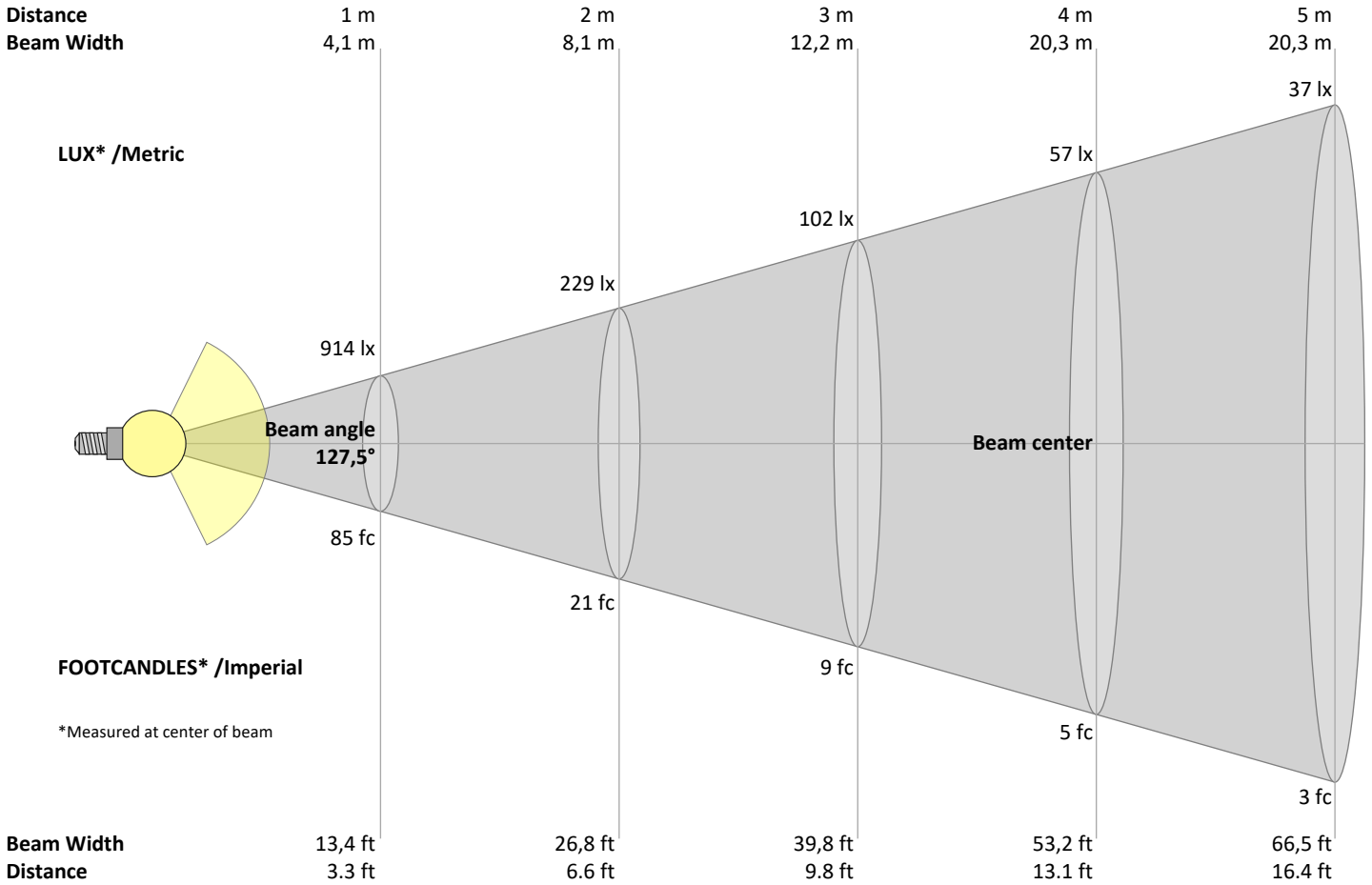
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Operator:



