

# Light Measurement Report

Print date: 13-6-2025

Measurement date and time: 13-6-2025 10:11:10 – Measurement no. VFR-250613-1551-MS

Measurement tracking No. and Link: [VT250613-000234](#)

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

20 planes – 18°  
5°  
12,10 m  
20,7 W – PF 0,96 – DPF 1,0  
230 V – 0,094 A  
50 Hz  
Lamp stabilized in 15 min 3 sec – 2,0%

## Tested Light Source

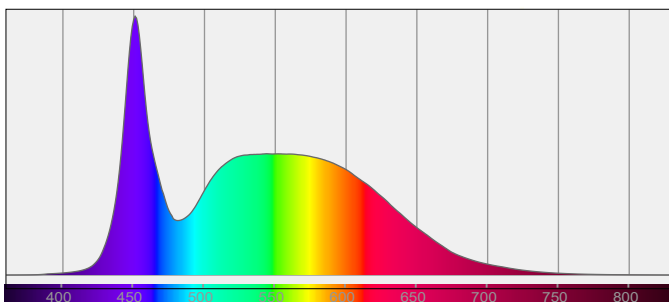
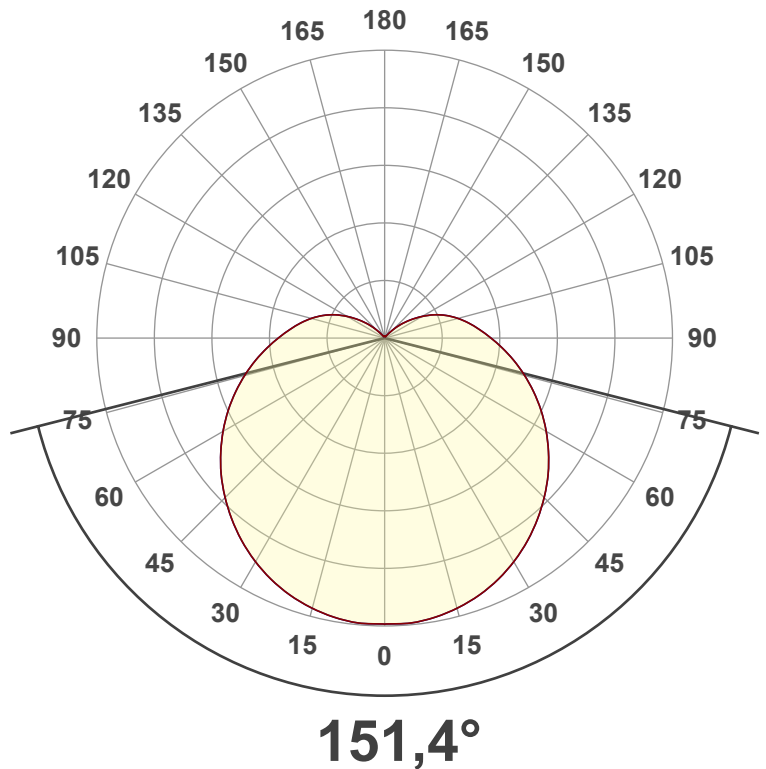
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

805098-6500K  
805098-6500K – Dutchfulfillment  
LED T5 BUIS | 145CM | 20W

## 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

3025 lm – 19,11% / 80,89%  
146 lm/W  
587 cd – 151,4°  
CCT = 6500 K / 6315 K  
CRI 81,9  
 $R_f$  82,8 –  $R_g$  94,4  
Duv 0,0066 – SDCM 8,9  
SVM 3,28 – PstLM 0,1



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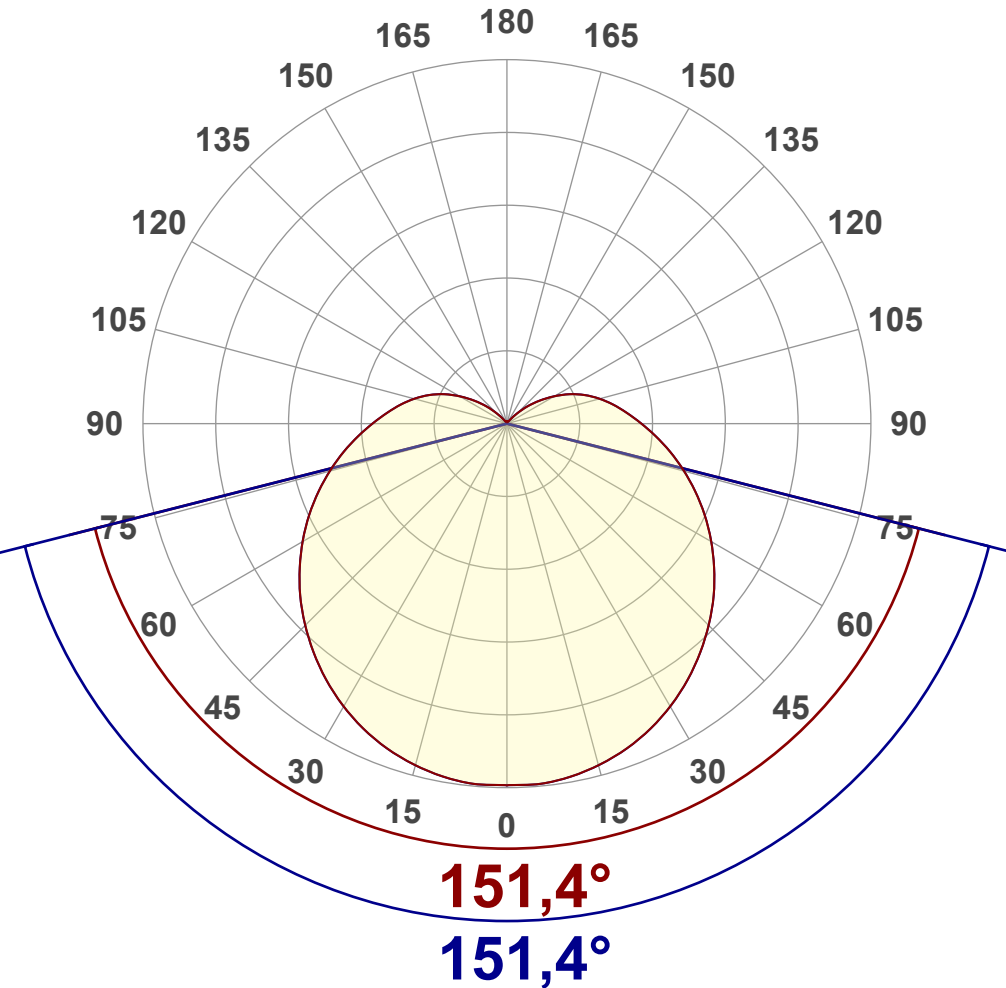
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	3025 lm
Lumen Up% / Down%	19,11% / 80,89%
Peak Intensity	587 cd
Beam Angle (50%)	151,4°
Beam Angle (90%)	151,4°
Beam Angle (10%)	151,4°

