

Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](https://vt241112-002105)

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
 γ (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°
8,05 m
32,5 W – PF 0,96 – DPF 0,96
230 V – 0,148 A
50 Hz
Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

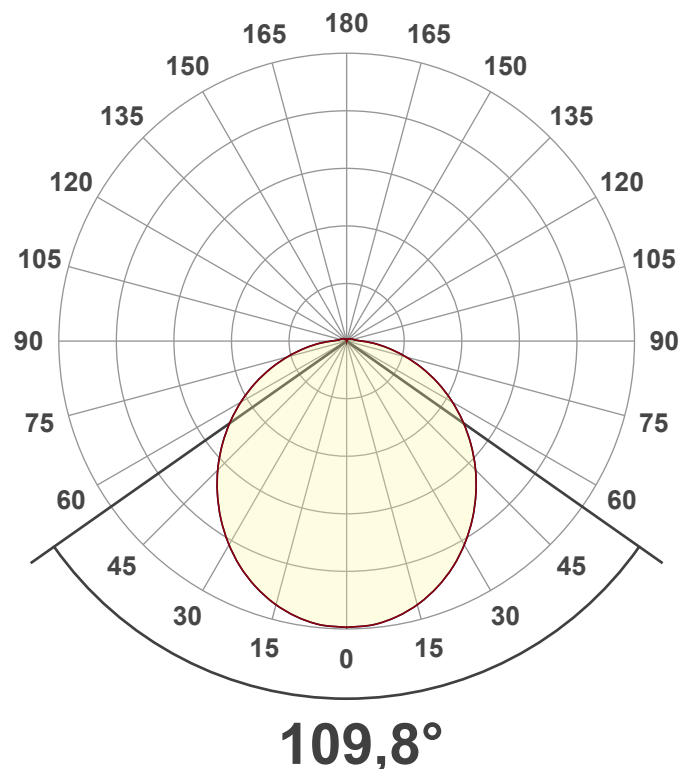
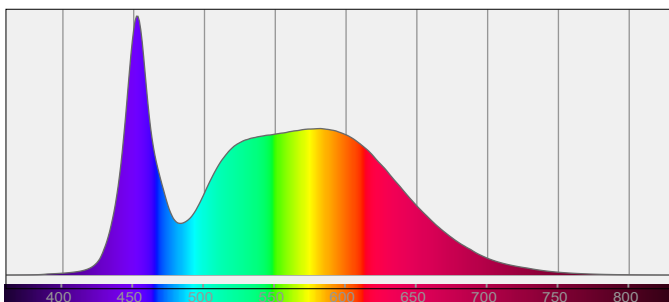
Product Name
Item No. and Manufacturer
Product Description (line 1)

804541-5000K
804541-5000K – Dutchfulfillment
LED FRAME PANEEL | EDGE LIT | 60x60 | 32W | UGR<23 | 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

3100 lm – 3,78% / 96,22%
95 lm/W
1039 cd – 109,8°
CCT = 5000 K / 5170 K
CRI 82,5
 R_f 82,8 – R_g 95,9
Duv 0,0005 – SDCM 3,9
SVM 0 – PstLM 0,02



Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

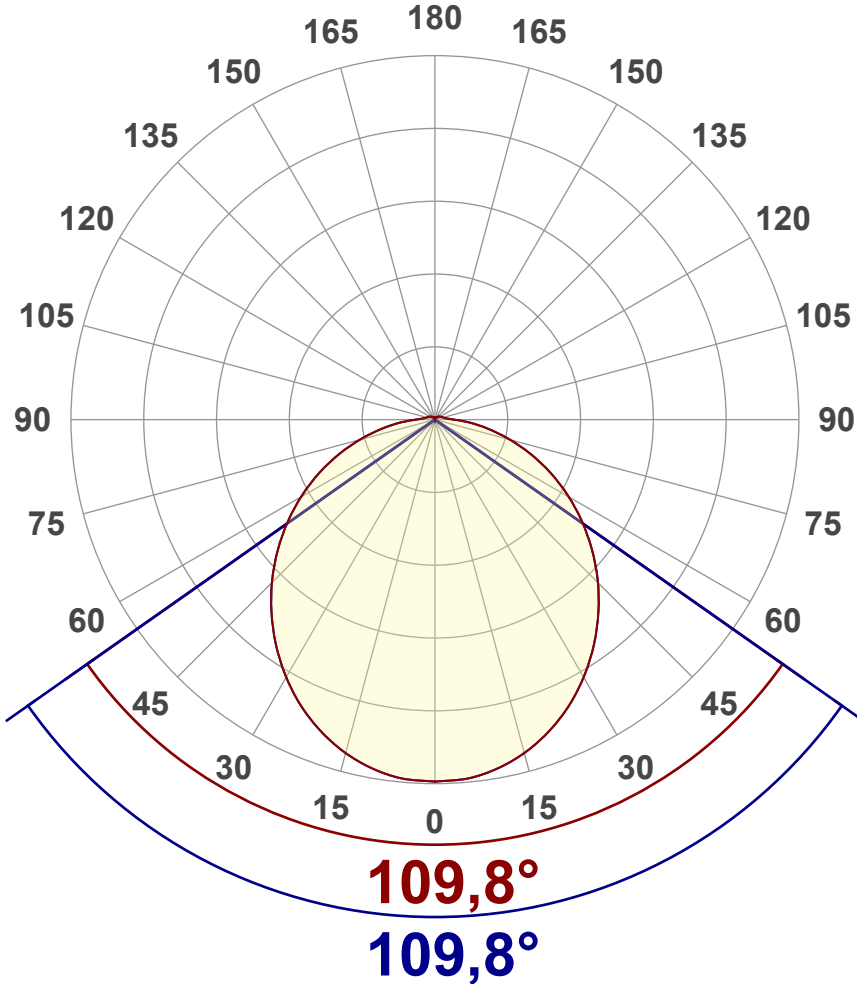
Measurement tracking No. and Link: [VT241112-002105](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	3100 lm
Lumen Up% / Down%	3,78% / 96,22%
Peak Intensity	1039 cd
Beam Angle (50%)	109,8°
Beam Angle (90%)	109,8°
Beam Angle (10%)	109,8°