## 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
914	229	102	57	37	25	19	14	11	9	8	6	5	5	4	4	3	3	3	2	lux
84,9	21,2	9,4	5,3	3,4	2,4	1,7	1,3	1	0,8	0,7	0,6	0,5	0,4	0,4	0,3	0,3	0,3	0,2	0,2	fc

### Intensities in 0° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
914	907	884	837	769	684	583	468	342	217	111	93	86	94	74	49	32	27	21	14	cd
100%	99%	97%	92%	84%	75%	64%	51%	37%	24%	12%	10%	9%	10%	8%	5%	4%	3%	2%	2%	of 0°val

### Intensities in 90° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
914	907	884	837	769	684	583	468	342	217	111	93	86	94	74	49	32	27	21	14	cd
100%	99%	97%	92%	84%	75%	64%	51%	37%	24%	12%	10%	9%	10%	8%	5%	4%	3%	2%	2%	of 0°val

### Intensities in 180° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
914	907	884	837	769	684	583	468	342	217	111	93	86	94	74	49	32	27	21	14	cd
100%	99%	97%	92%	84%	75%	64%	51%	37%	24%	12%	10%	9%	10%	8%	5%	4%	3%	2%	2%	of 0°val

### Intensities in 270° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
914	907	884	837	769	684	583	468	342	217	111	93	86	94	74	49	32	27	21	14	cd
100%	99%	97%	92%	84%	75%	64%	51%	37%	24%	12%	10%	9%	10%	8%	5%	4%	3%	2%	2%	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	15,7	16,9	16,2	17,4	17,9	15,8	17,0	16,2	17,5	17,9
	3H	17,7	18,8	18,2	19,3	19,8	17,7	18,9	18,3	19,4	19,9
	4H	18,6	19,7	19,2	20,2	20,7	18,7	19,8	19,3	20,3	20,8
	6H	19,6	20,6	20,1	21,1	21,7	19,7	20,7	20,2	21,2	21,8
	8H	20,0	21,0	20,5	21,5	22,1	20,1	21,1	20,7	21,6	22,3
	12H	20,4	21,4	21,0	21,9	22,6	20,6	21,6	21,1	22,1	22,7
4H	2H	16,5	17,6	17,0	18,1	18,6	16,5	17,6	17,1	18,1	18,6
	3H	18,7	19,7	19,2	20,2	20,8	18,7	19,7	19,3	20,2	20,9
	4H	19,7	20,7	20,3	21,2	21,9	19,8	20,8	20,4	21,3	22,0
	6H	20,8	21,6	21,4	22,2	22,8	20,9	21,7	21,5	22,3	22,9
	8H	21,3	22,1	22,0	22,6	23,2	21,4	22,2	22,1	22,8	23,4
	12H	21,8	22,5	22,5	23,1	23,8	22,0	22,6	22,6	23,3	23,9
8H	4H	20,2	20,9	20,8	21,5	22,1	20,2	21,0	20,9	21,6	22,2
	6H	21,5	22,1	22,1	22,7	23,4	21,6	22,1	22,2	22,8	23,5
	8H	22,2	22,7	22,8	23,4	24,2	22,3	22,8	22,9	23,5	24,3
	12H	22,8	23,3	23,6	24,0	24,7	23,0	23,5	23,7	24,1	24,9
12H	4H	20,2	20,9	20,9	21,5	22,2	20,3	20,9	20,9	21,5	22,2
	6H	21,6	22,2	22,3	22,9	23,7	21,7	22,2	22,4	22,9	23,8
	8H	22,4	22,8	23,1	23,5	24,3	22,5	22,9	23,2	23,6	24,4

