PI²-LED®

LUMITECH
YOUR LIGHTING SOLUTION

Preliminary datasheet

Lumen package
S und M

Lumen package
L

Z 3.0

DALI

my PI-LED

ZigBee Member

Digital Illumination Interface Alliance
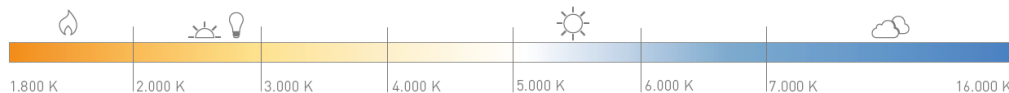
DARA LIGHTING
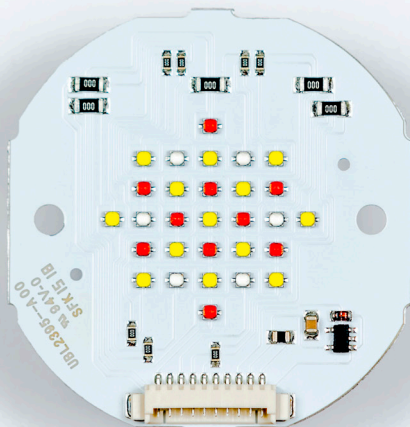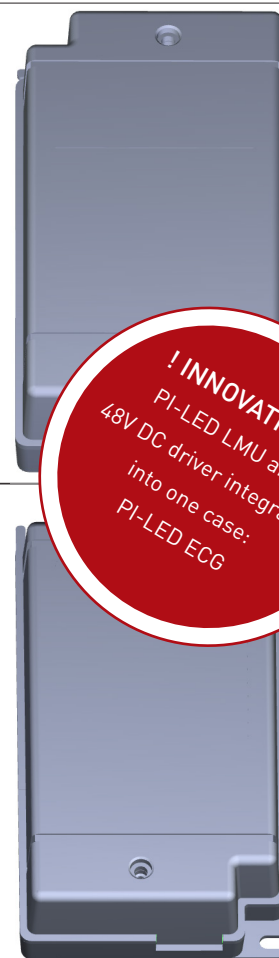
! INNOVATION !
PI-LED LMU and 48V DC driver integrated into one case: PI-LED ECG

DOWNLIGHT SYSTEM ZHAGA with PI-LED ECG

Human Centric Lighting
makes the day light.

| 1.800 K | 2.000 K | 3.000 K | 4.000 K | 5.000 K | 6.000 K | 7.000 K | 16.000 K |

Tunable white
1,800K - 16,000K

Brightness dimmable
1% - 100%

RGB/CIE-xy adjustable
Colour points and sequences

Biorhythmic lighting
Vitalisation and recreation

2 Control modes
DALI DT8, ZigBee 3.0

Excellent CRI
CRI>90

▐▌▐ TECHNICAL DATA

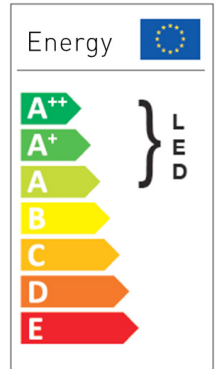|	Lumen package S	Lumen package M	Lumen package L
Luminous source	SMD LED module (High Power LEDs)		
Supply voltage	230V AC		
Typ. power	22W	31W	48W
Luminous flux	2,300lm	3,000lm	4,500lm
Efficiency	typ. 105lm/W	typ. 97lm/W	typ. 94lm/W
Control mode	ZigBee 3.0, DALI DT8		
Dimmable	1% - 100% Modular Dimming* / Camera-Ready*		
CCT and colour control	1,800 - 16,000K / adjustable CIE-xy-colours and RGB colours		
Ambient / storage temperature	+10°C … +45°C / -20°C … +80°C		
$t_{c, max}$ LED module	+85°C		
Lifetime	50,000h L80B10		
Additional features	Low tolerance for colour temperature MacAdam 1 (typical/initial) Integrated overtemperature protection		

▽ CE ✓RoHS

*According to IEEE 1789-2015 (valid for all dimming levels, CCT and colour settings)