## Cut-off Angle

Average 2,5%	276,6°
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## Field Angle

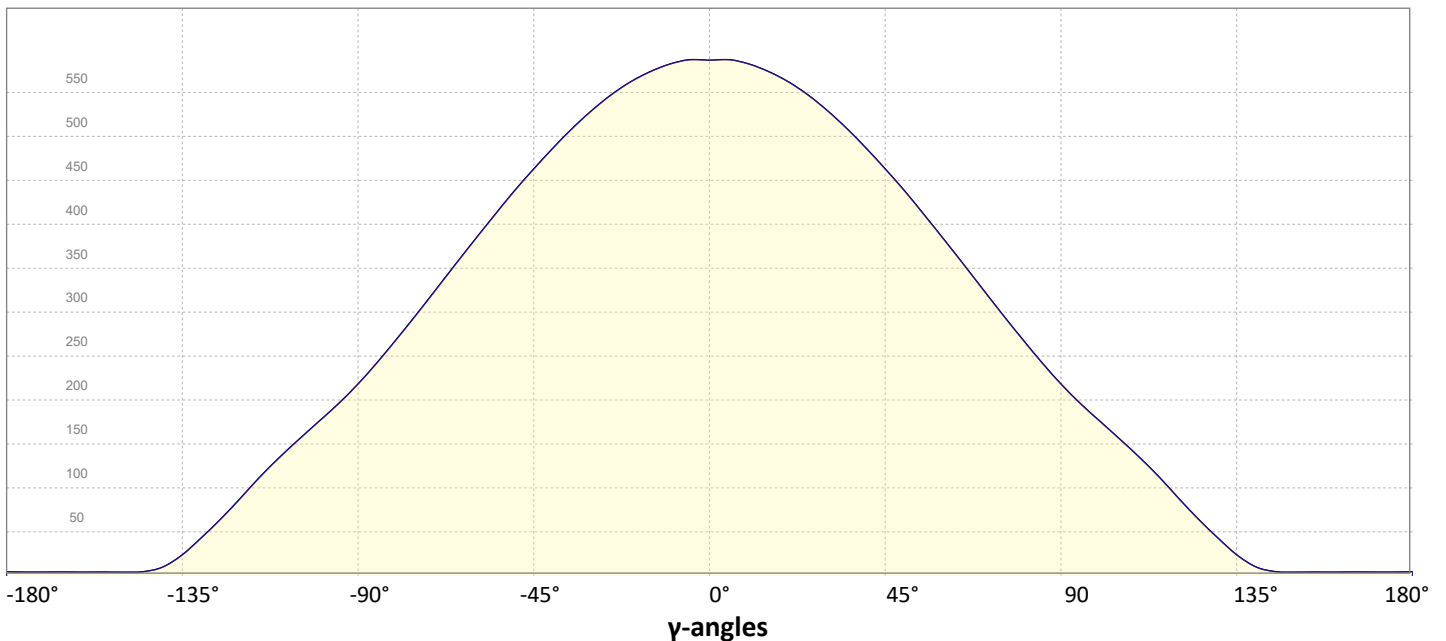
Average 10%	253,1°
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## Intensity Ratio

In 120° cone	50,1%
In 90° cone	31,9%

**C000-C180**  
**C090-C270**

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



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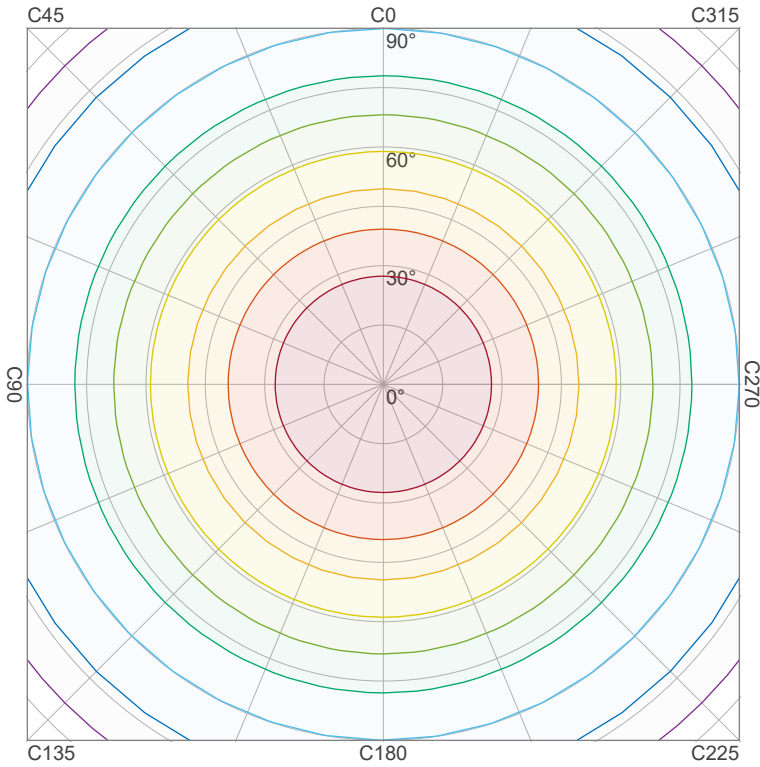
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Operator:



## Iso-intensity Diagram (Iso-candela)

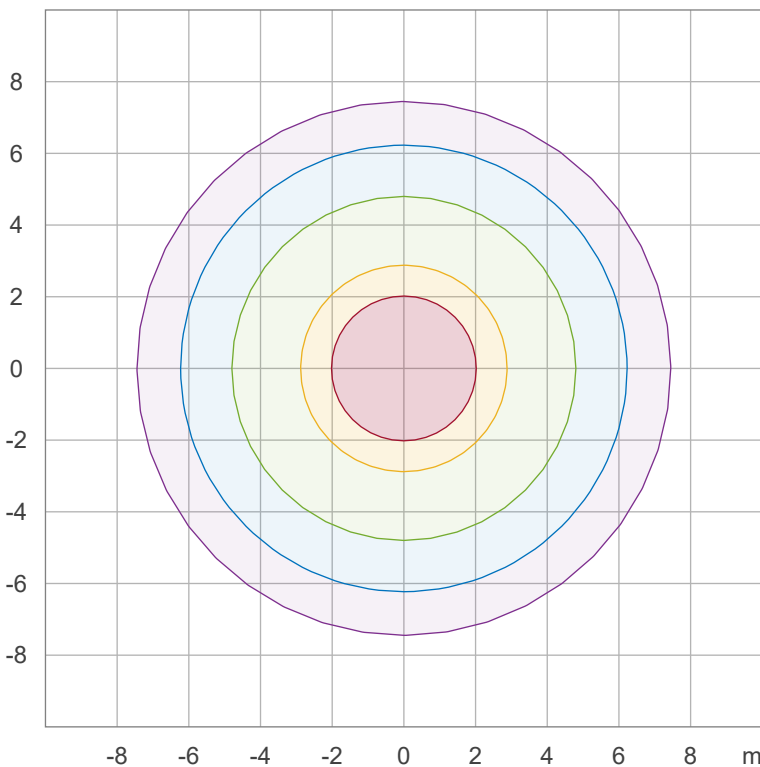


90 %	528,4 cd
80 %	469,7 cd
70 %	411,0 cd
60 %	352,3 cd
50 %	293,5 cd
40 %	234,8 cd
30 %	176,1 cd
20 %	117,4 cd
10 %	58,7 cd

Peak intensity: 587,1 cd

Number of c-planes: 20

## Iso-illuminance Diagram (Iso-lux)



50,0 %	32,6 lx
30,0 %	19,6 lx
10,0 %	6,5 lx
5,0 %	3,3 lx
3,0 %	2,0 lx

Peak illuminance: 65,2 lx

Mounting height: 3,0 m

Number of c-planes: 20

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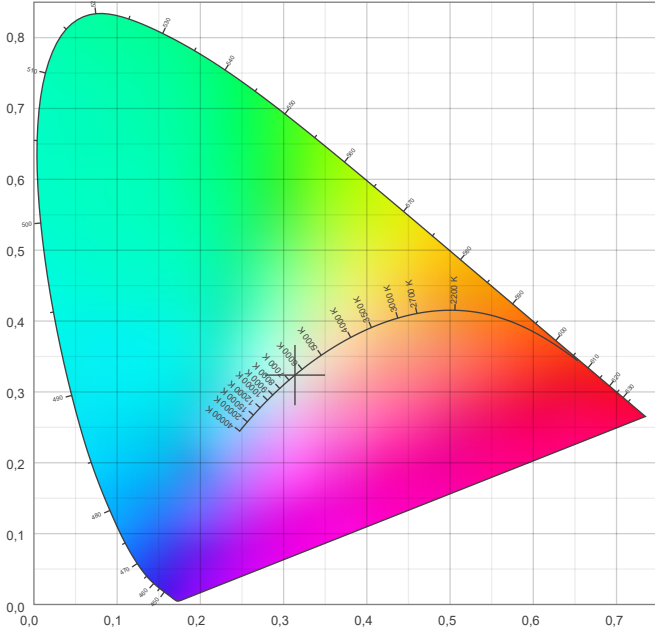


## Color details

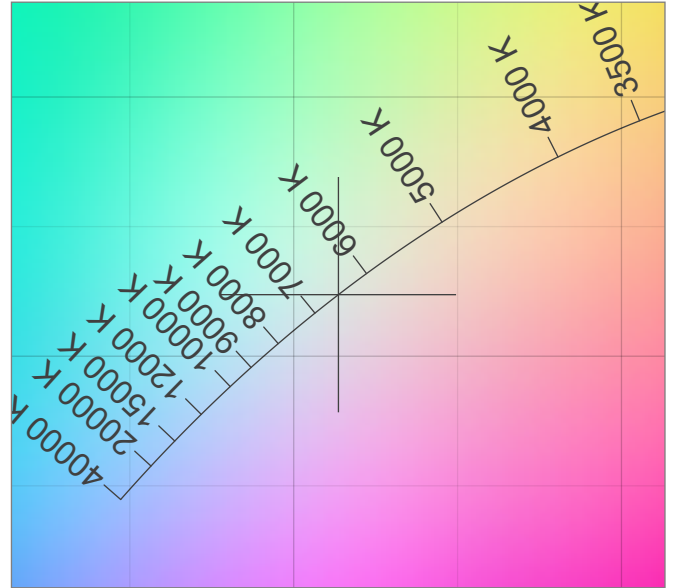
Correlated Color Temperature, Target CCT = 6500 K  
 Correlated Color Temperature, Measured CCT = 6315 K  
 Color Rendering Index CRI 81,9  
 Color Rendering Index, R9 (red component) R9 = 2,3  
 Color Rendering TM30-18 R<sub>f</sub> 82,8 – R<sub>g</sub> 94,4  
 Color Quality Scale CQS = 80,7