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

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

## 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	116	116	116	116	112	112	112	112	104	104	104	97	97	97	91	91	91	88
1	104	99	94	89	100	95	91	87	89	85	82	83	80	77	77	75	73	70
2	94	85	77	71	90	82	75	69	76	71	66	71	67	62	66	63	59	56
3	85	74	65	58	81	71	63	57	67	60	54	62	56	52	58	53	49	47
4	78	65	56	49	74	63	54	48	59	51	46	55	49	44	51	46	42	39
5	71	58	48	41	68	56	47	41	52	45	39	49	43	38	46	40	36	34
6	65	52	42	36	63	50	41	35	47	39	34	44	38	33	42	36	31	29
7	61	47	38	31	58	45	37	31	43	35	30	40	34	29	38	32	28	25
8	56	42	34	28	54	41	33	27	39	32	26	37	30	26	35	29	25	23
9	52	39	30	25	50	38	30	24	36	29	24	34	27	23	32	26	22	20
10	49	36	28	22	47	35	27	22	33	26	21	31	25	21	30	24	20	18

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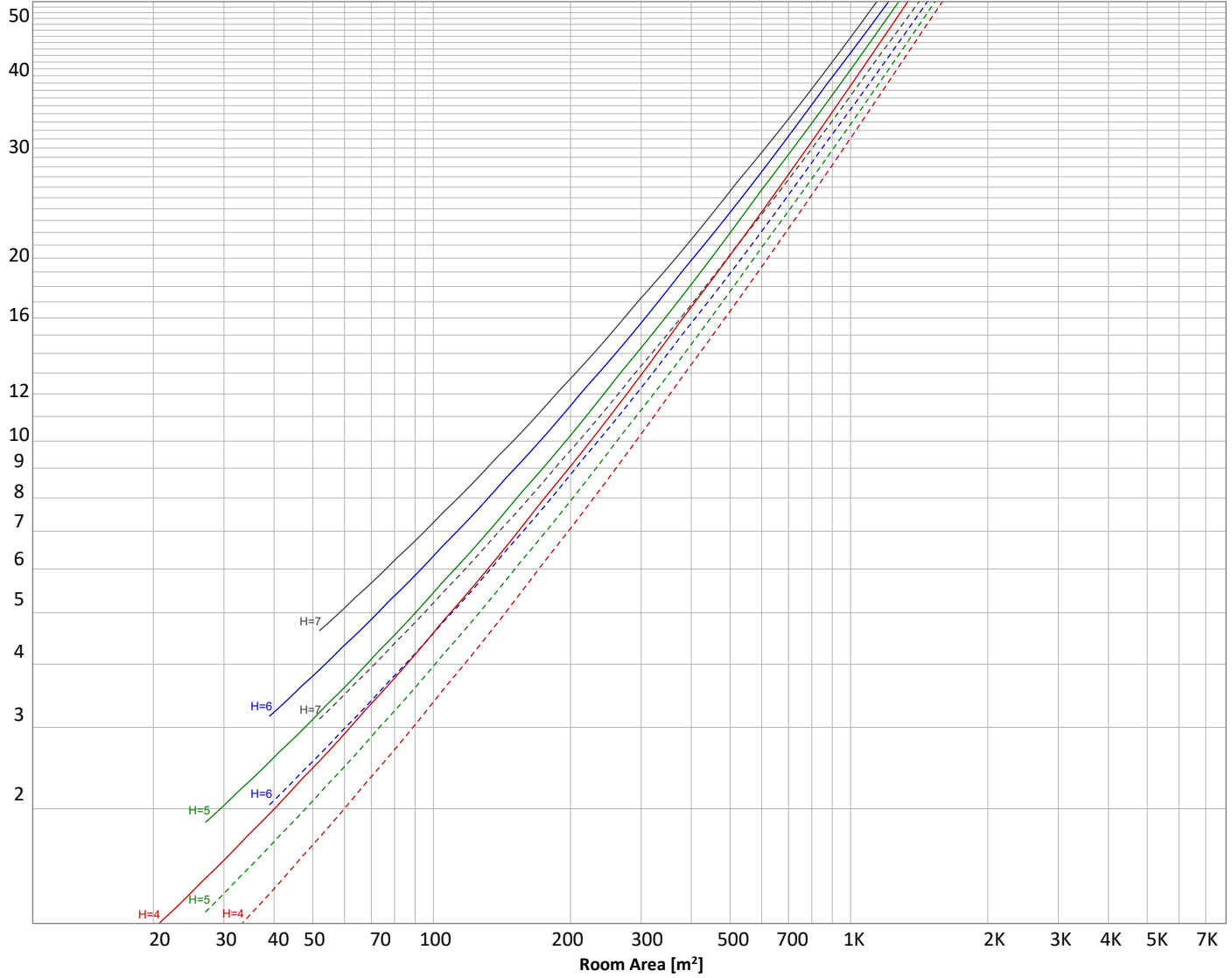
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 3626 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°
86,9 lm	253 lm	392 lm	487 lm	528 lm	511 lm	436 lm	317 lm	180 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
99,9 lm	94,2 lm	95,7 lm	69,0 lm	37,9 lm	20,1 lm	12,1 lm	5,42 lm	1,16 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	87 lm	2,4%
10-20°	253 lm	7,0%
20-30°	392 lm	10,8%
30-40°	487 lm	13,4%
40-50°	528 lm	14,6%
50-60°	511 lm	14,1%
60-70°	436 lm	12,0%
70-80°	317 lm	8,7%
80-90°	180 lm	5,0%
90-100°	100 lm	2,8%
100-110°	94 lm	2,6%
110-120°	96 lm	2,6%
120-130°	69 lm	1,9%
130-140°	38 lm	1,0%
140-150°	20 lm	0,6%
150-160°	12 lm	0,3%
160-170°	5 lm	0,1%
170-180°	1 lm	0,0%
<b>Total</b>	<b>3626 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	914 cd
Intensity, 90°	111 cd
Intensity, 0°	914 cd