Letzte Änderung: 03.04.2020   PI-LED_Zhaga_PI-LEDECG_en

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DOWNLIGHT SYSTEM ZHAGA with PI-LED ECG

▉▉ ORDERING DATA AND TECHNICAL DATA - PI-LED DOWNLIGHT SYSTEM ZHAGA WITH PI-LED ECG

| Type	Description	Control mode	Cable [mm]	Lum. flux [lm]	Voltage [V AC]	Power [W]
LTS-02330-15-CR	PI-LED Spot 2300LM / DALI DT8 / PI-LED EVG / 140mm	DALI DT8	140	2,300	230	22
LTS-02330-15-CR1	PI-LED Spot 2300LM / DALI DT8 / PI-LED EVG / 400mm	DALI DT8	400	2,300	230	22
LTS-02330-16-CR	PI-LED Spot 2300LM / ZigBee 3.0 / PI-LED EVG / 140mm	ZigBee 3.0	140	2,300	230	22
LTS-02330-16-CR1	PI-LED Spot 2300LM / ZigBee 3.0 / PI-LED EVG / 400mm	ZigBee 3.0	400	2,300	230	22
LTS-03030-15-CR	PI-LED Spot 3000LM / DALI DT8 / PI-LED EVG / 140mm	DALI DT8	140	3,000	230	31
LTS-03030-15-CR1	PI-LED Spot 3000LM / DALI DT8 / PI-LED EVG / 400mm	DALI DT8	400	3,000	230	31
LTS-03030-16-CR	PI-LED Spot 3000LM / ZigBee 3.0 / PI-LED EVG / 140mm	ZigBee 3.0	140	3,000	230	31
LTS-03030-16-CR1	PI-LED Spot 3000LM / ZigBee 3.0 / PI-LED EVG / 400mm	ZigBee 3.0	400	3,000	230	31
LTS-04530-15-CR	PI-LED Spot 4500LM / DALI DT8 / PI-LED EVG / 140mm	DALI DT8	140	4,500	230	48
LTS-04530-15-CR1	PI-LED Spot 4500LM / DALI DT8 / PI-LED EVG / 400mm	DALI DT8	400	4,500	230	48
LTS-04530-16-CR	PI-LED Spot 4500LM / ZigBee 3.0 / PI-LED EVG / 140mm	ZigBee 3.0	140	4,500	230	48
LTS-04530-16-CR1	PI-LED Spot 4500LM / ZigBee 3.0 / PI-LED EVG / 400mm	ZigBee 3.0	400	4,500	230	48

Energy

A++
A+
A
B
C
D
E

} L E D

▉▉ TECHNICAL DRAWINGS AND DATA - LED MODULES

LED module data / Lumen packages S and M

L/W [mm]	Design type	Light spots P / B / R	Light field diameter LES [mm]
46.5 x 44.0	Zhaga	13 / 6 / 10	23

LED module data / Lumen package L

L/W [mm]	Design type	Light spots P / B / R	Light field diameter LES [mm]
46.5 x 47.4	Zhaga	18 / 10 / 16	22.5