Cut-off Angle

Average 2,5%	204,6°
--------------	--------

Field Angle

Average 10%	169,7°
-------------	--------

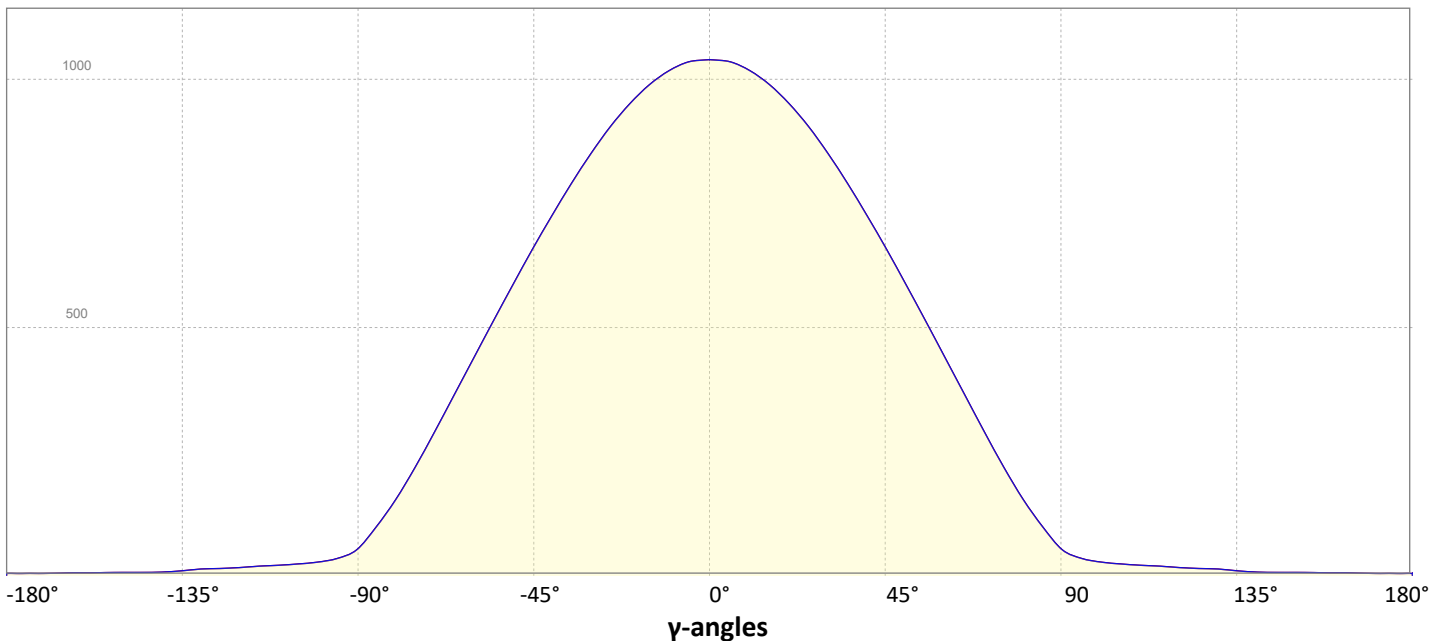
Intensity Ratio

In 120° cone	73,1%
In 90° cone	50,0%

C000-C180

C090-C270

Linear distribution diagram - Intensity (candela) vs γ -angle



Light Measurement Report

Print date: 12-11-2024

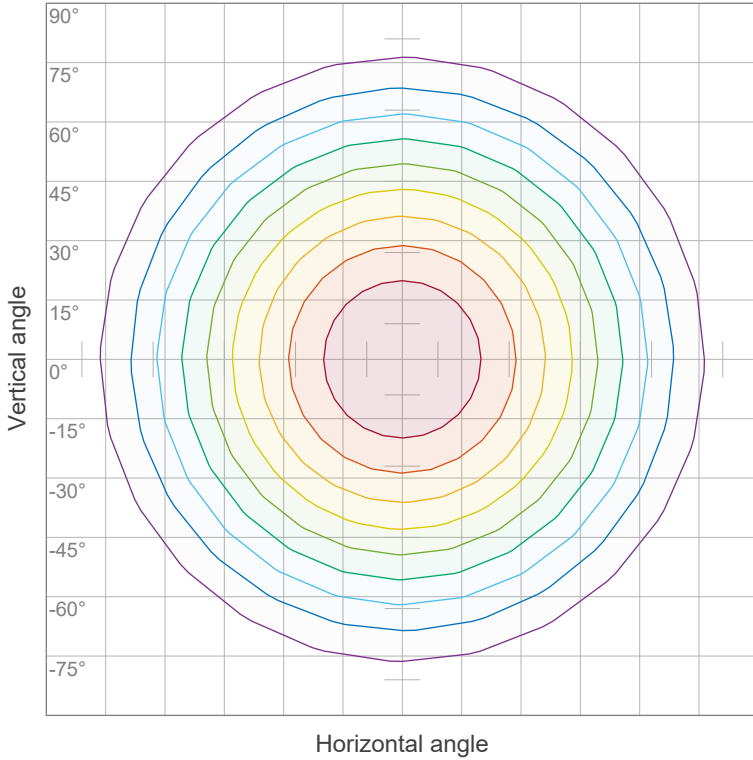
Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](https://www.viso-systems.com/VT241112-002105)

Operator:



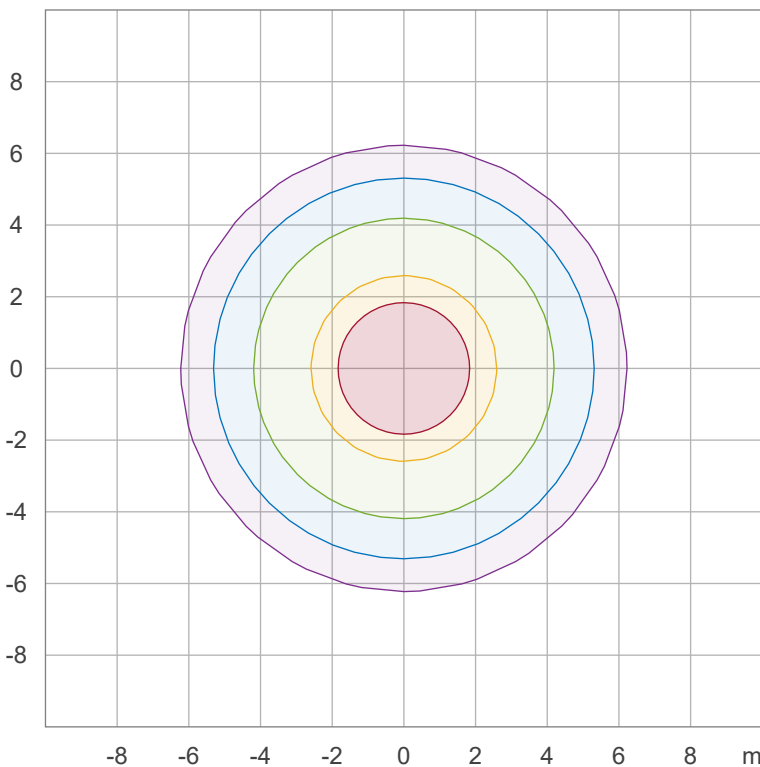
Iso-intensity Diagram (Iso-candela)



90 %	935,3 cd
80 %	831,4 cd
70 %	727,5 cd
60 %	623,5 cd
50 %	519,6 cd
40 %	415,7 cd
30 %	311,8 cd
20 %	207,8 cd
10 %	103,9 cd

Peak intensity: 1039,2 cd
Number of c-planes: 12

Iso-illuminance Diagram (Iso-lux)



50,0 %	57,7 lx