### Zonal Lumen summary

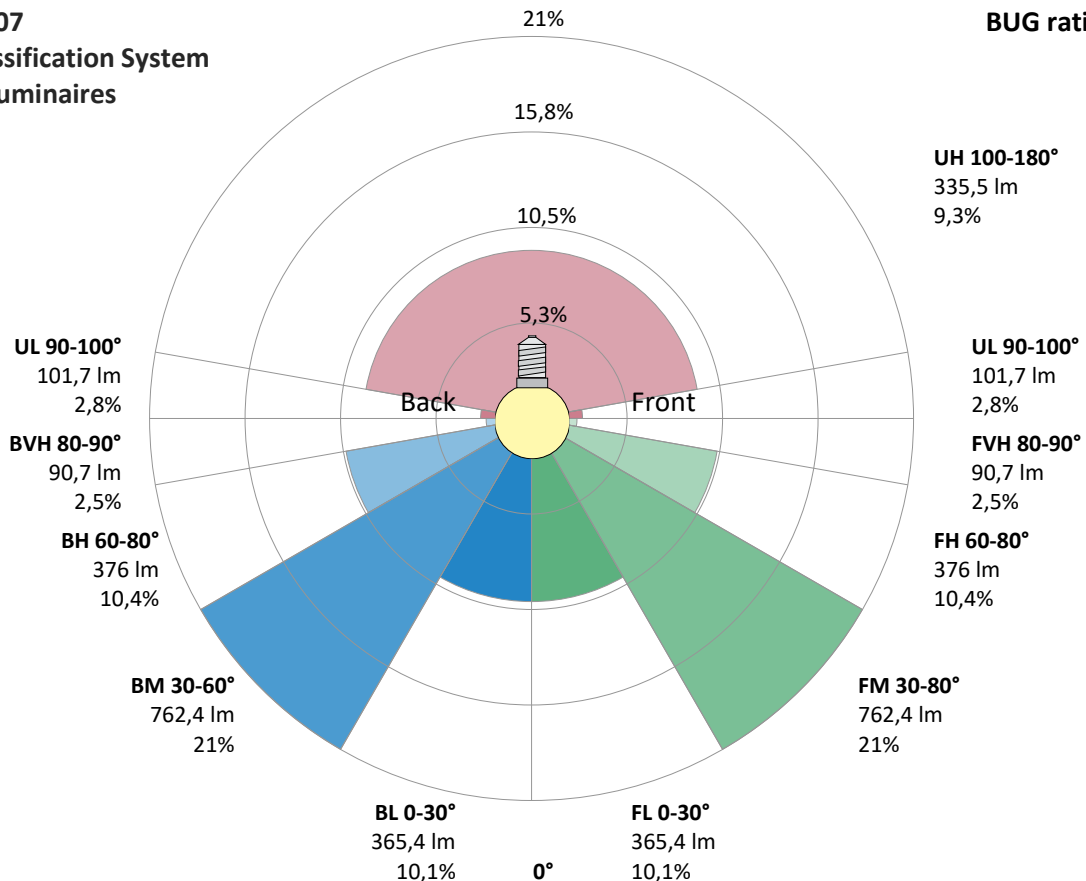
Zone (γ)	Lumen	% Total
0-30°	732 lm	20,2%
0-40°	1219 lm	33,6%
0-60°	2258 lm	62,3%
60-90°	933 lm	25,7%
70-100°	597 lm	16,5%
90-120°	290 lm	8,0%
0-90°	3191 lm	88,0%
90-180°	436 lm	12,0%
0-180°	3626 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	365 lm	10,1%
Medium(30-60°)	762 lm	21,0%
High(60-80°)	376 lm	10,4%
Very high(80-90°)	91 lm	2,5%
<b>Back light</b>		
Low(0-30°)	365 lm	10,1%
Medium(30-60°)	762 lm	21,0%
High(60-80°)	376 lm	10,4%
Very high(80-90°)	91 lm	2,5%
<b>Uplight</b>		
Low(90-100°)	102 lm	2,8%
High(100-180°)	336 lm	9,3%