LED module / Lumen packages S and M

Size in mm

LED module / Lumen package L
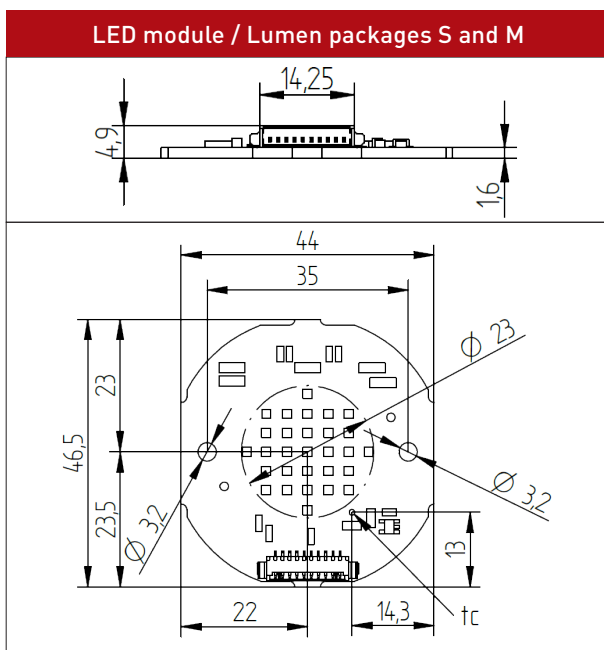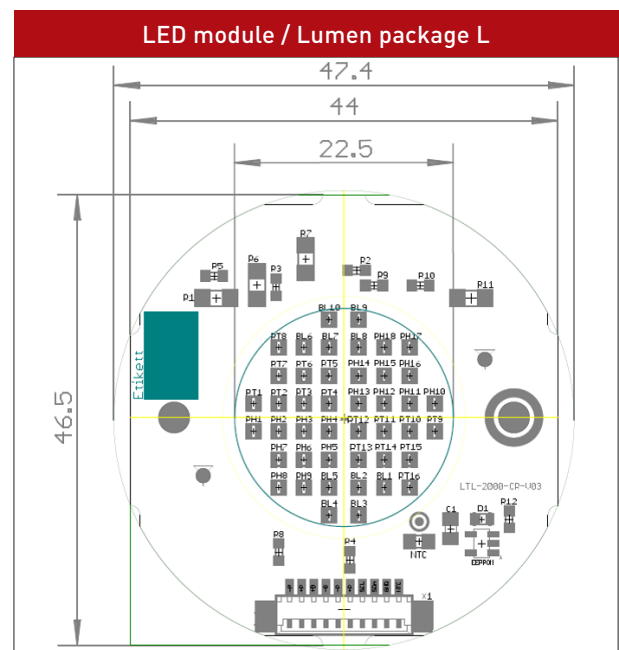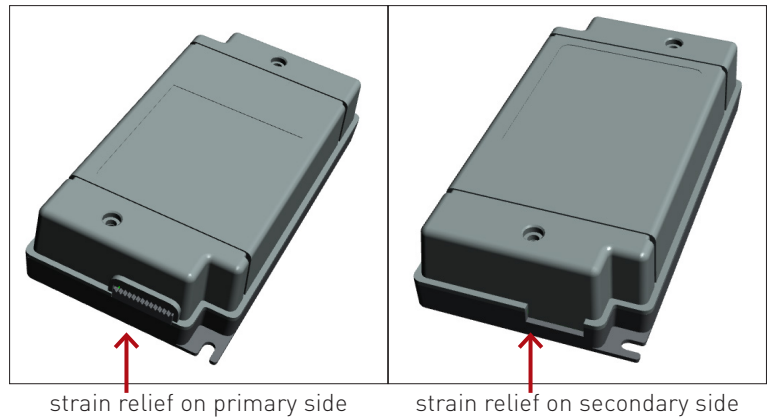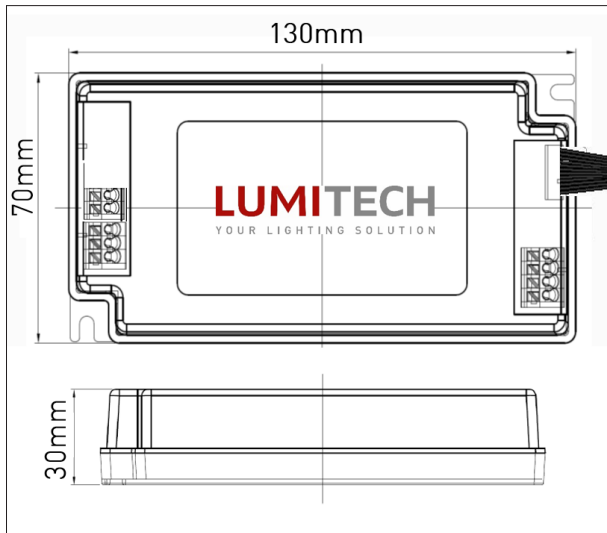

Size in mm

Notes:
- All values apply at ta=25°C, tc=65°C and 3000K
- Tolerance range of illumination data: +/-10%
- Tolerance range of electrical data: +/-15%
- Illumination specifications in accordance with CIE1931
- Tolerance range of supply voltages: 48V +/-5%
- If the supply voltage exceeds the max. permitted operating voltage, the PI-LED system will be overstressed. This will result in a highly reduced service life.
- If the maximum temperature limits are exceeded, the lifetime of the PI-LED system will be greatly reduced or the system may be damaged. Temperature measurements of the LED module or PI-LED system have to be taken in the thermally stable state by means of a temperature sensor as per EN60598-1.
- The maximum system power of the PI-LED DOWNLIGHT SYSTEM Zhaga with PI-LED ECG is limited to 23W / 35W / 50W due to its software.
- According to colour temperature and temperature of the PI-LED system, the Mac Adam tolerance takes on values < 4.
- All diagrams shown in this document show typical curves and not the exact behaviour of single LED modules.