30,0 %	34,6 lx
10,0 %	11,5 lx
5,0 %	5,8 lx
3,0 %	3,5 lx

Peak illuminance: 115,5 lx
Mounting height: 3,0 m
Number of c-planes: 12

Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](#)

Operator:



Color details

Correlated Color Temperature, Target CCT = 5000 K
 Correlated Color Temperature, Measured CCT = 5170 K
 Color Rendering Index CRI 82,5
 Color Rendering Index, R9 (red component) R9 = 9,3
 Color Rendering TM30-18 Rf 82,8 – Rg 95,9
 Color Quality Scale CQS = 80,3

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 = 0,0005
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,211;0,485)

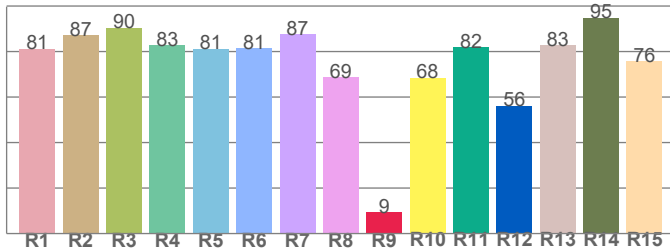
CIE 1931



CIE 1931 – zoomed on Planckian locus



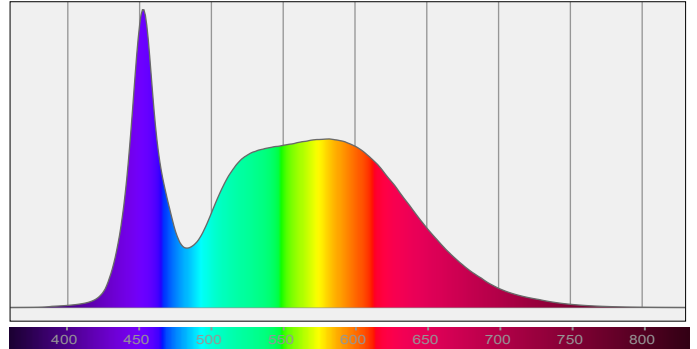
Color Rendering Index per reference color (CIE 1995)