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

**BUG rating B1 U3 G1**



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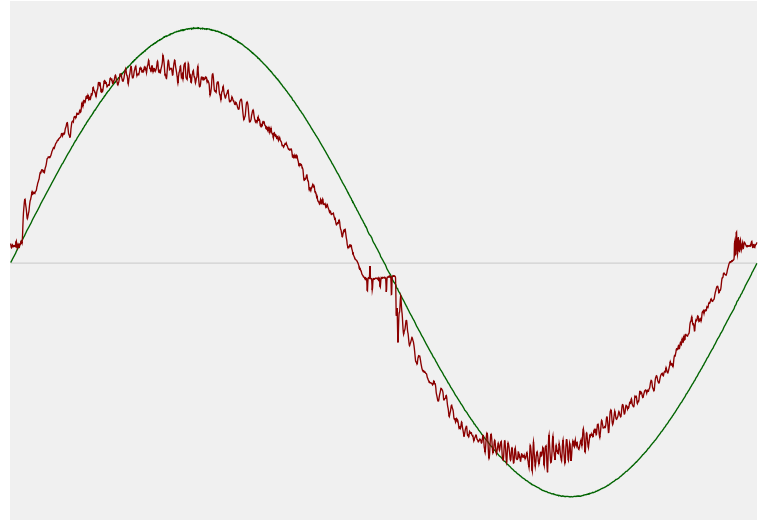


## Power Details

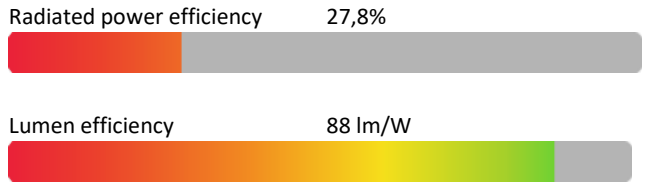
### Input Power

Power feed to light source	41,3 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,184 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	42,38 VA
Displacement factor of AC power feed	0,98
Power factor of AC current feed	0,97
Total harmonic distortion of the current	6,78%
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	5002 K
CCT shift	-2 K
CCT end	5000 K