TECHNICAL DRAWINGS AND DIMENSIONS - PI-LED ECG

130mm

70mm

30mm

strain relief on primary side

strain relief on secondary side

ACCESSORIES

1mm distance

ϕ 27,78

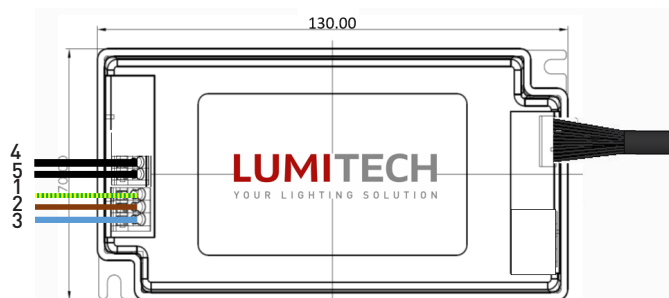| Type	Description
LTZ-LED-COVER-03	LED COVER WHITE LES 23MM
LTZ-LED-MIXINGCAP-03	MIXINGCAP for LED COVER WHITE LES 23MM

- Design of cover and mixing cap ist made for all PI-LED Downlight modules Zhaga
- Mixing cap made of silicon for maximum thermal resistance
- Homogeneous light output
- Transmission: 80%

DOWNLIGHT SYSTEM ZHAGA with PI-LED ECG

▮▮ CONNECTION - DALI DT8

130.00

Terminal connection

Terminal No.	Function
1	PE (230V AC connection)
2	L (230V AC connection)
3	N (230V AC connection)
4	DALI IN (no DALI polarity to be considered)
5	DALI IN (no DALI polarity to be considered)

▮▮ FUNCTIONAL DESCRIPTION - DALI DT8*

Mode	CCT	RGB	CIE
Colour	1,800K-16,000K	Channels separately controllable	PI-LED colour space
Brightness	1% - 100%		

Information:
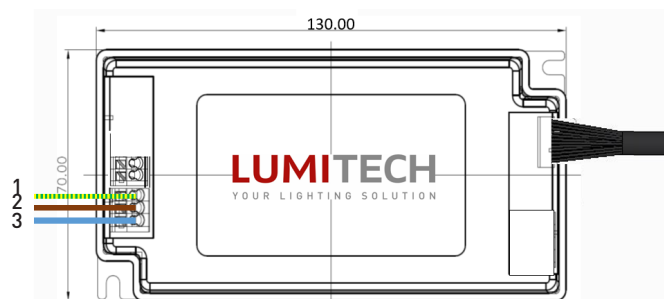*Colour accuracy in the colour mode (= RGB or CIE) is given only for CIE-xy points.*

Possible assignment to a maximum of 16 groups and 16 light scenes

Recommended control units:
• LTP-1028 (DALI Touchpanel DT8)
• LTP-1029 (DALI Display 7´´ DT8)
• K-WDALI-USB (DALI USB Stick), together with the PC-App myPI-LED
• K-DALI-CDC (DALI control for daylight curves)
• K-DALI-SEQ (DALI control for colour sequences)
• LTP-DARA0x (DARA L Device in various versions, x = 1-6)

A complete list of compatible DALI DT8 control devices is available on request.

*PI-LED systems with DALI interface are DALI1 / DALI Device Type 8 registered where colour control with regard to DALI Device Type 8 is fully implemented according to the underlying DALI standard. Since there is currently no possibility for testing products for compliance with the DALI Device Type 8 standard (no official DALI tester exisiting or available), a formal verification can not be provided.
"The DALI colour control functionality (part 209/Device Type 8) of this product has not been verified."