MacAdam Steps SDCM = 8,9  
 Color coordinates CIE 1931 (x;y) = (0,314;0,324)  
 Color coordinate CIEs 1960 (u;v) = (0,200;0,310)  
 Color deviation from BBL Duv = 0,0066  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,200;0,466)

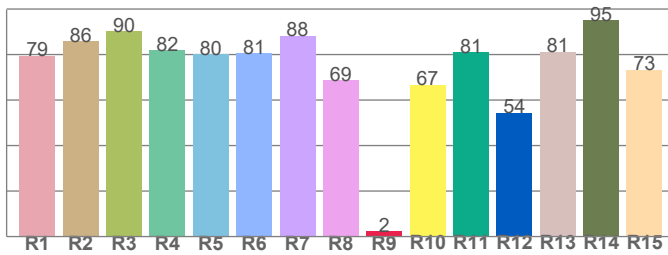
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



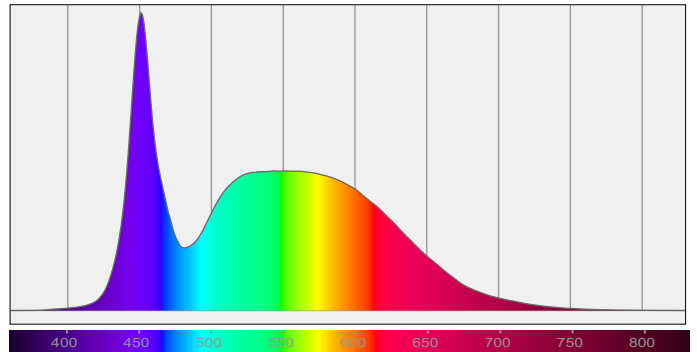
### Color Rendering Index per reference color (CIE 1995)



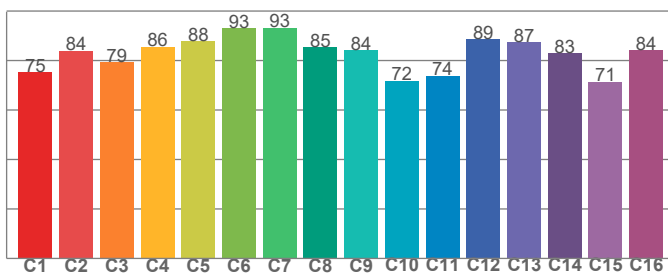
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
79,4	86,0	90,3	81,9	80,1	80,6	88,3	68,8	2,3	66,7	81,0	54,4	81,3	95,0	73,3

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



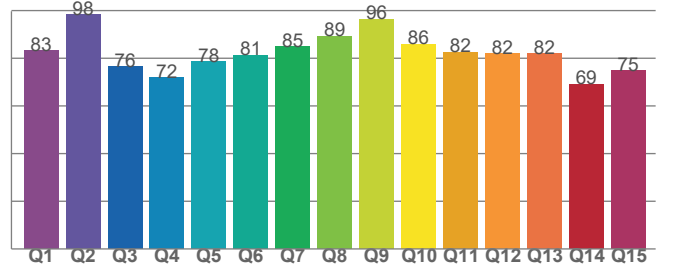
### TM30-18 R<sub>f</sub>-values per hue bin



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
75,2	84,0	79,3	85,6	87,7	93,0	93,3	85,4	84,2	71,8	73,9	88,5	87,3	83,1	71,4	84,1

### 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	98,2	76,4	71,8	78,5	81,2	84,8	89,3	96,3	85,8	82,4	82,0	81,9	69,2	74,7