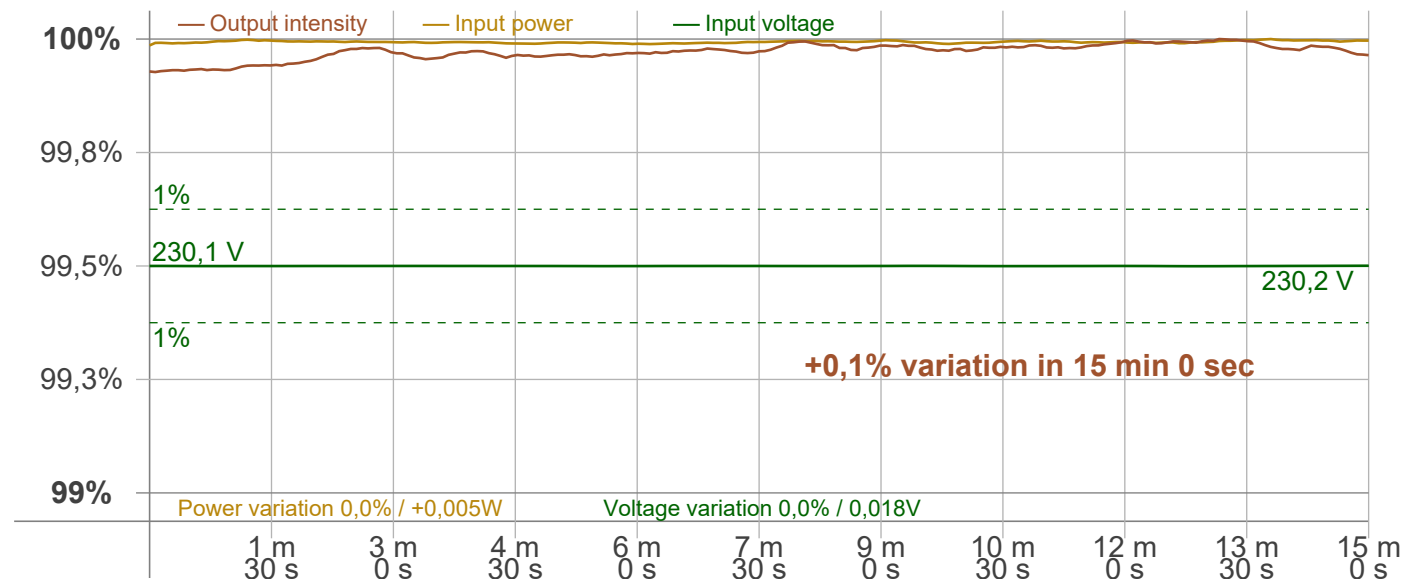
### Warmup Result

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

### Output Change

Output start	3624 lm
Output change	+2 lm
Output end	3626 lm

### Stabilization Curve



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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 101,01 Hz  
 Percent Flicker 0,24 %  
 Flicker index 0

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

JA8/10 40 Hz 0,02 %  
 JA8/10 90 Hz 0,03 %  
 JA8/10 200 Hz 0,2 %  
 JA8/10 400 Hz 0,2 %  
 JA8/10 1000 Hz 0,22 %

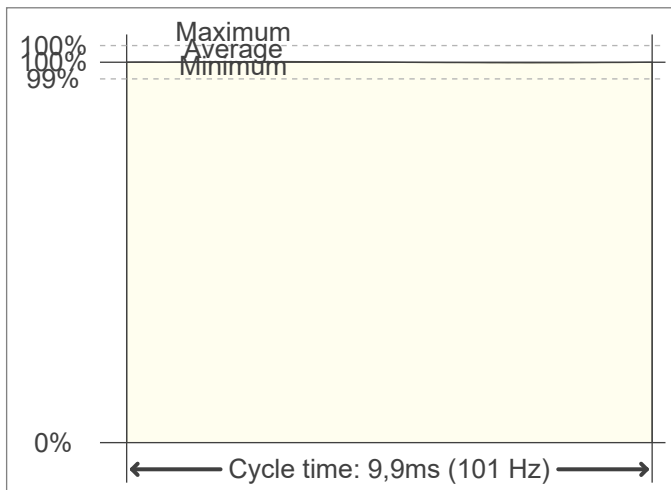
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