▮▮ CONNECTION - ZIGBEE 3.0

130.00

Terminal connection

Terminal No.	Function
1	PE (230V AC connection)
2	L (230V AC connection)
3	N (230V AC connection)

▮▮ FUNCTIONAL DESCRIPTION - ZIGBEE 3.0

Mode	CCT	RGB	CIE
Colour	1,800K–16,000K	Channels separately controllable	PI-LED colour space
Brightness	1% - 100%		

Possible assignment to groups and light scenes depending on control unit

Possible control units:
• LTP-1026 (NeoLink Box) together with the myPI-LED App for Android/iOS
• K-ZWALLY-1.2/2.2/3.2/4.2/5.2
• K-Z1001014 (ZigBee USB Stick), together with the PC-App myPI-LED

A complete list of compatible ZigBee 3.0 control devices is available on request.

▮▮ NOTES ON STANDARDS AND SECURITY POLICIES

EOS/ESD security police	The PI-LED DOWNLIGHT SYSTEM Zhaga with PI-LED ECG contains components that are sensitive to electrostatic discharge. It may only be installed if appropriate EOS/ESD protection in manufacturing and in application is applied.
CE - marking of the luminaire	The PI-LED DOWNLIGHT SYSTEM Zhaga with PI-LED ECG is tested according to the applicable standards (see Standards). Corresponding standard tests of the final product must be carried out separately.
Fulfilled standards	EN62031 — LED modules for general lighting - Safety specifications EN62471 — Photobiological safety of lamps and lamp systems EN61347-2-13 — Particular requirements for d.c. or a.c. supplied electronic control gear for LED modules ETSI EN 300 328 V2.1.1 — Wideband transmission systems - Data transmission equipment operating in the 2,4 GHz ISM band EN 301 489-3 — Electromagnetic compatibility and Radio spectrum Matters (ERM)