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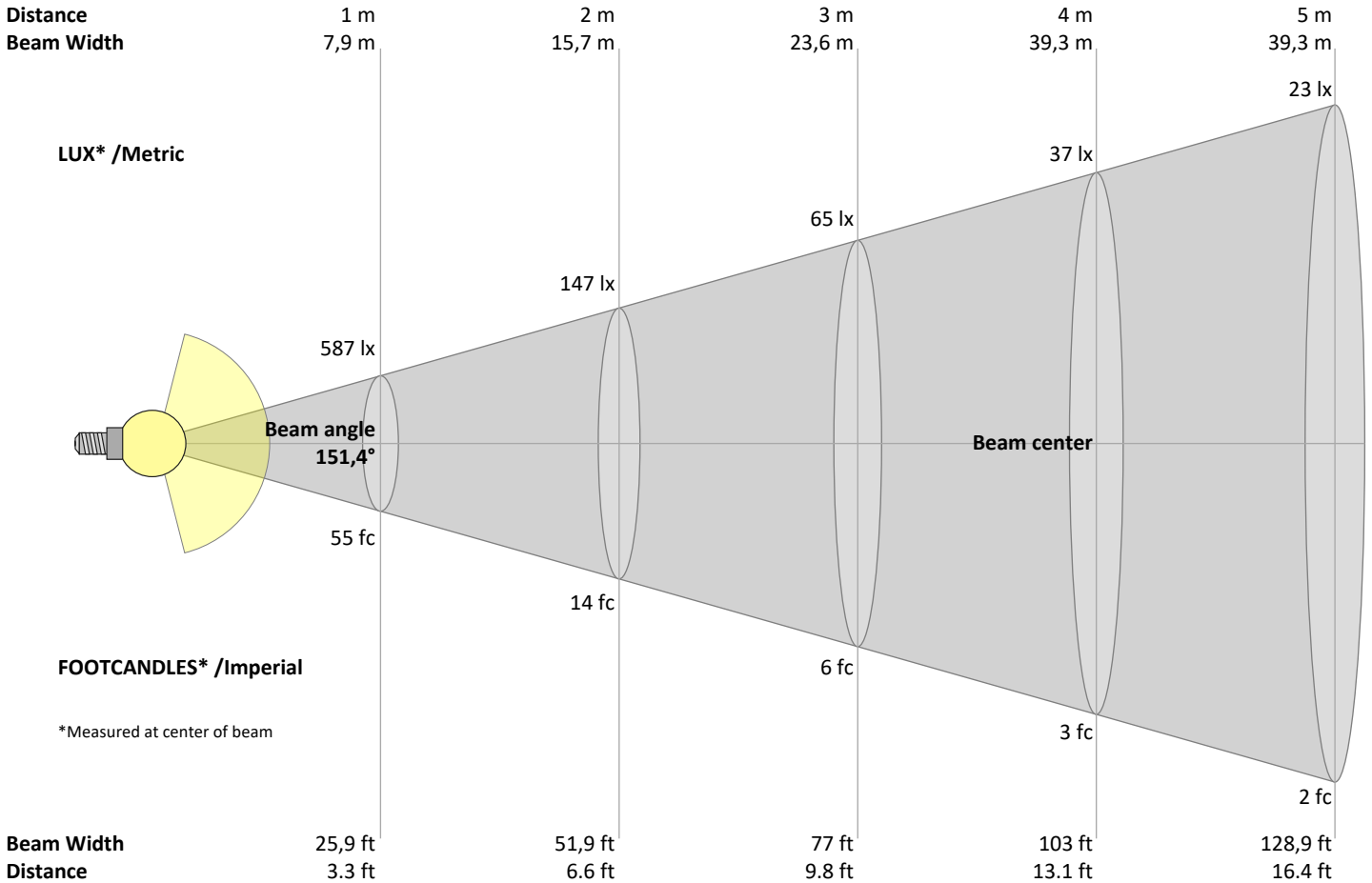
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## Beam Details



### 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
587	147	65	37	23	16	12	9	7	6	5	4	3	3	3	2	2	2	2	1	lux
54,5	13,6	6,1	3,4	2,2	1,5	1,1	0,9	0,7	0,5	0,5	0,4	0,3	0,3	0,2	0,2	0,2	0,2	0,2	0,1	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
587	583	567	541	505	463	416	366	315	265	218	180	143	103	61	24	6	4	4	4	cd
100%	99%	97%	92%	86%	79%	71%	62%	54%	45%	37%	31%	24%	18%	10%	4%	1%	1%	1%	1%	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
587	583	567	541	505	463	416	366	315	265	218	180	143	103	61	24	6	4	4	4	cd
100%	99%	97%	92%	86%	79%	71%	62%	54%	45%	37%	31%	24%	18%	10%	4%	1%	1%	1%	1%	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
587	583	567	541	505	463	416	366	315	265	218	180	143	103	61	24	6	4	4	4	cd
100%	99%	97%	92%	86%	79%	71%	62%	54%	45%	37%	31%	24%	18%	10%	4%	1%	1%	1%	1%	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
587	583	567	541	505	463	416	366	315	265	218	180	143	103	61	24	6	4	4	4	cd
100%	99%	97%	92%	86%	79%	71%	62%	54%	45%	37%	31%	24%	18%	10%	4%	1%	1%	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	19,7	20,9	20,3	21,5	22,1	21,5	22,7	22,0	23,3	23,9
	3H	21,6	22,7	22,2	23,3	23,9	23,9	25,1	24,6	25,7	26,3
	4H	22,5	23,6	23,1	24,2	24,8	25,3	26,4	26,0	27,0	27,7
	6H	23,5	24,4	24,0	25,0	25,8	26,9	27,8	27,4	28,4	29,2
	8H	23,9	24,9	24,5	25,5	26,2	27,7	28,7	28,3	29,3	30,0
	12H	24,3	25,3	24,9	25,9	26,6	28,6	29,6	29,2	30,2	30,9
4H	2H	20,6	21,7	21,2	22,3	22,9	21,9	23,0	22,6	23,6	24,3
	3H	22,7	23,7	23,3	24,3	25,0	24,6	25,6	25,2	26,2	26,9
	4H	23,7	24,8	24,4	25,3	26,1	26,0	27,1	26,7	27,6	28,4
	6H	24,7	25,6	25,4	26,2	26,9	27,6	28,5	28,3	29,1	29,8
	8H	25,2	26,0	25,9	26,7	27,4	28,5	29,3	29,2	30,0	30,7
	12H	25,7	26,4	26,4	27,1	27,9	29,5	30,2	30,2	30,9	31,7
8H	4H	24,2	25,0	25,0	25,7	26,4	26,2	27,0	27,0	27,7	28,4
	6H	25,5	26,1	26,2	26,9	27,7	28,0	28,6	28,7	29,4	30,2
	8H	26,2	26,7	26,9	27,5	28,4	29,0	29,6	29,8	30,3	31,3
	12H	26,8	27,3	27,6	28,0	28,9	30,2	30,6	31,0	31,4	32,3
12H	4H	24,4	25,0	25,1	25,7	26,5	26,3	26,9	27,0	27,6	28,4
	6H	25,7	26,3	26,5	27,1	28,0	28,1	28,6	28,8	29,4	30,3
	8H	26,4	26,9	27,2	27,7	28,6	29,1	29,6	29,9	30,4	31,2