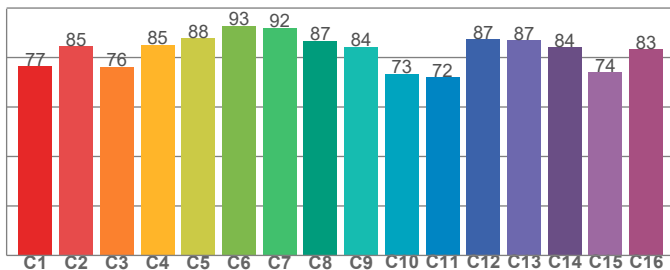
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
81,2	87,1	90,5	82,8	81,2	81,5	87,5	68,6	9,3	68,5	81,8	56,2	82,8	94,8	75,6

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



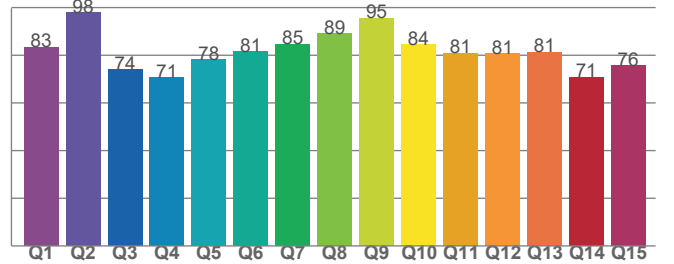
TM30-18 Rf-values per hue bin



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
76,5	84,7	76,3	85,2	87,9	92,9	92,0	86,7	84,3	73,5	72,1	87,3	87,1	84,2	74,1	83,4

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
83,3	97,8	73,9	70,6	78,1	81,5	84,7	89,0	95,5	84,4	80,9	80,6	81,3	70,8	75,5

Light Measurement Report

Print date: 12-11-2024

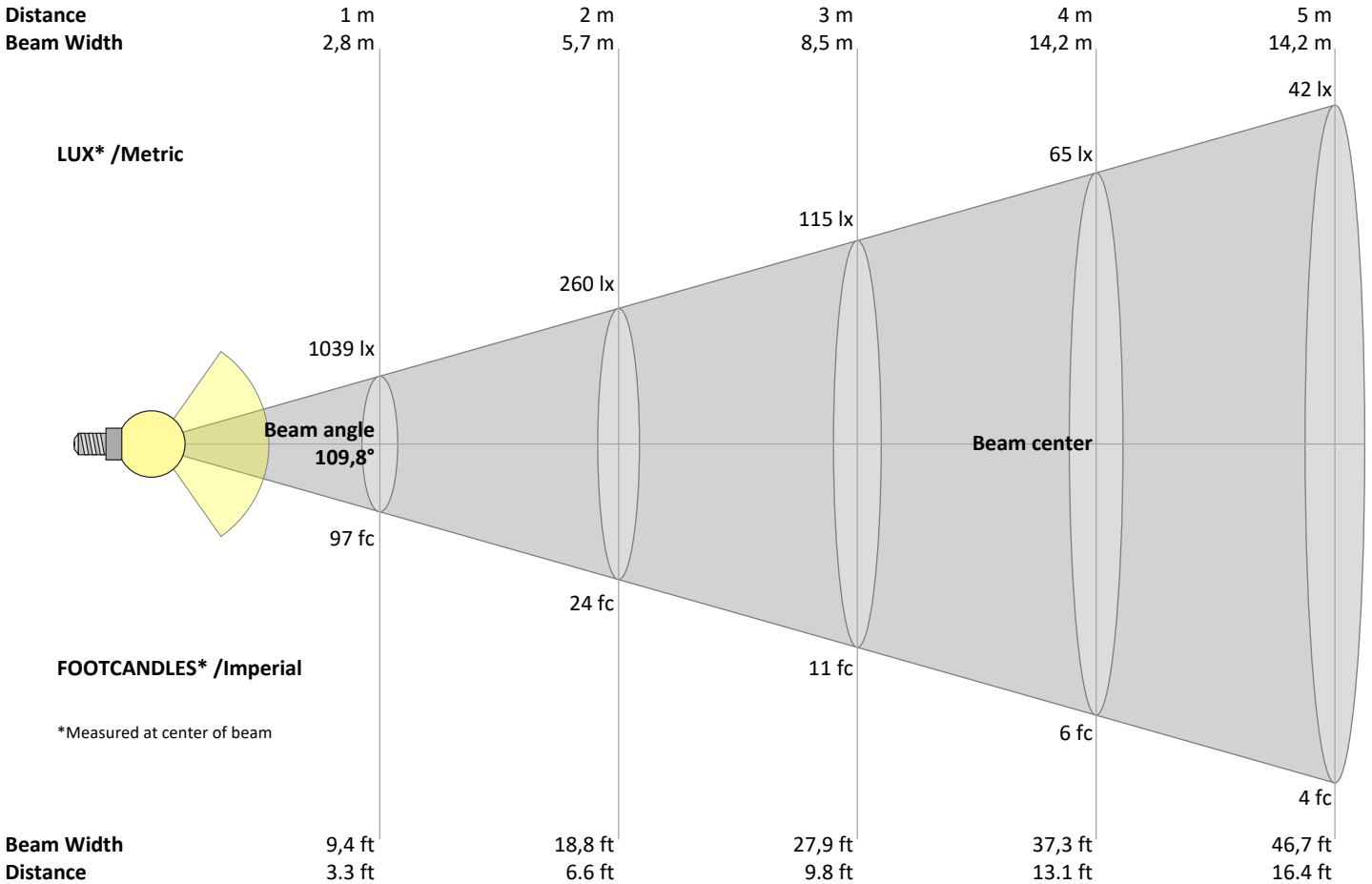
Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](https://www.viso-systems.com/VT241112-002105)