DOWNLIGHT SYSTEM ZHAGA with PI-LED ECG

## ▮▮ PHOTOMETRICAL PROPERTIES / VISUAL DATA AND DATA FOR MELANOPIC LIGHT DESIGN
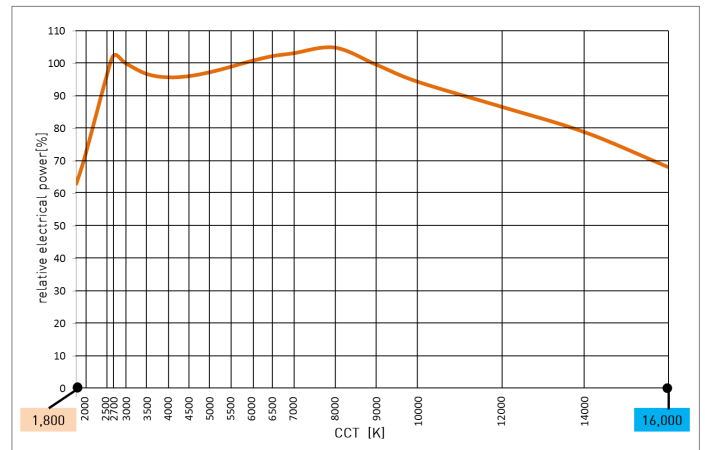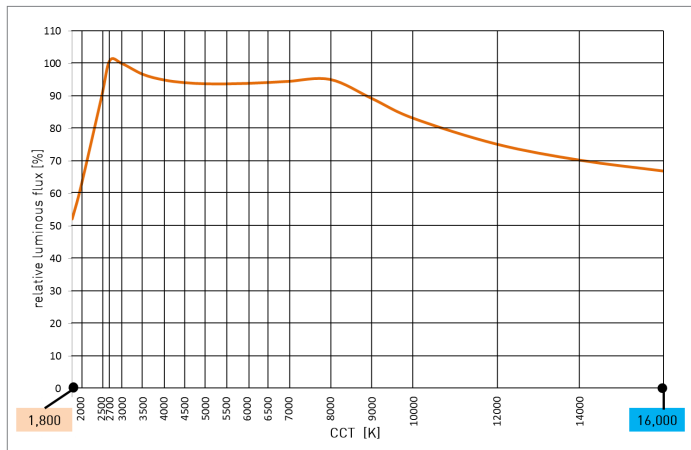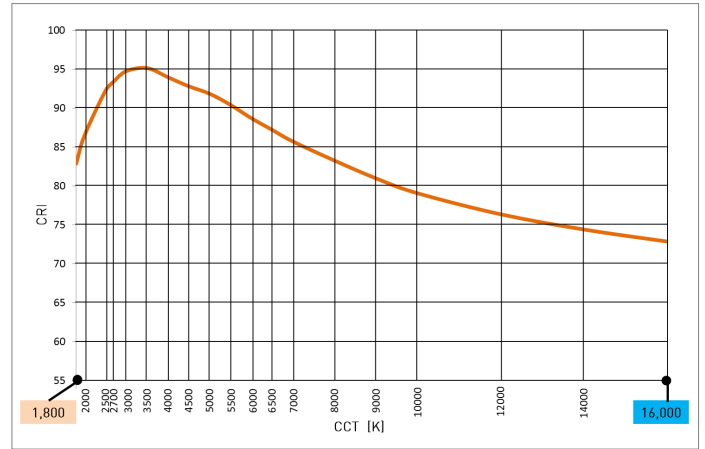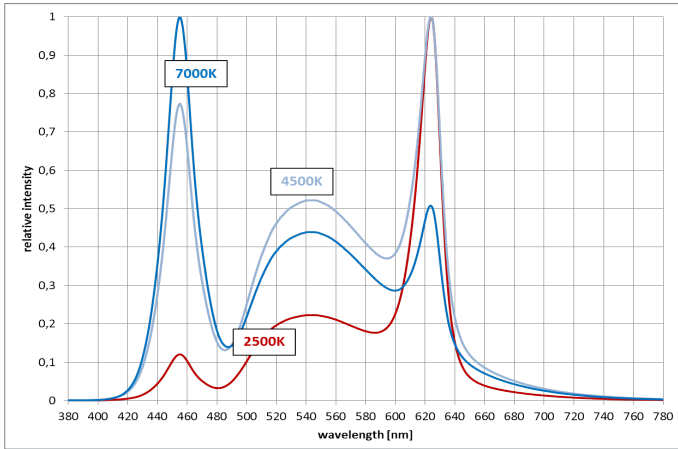
CCT [K]	general data			visual data		melanopic values (relevant for melanopic light design)				
	CRI	CIE-x	CIE-y	Luminous flux [lm]	Efficiency [lm/W]	alpha (smel)	alpha (smel) x correction factor 1.103	Luminous flux (smel, d65) in %	Efficiency (smel, d65) in lm/W	
				S / M / L / %	S / M / L				S / M / L	
1,800	82.7	0.5492	0.4082	1,196 / 1,560 / 2,340 / 52%	86 / 80 / 77	0.235	0.259	13	22 / 21 / 20	
2,000	86.2	0.5268	0.4133	1,425 / 1,860 / 2,790 / 62%	91 / 85 / 82	0.260	0.287	18	26 / 24 / 24	
2,500	92.0	0.4770	0.4137	2,045 / 2,670 / 4,005 / 89%	98 / 91 / 88	0.326	0.360	32	35 / 33 / 32	
2,700	93.2	0.4599	0.4106	2,325 / 3,030 / 4,545 / 101%	103 / 95 / 92	0.366	0.404	41	42 / 38 / 37	
3,000	93.7	0.4369	0.4041	2,300 / 3,000 / 4,500 / 100%	105 / 97 / 94	0.425	0.469	47	49 / 45 / 44	
3,500	93.5	0.4053	0.3907	2,230 / 2,910 / 4,365 / 97%	105 / 97 / 94	0.521	0.575	56	60 / 56 / 54	
4,000	92.3	0.3804	0.3767	2,185 / 2,850 / 4,275 / 95%	103 / 96 / 93	0.610	0.673	64	69 / 65 / 63	
4,500	90.8	0.3608	0.3635	2,160 / 2,820 / 4,230 / 94%	102 / 95 / 92	0.692	0.763	72	78 / 72 / 70	
5,000	90.5	0.3451	0.3516	2,160 / 2,820 / 4,230 / 94%.	101 / 94 / 91	0.766	0.845	79	85 / 79 / 77	
5,500	89.9	0.3324	0.3410	2,160 / 2,820 / 4,230 / 94%	99 / 92 / 89	0.833	0.919	86	91 / 85 / 82	
6,000	89.4	0.3221	0.3318	2,160 / 2,820 / 4,230 / 94%	97 / 90 / 87	0.893	0.985	93	96 / 89 / 86	
6,500	88.4	0.3135	0.3236	2,160 / 2,820 / 4,230 / 94%	96 / 89 / 86	0.947	1.045	98	100 / 93 / 90	
7,000	87.7	0.3064	0.3165	2,185 / 2,850 / 4,275 / 95%	96 / 89 / 86	0.995	1.097	104	105 / 98 / 94	
8,000	85.9	0.2952	0.3048	2,185 / 2,850 / 4,275 / 95%	95 / 88 / 85	1.077	1.188	113	113 / 105 / 101	
9,000	84.6	0.2869	0.2956	2,045 / 2,670 / 4,005 / 89%	93 / 86 / 83	1.144	1.262	112	117 / 109 / 105	
10,000	83.4	0.2806	0.2883	1,910 / 2,490 / 3,735 / 83%	92 / 85 / 83	1.198	1.321	110	122 / 112 / 110	
12,000	81.4	0.2718	0.2776	1,725 / 2,250 / 3,375 / 75%	90 / 83 / 81	1.282	1.414	106	127 / 117 / 115	
14,000	80.0	0.2659	0.2702	1,610 / 2,100 / 3,150 / 70%	93 / 86 / 83	1.342	1.480	104	138 / 127 / 123	
16,000	79.0	0.2618	0.2648	1,540 / 2,010 / 3,015 / 67%	103 / 95 / 92	1.385	1.528	102	157 / 145 / 141	