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

S = 1.0H	0,1 / -0,1	0,1 / -0,1
S = 1.5H	0,1 / -0,1	0,3 / -0,3
S = 2.0H	0,2 / -0,3	0,5 / -0,5

## 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	114	114	114	114	110	110	110	110	100	100	100	92	92	92	84	84	84	81
1	101	94	89	84	96	90	85	80	82	78	74	75	72	69	68	66	63	60
2	90	80	72	65	85	77	69	63	70	64	59	64	59	54	58	54	50	47
3	81	69	60	53	77	66	58	51	60	53	48	55	49	44	50	45	41	38
4	74	61	51	44	70	58	49	42	53	46	40	48	42	37	44	39	35	32
5	68	54	44	37	64	52	43	36	47	40	34	43	37	32	39	34	30	27
6	62	48	39	32	59	46	37	31	42	35	29	39	32	27	35	30	26	23
7	58	43	34	28	55	42	33	27	38	31	25	35	29	24	32	27	22	20
8	53	39	30	24	51	38	30	24	35	28	22	32	26	21	30	24	20	18
9	50	36	27	22	47	35	27	21	32	25	20	30	23	19	27	22	18	16
10	47	33	25	19	44	32	24	19	29	23	18	27	21	17	25	20	16	14

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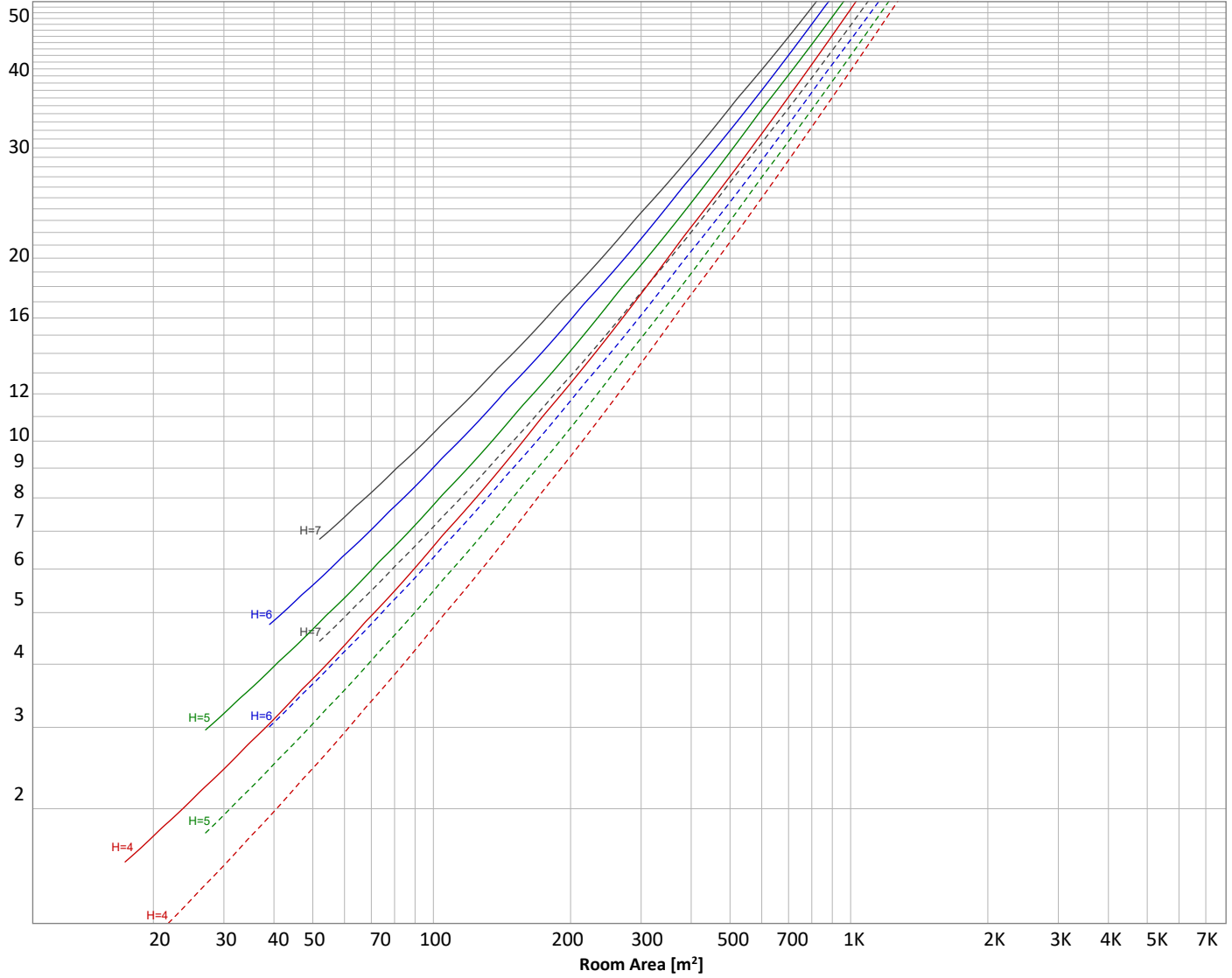
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 3025 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°
55,9 lm	162 lm	253 lm	319 lm	358 lm	368 lm	352 lm	315 lm	266 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
214 lm	165 lm	112 lm	59,5 lm	20,1 lm	3,73 lm	1,92 lm	1,19 lm	0,400 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	56 lm	1,8%
10-20°	162 lm	5,4%
20-30°	253 lm	8,4%
30-40°	319 lm	10,6%
40-50°	358 lm	11,8%
50-60°	368 lm	12,2%
60-70°	352 lm	11,6%
70-80°	315 lm	10,4%
80-90°	266 lm	8,8%
90-100°	214 lm	7,1%
100-110°	165 lm	5,4%
110-120°	112 lm	3,7%
120-130°	59 lm	2,0%
130-140°	20 lm	0,7%
140-150°	4 lm	0,1%
150-160°	2 lm	0,1%
160-170°	1 lm	0,0%
170-180°	0 lm	0,0%
<b>Total</b>	<b>3025 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	587 cd
Intensity, 90°	218 cd
Intensity, 0°	587 cd