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
1039	260	115	65	42	29	21	16	13	10	9	7	6	5	5	4	4	3	3	3	lux
96,5	24,1	10,7	6	3,9	2,7	2	1,5	1,2	1	0,8	0,7	0,6	0,5	0,4	0,4	0,3	0,3	0,3	0,2	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
1039	1035	1019	991	954	908	854	794	730	662	591	518	444	370	296	224	158	102	55	36	cd
100%	100%	98%	95%	92%	87%	82%	76%	70%	64%	57%	50%	43%	36%	28%	22%	15%	10%	5%	3%	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
1039	1035	1019	991	954	908	854	794	730	662	591	518	444	370	296	224	158	102	55	36	cd
100%	100%	98%	95%	92%	87%	82%	76%	70%	64%	57%	50%	43%	36%	28%	22%	15%	10%	5%	3%	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
1039	1035	1019	991	954	908	854	794	730	662	591	518	444	370	296	224	158	102	55	36	cd
100%	100%	98%	95%	92%	87%	82%	76%	70%	64%	57%	50%	43%	36%	28%	22%	15%	10%	5%	3%	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
1039	1035	1019	991	954	908	854	794	730	662	591	518	444	370	296	224	158	102	55	36	cd
100%	100%	98%	95%	92%	87%	82%	76%	70%	64%	57%	50%	43%	36%	28%	22%	15%	10%	5%	3%	of 0°val

Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](#)

Operator:



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	17,0	16,0	17,3	17,6	15,7	17,0	16,0	17,3	17,6
	3H	17,3	18,6	17,8	18,9	19,2	17,3	18,6	17,8	18,9	19,2
	4H	18,1	19,3	18,6	19,6	20,0	18,1	19,3	18,6	19,6	20,0
	6H	18,8	19,9	19,2	20,2	20,7	18,8	19,9	19,2	20,2	20,7
	8H	19,1	20,1	19,5	20,5	21,0	19,1	20,1	19,5	20,5	21,0
	12H	19,4	20,4	19,8	20,8	21,3	19,4	20,4	19,8	20,8	21,3
4H	2H	16,4	17,6	16,8	17,9	18,2	16,4	17,6	16,8	17,9	18,2
	3H	18,3	19,3	18,7	19,7	20,2	18,3	19,3	18,7	19,7	20,2
	4H	19,1	20,1	19,6	20,5	21,1	19,1	20,1	19,6	20,5	21,1
	6H	19,9	20,8	20,5	21,2	21,7	19,9	20,8	20,5	21,2	21,7
	8H	20,3	21,1	20,9	21,5	22,0	20,3	21,1	20,9	21,5	22,0
	12H	20,7	21,3	21,2	21,8	22,3	20,7	21,3	21,2	21,8	22,3
8H	4H	19,5	20,3	20,0	20,7	21,2	19,5	20,3	20,0	20,7	21,2
	6H	20,5	21,1	21,0	21,6	22,2	20,5	21,1	21,0	21,6	22,2
	8H	21,0	21,5	21,6	22,1	22,8	21,0	21,5	21,6	22,1	22,8
	12H	21,5	22,0	22,1	22,5	23,2	21,5	22,0	22,1	22,5	23,2
12H	4H	19,5	20,2	20,1	20,7	21,2	19,5	20,2	20,1	20,7	21,2
	6H	20,6	21,2	21,2	21,7	22,4	20,6	21,2	21,2	21,7	22,4
	8H	21,2	21,6	21,8	22,2	22,9	21,2	21,6	21,8	22,2	22,9

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	0,1 / -0,1
S = 2.0H	0,3 / -0,3	0,3 / -0,3

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	118	118	118	118	115	115	115	115	109	109	109	104	104	104	99	99	99	96
1	107	102	97	93	104	99	95	91	94	91	88	90	87	84	85	83	81	79
2	97	88	81	75	94	86	80	74	82	77	72	78	74	70	75	71	67	65
3	88	77	69	62	85	76	68	62	72	65	60	69	63	58	66	61	57	55
4	81	69	60	53	78	67	59	52	64	57	51	61	55	50	59	53	49	46
5	74	61	52	45	72	60	51	45	57	50	44	55	48	43	53	47	42	40
6	69	55	46	40	66	54	45	39	52	44	39	50	43	38	48	42	37	35
7	64	50	41	35	62	49	41	35	47	40	34	45	39	34	44	38	33	31
8	59	46	37	31	57	45	37	31	43	36	30	42	35	30	40	34	30	28
9	55	42	34	28	54	41	33	28	40	32	27	38	32	27	37	31	27	25
10	52	39	31	25	50	38	30	25	37	30	25	35	29	25	34	29	24	23

Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](#)

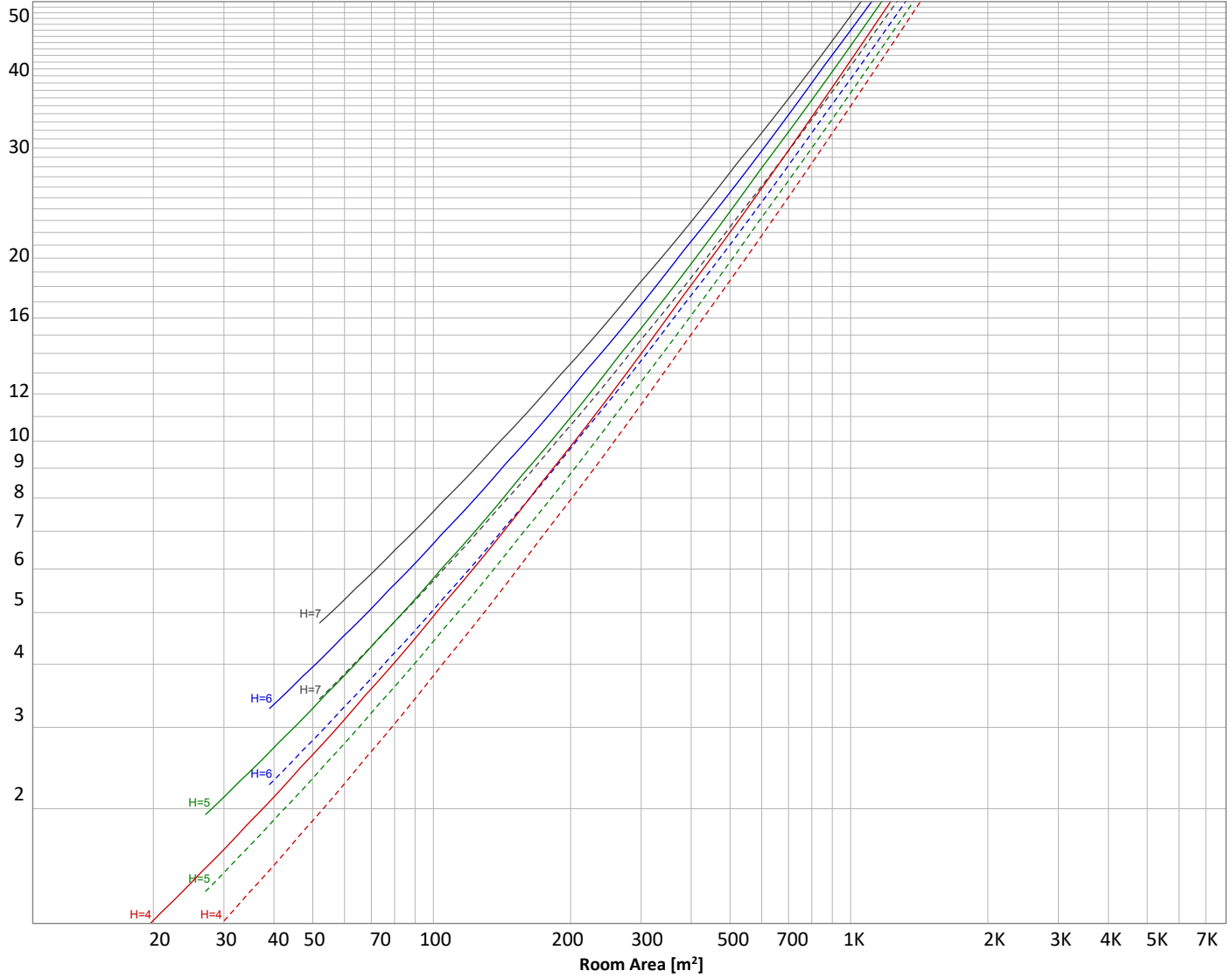
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 3100 lm	$\rho(\%)$			
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance	Floor reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50	30
E _{work} = 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°
98,2 lm	279 lm	418 lm	497 lm	510 lm	463 lm	366 lm	238 lm	113 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
41,7 lm	25,7 lm	19,1 lm	13,4 lm	8,04 lm	4,33 lm	2,94 lm	1,58 lm	0,448 lm

Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](#)

Operator:



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	98 lm	3,2%
10-20°	279 lm	9,0%
20-30°	418 lm	13,5%
30-40°	497 lm	16,0%
40-50°	510 lm	16,5%
50-60°	463 lm	14,9%
60-70°	366 lm	11,8%
70-80°	238 lm	7,7%
80-90°	113 lm	3,7%
90-100°	42 lm	1,3%
100-110°	26 lm	0,8%
110-120°	19 lm	0,6%
120-130°	13 lm	0,4%
130-140°	8 lm	0,3%
140-150°	4 lm	0,1%
150-160°	3 lm	0,1%
160-170°	2 lm	0,1%
170-180°	0 lm	0,0%
Total	3100 lm	100,0%