Remark: The coefficient alpha(smel) describes the melanopic effectiveness of the light source on humans and their circadian rhythm. To give the natural human biorhythm the best possible support, the melatonin production can be minimized by higher values of alpha(smel) throughout the day and stimulated by lower values in the evening.

PI-LED enables the implementation of an illumination that is not only visual but also biological/melanopic effective. For a standard-conforming lighting design, Lumitech recommends the document DIN SPEC 5031-100 to be taken as a basis.

▌▌ COORDINATES AND TOLERANCES ACCORDING TO CIE 1931
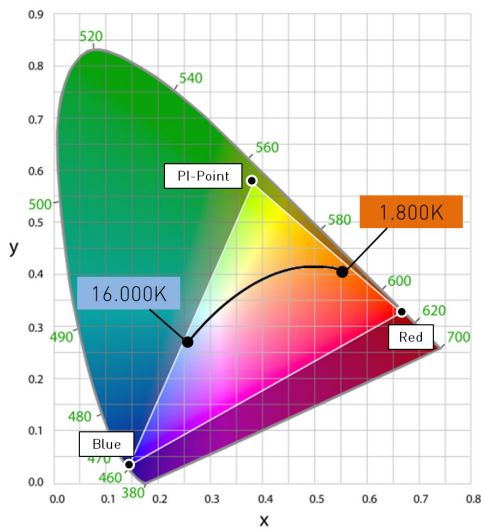
Representable PI-LED colour space in the CIE 1931 system

If a colour point outside of the triangle (PI-LED colour space) is set, the closest colour point within the triangle is referenced.

▌▌ LIFETIME LED MODULES

tp [°C]	L80B10 [h]
85°C	50,000

Notes:
- Value L is a statistical value, the actual drop in the luminous flux can vary across the delivered LED modules.
- tp-position = tc-position LED Module

▌▌ THERMAL CHARACTERISTICS

Ambient temperature	+10°C ... +45°C
Storage temperature	-20°C.. +80°C
$t_{c, max}$ LED Module	+85°C
$t_{c, max}$ LMU	+65°C

Lumitech PI-LED systems are equipped with integrated overtemperature protection that protects the LED module against thermal overloads.

If the temperature tc at the LED module reaches 85°C, power is reduced by lowering the brightness. If the temperature remains at that level or reaches 90°C, the LED is totally switched off. The LED module is switched on again when the temperature tc drops to below 65°C again.

Measured values for 3,000K

Measured values for 3,000K