### Zonal Lumen summary

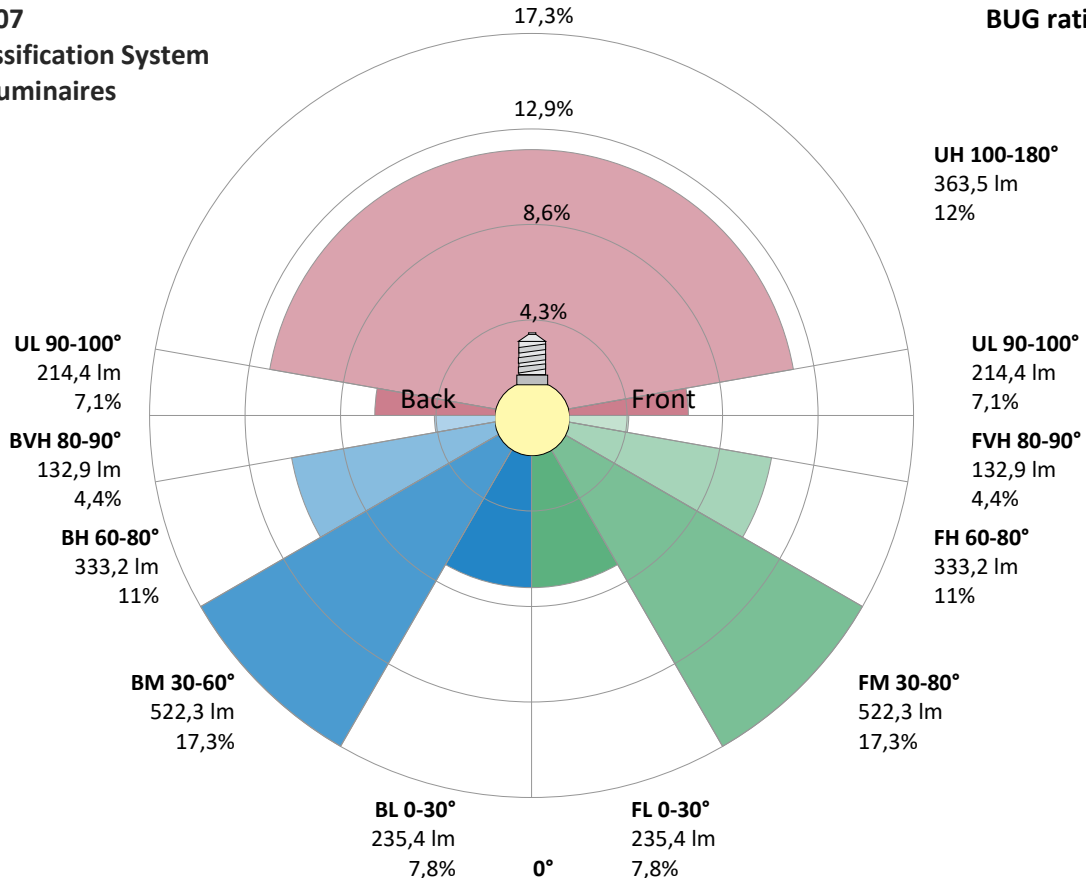
Zone (γ)	Lumen	% Total
0-30°	471 lm	15,6%
0-40°	790 lm	26,1%
0-60°	1515 lm	50,1%
60-90°	932 lm	30,8%
70-100°	795 lm	26,3%
90-120°	491 lm	16,2%
0-90°	2447 lm	80,9%
90-180°	578 lm	19,1%
0-180°	3025 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	235 lm	7,8%
Medium(30-60°)	522 lm	17,3%
High(60-80°)	333 lm	11,0%
Very high(80-90°)	133 lm	4,4%
<b>Back light</b>		
Low(0-30°)	235 lm	7,8%
Medium(30-60°)	522 lm	17,3%
High(60-80°)	333 lm	11,0%
Very high(80-90°)	133 lm	4,4%
<b>Uplight</b>		
Low(90-100°)	214 lm	7,1%
High(100-180°)	363 lm	12,0%

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

**BUG rating B1 U3 G2**



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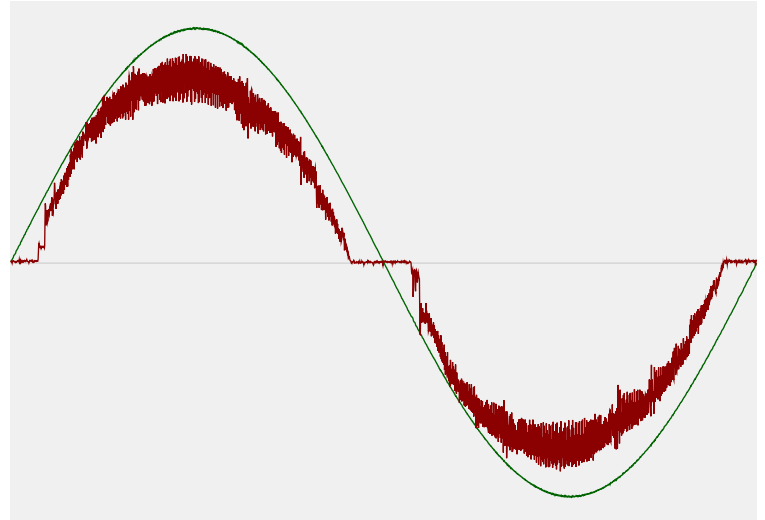


## Power Details

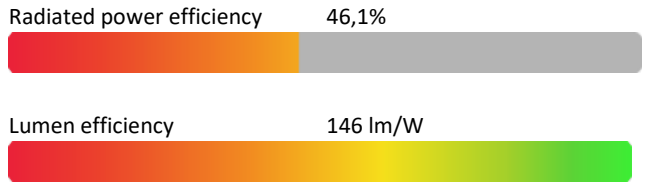
### Input Power

Power feed to light source	20,7 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,094 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	21,56 VA
Displacement factor of AC power feed	1,0
Power factor of AC current feed	0,96
Total harmonic distortion of the current	12,12%
Total harmonic distortion of the voltage	0,06%