Intensity peaks

Max intensity	1039 cd
Intensity, 90°	55 cd
Intensity, 0°	1039 cd

Zonal Lumen summary

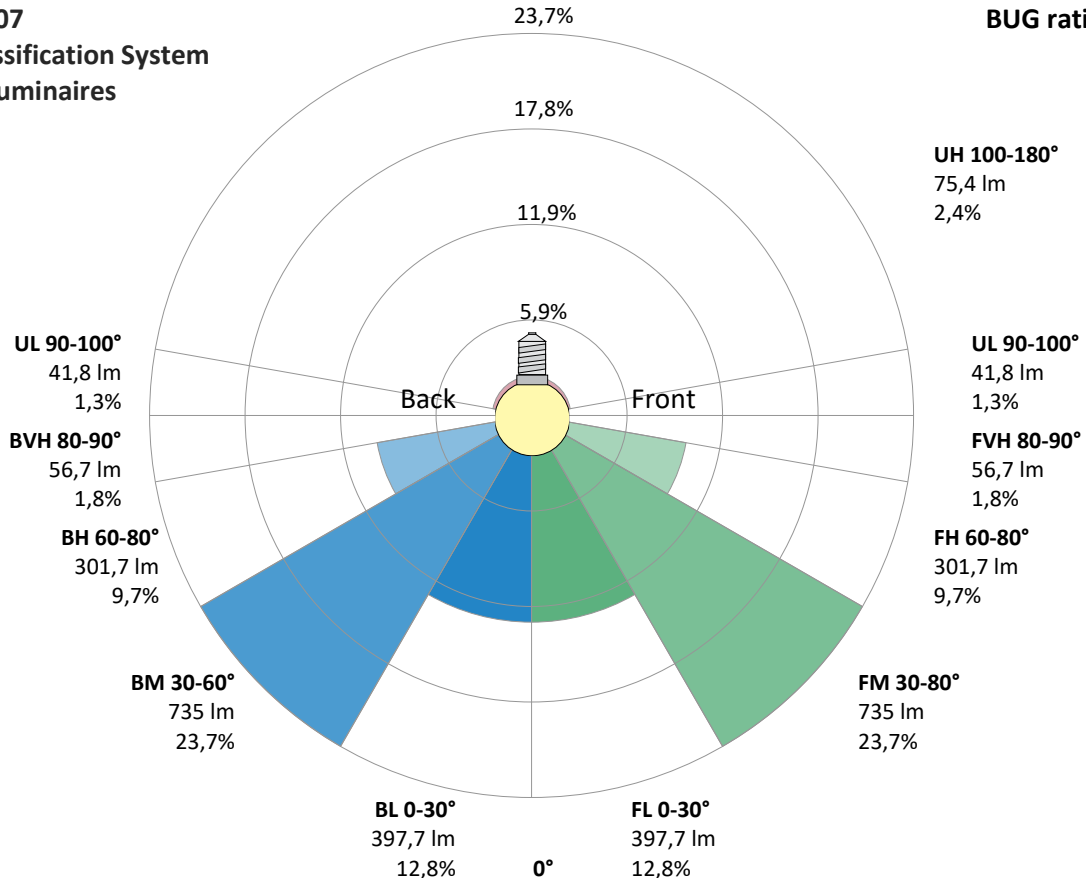
Zone (γ)	Lumen	% Total
0-30°	795 lm	25,7%
0-40°	1292 lm	41,7%
0-60°	2266 lm	73,1%
60-90°	717 lm	23,1%
70-100°	393 lm	12,7%
90-120°	86 lm	2,8%
0-90°	2982 lm	96,2%
90-180°	117 lm	3,8%
0-180°	3100 lm	100,0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	398 lm	12,8%
Medium(30-60°)	735 lm	23,7%
High(60-80°)	302 lm	9,7%
Very high(80-90°)	57 lm	1,8%
Back light		
Low(0-30°)	398 lm	12,8%
Medium(30-60°)	735 lm	23,7%
High(60-80°)	302 lm	9,7%
Very high(80-90°)	57 lm	1,8%
Uplight		
Low(90-100°)	42 lm	1,3%
High(100-180°)	75 lm	2,4%

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

BUG rating B1 U3 G1



Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](#)

Operator:

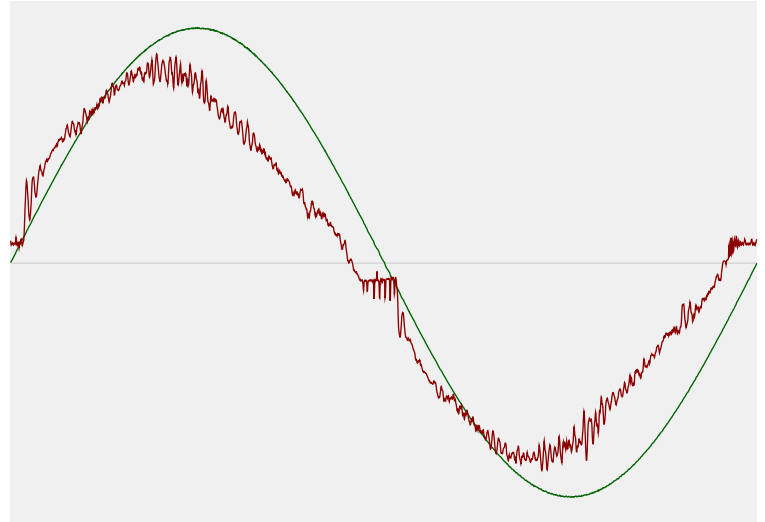


Power Details

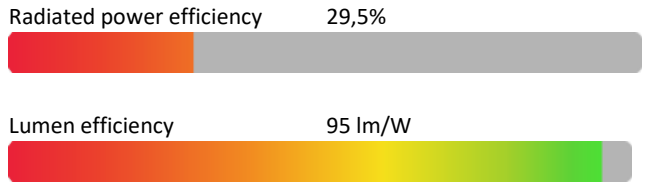
Input Power

Power feed to light source	32,5 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,148 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	34,0 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,96
Total harmonic distortion of the current	8,96%
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	4994 K
CCT shift	+6 K
CCT end	5000 K

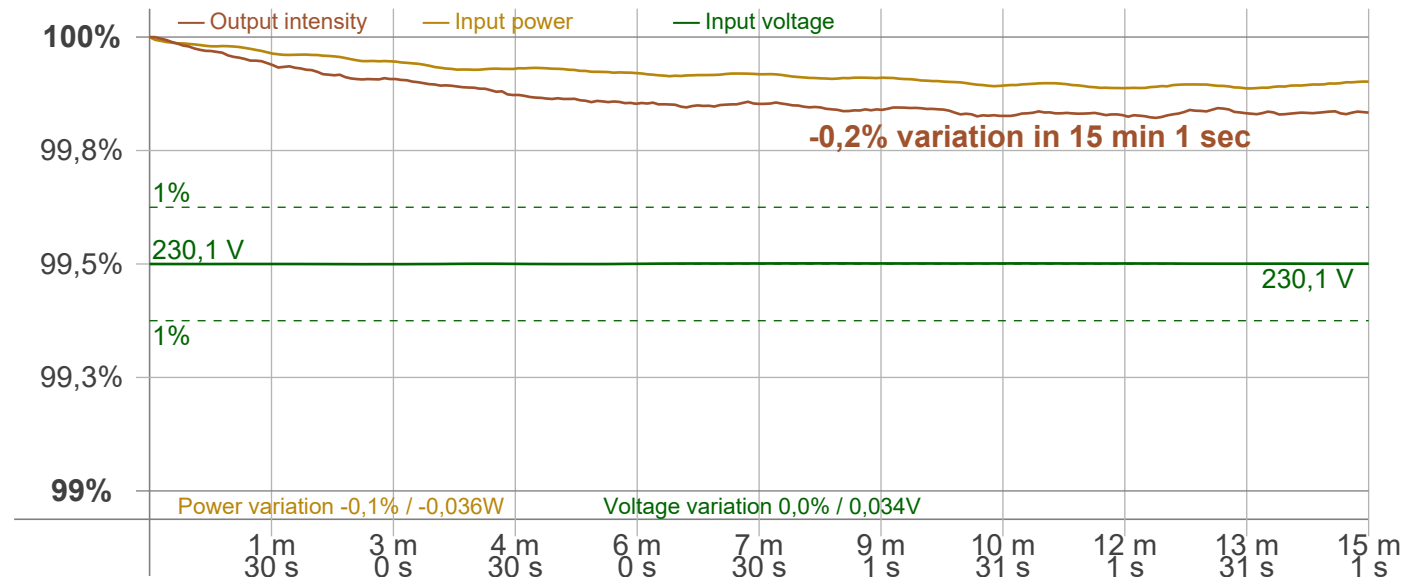
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	-0,2%

Output Change

Output start	3105 lm
Output change	-6 lm
Output end	3100 lm

Stabilization Curve



Light Measurement Report

Print date: 12-11-2024

Measurement date and time: 12-11-2024 13:32:16 – Measurement no. VFR-241112-2010-MS

Measurement tracking No. and Link: [VT241112-002105](https://www.viso-systems.com/VT241112-002105)

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 98,04 Hz
 Percent Flicker 0,18 %
 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 0,16 %
 JA8/10 400 Hz 0,16 %
 JA8/10 1000 Hz 0,17 %

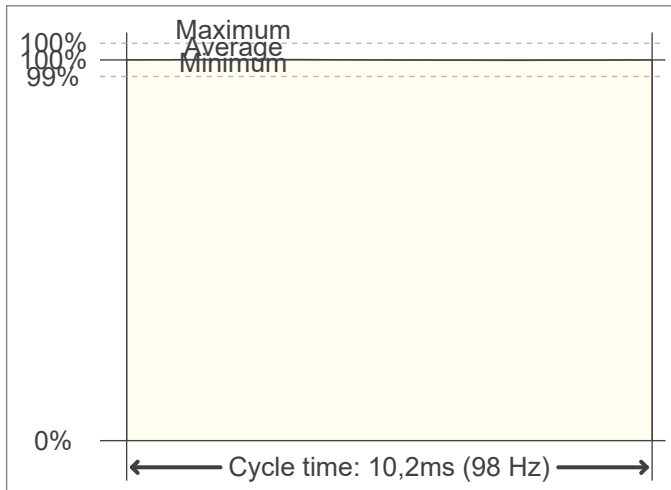
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

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

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