### 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	6475 K
CCT shift	+25 K
CCT end	6500 K

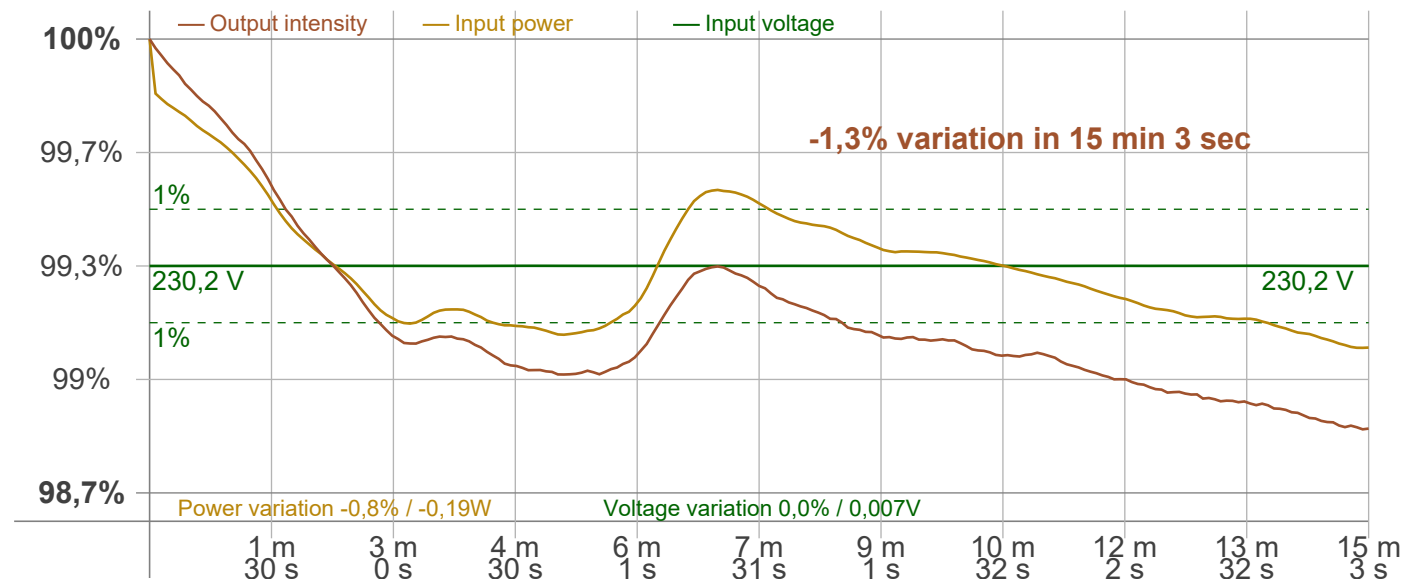
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 3 sec
Warmup variation	-1,3%

### Output Change

Output start	3061 lm
Output change	-36 lm
Output end	3025 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: 83,4 %  
 Flicker index: 0,27

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

JA8/10 40 Hz: 0,26 %  
 JA8/10 90 Hz: 0,8 %  
 JA8/10 200 Hz: 85,5 %  
 JA8/10 400 Hz: 83,54 %  
 JA8/10 1000 Hz: 83,36 %

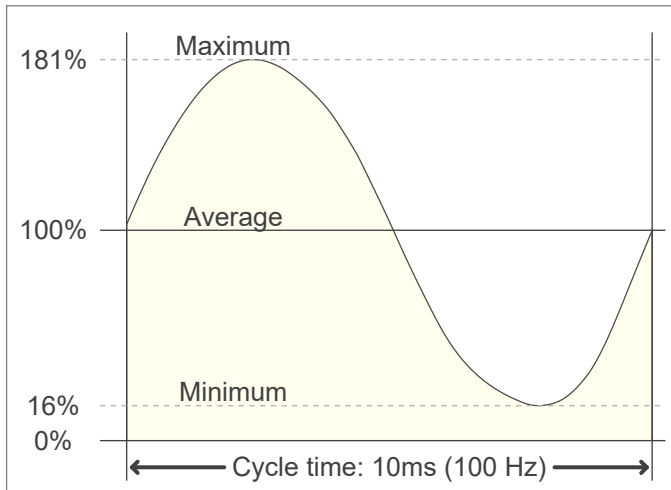
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz): 0,1  
 SVM value (80 < F < 2000 Hz): 3,28

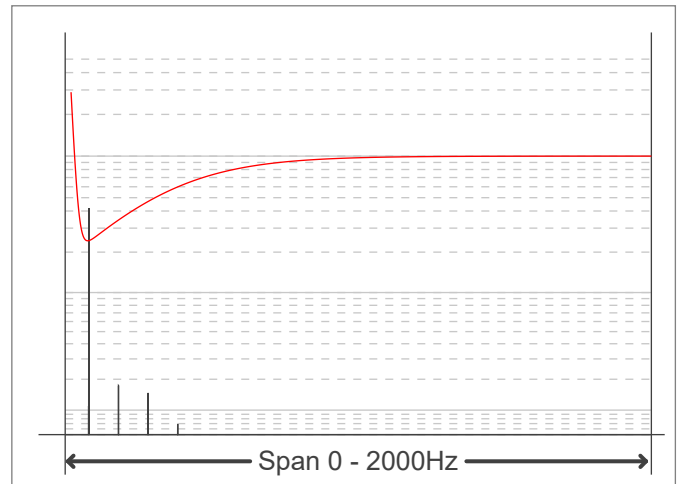
### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp: 0,07

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



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

