

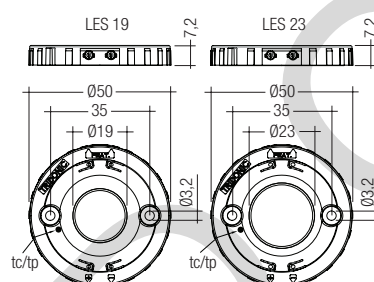
TALEXmodule STARK SLE GEN3 SELECT STARK SLE

Product description

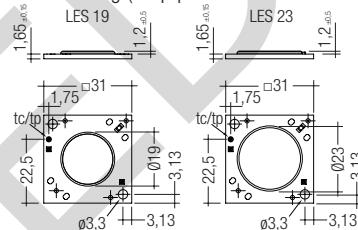
- For spotlights and downlights
- Luminous flux range from 1,110 – 6,020 lm
- High efficiency up to 112 lm/W for the LED module
- High system efficiency up to 95 lm/W at $t_p = 65^\circ\text{C}$
- BLO operation mode: Best LED Operation for optimum operation and constant luminous flux at all colour temperatures in combination with Tridonic LED control gear of TOP and ECO series
- High colour consistency (MacAdams 3)
- Small LES (light emitting surface) diameter enables small beam angle for spotlights
- Excellent thermal management by COB technology
- Uniform radiation with Dam&Fill technology
- Fixing holes for M3 screws
- Integrated LED module
- Cooling required
- Flexible operating modes
- 5-year guarantee

Technical data

Beam characteristic	140°
Ambient temperature t_a	-25 ... +50 °C
t_{p_rated} temperature ^①	65 °C
Max. t_c point temperature ^①	up to 90 °C
Risk group (EN 62471:2008)	1
Type of protection	IP00



With housing (tc/tp position same as without housing) – Dimensions in mm



PURE (without housing) – Dimensions in mm

Ordering data

Type	Article number	Colour temperature	Housing	Connection cable	Packaging	Weight per pc.
STARK-SLE-G3-19-2000-930-SEL	89601834	3,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-G3-19-2000-940-SEL	89601835	4,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-G3-19-3000-930-SEL	89601844	3,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-G3-19-3000-940-SEL	89601845	4,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-G3-23-3000-930-SEL	89601836	3,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-G3-23-3000-940-SEL	89601837	4,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-G3-23-4000-930-SEL	89601838	3,000 K	yes	no	15 pc(s).	0.010 kg
STARK-SLE-G3-23-4000-940-SEL	89601839	4,000 K	yes	no	15 pc(s).	0.009 kg
STARK-SLE-PURE-G3-19-2000-930-SEL	89601818	3,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-19-2000-940-SEL	89601819	4,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-19-3000-930-SEL	89601840	3,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-19-3000-940-SEL	89601841	4,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-23-3000-930-SEL	89601820	3,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-23-3000-940-SEL	89601821	4,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-23-4000-930-SEL	89601822	3,000 K	no	yes	20 pc(s).	0.009 kg
STARK-SLE-PURE-G3-23-4000-940-SEL	89601823	4,000 K	no	yes	20 pc(s).	0.009 kg



Standards, page 3

Colour temperatures and tolerances, page 12

ZHAGA relevant technical data, page 13 + 14

Specific technical data

Type®	Photo-metric code	Forward current® ④ ⑤	Luminous flux at tp = 25 °C®	Luminous flux at tp = 65 °C®	Power consumption®	Min. forward voltage at tp = 65 °C	Max. forward voltage at tp = 25 °C	Luminous efficacy module at tp = 25 °C	Luminous efficacy module at tp = 65 °C	Luminous efficacy system at tp = 65 °C®	Colour rendering index CRI	Energy classification
STARK-SLE-19-2000 – Operating mode HE at 350 mA												
STARK-SLE-G3-19-2000-930-SEL	930/349	350 mA	1,200 lm	1,110 lm	11.9 W	32.9 V	37.2 V	98 lm/W	93 lm/W	84 lm/W	90	A+
STARK-SLE-G3-19-2000-940-SEL	940/349	350 mA	1,360 lm	1,250 lm	11.9 W	32.9 V	37.2 V	111 lm/W	105 lm/W	95 lm/W	90	A+
STARK-SLE-19-2000 – Operating mode BLO												
STARK-SLE-G3-19-2000-930-SEL	930/349	–	1,930 lm	1,780 lm	21.5 W	34.6 V	38.9 V	88 lm/W	83 lm/W	75 lm/W	90	A
STARK-SLE-G3-19-2000-940-SEL	940/349	–	1,990 lm	1,830 lm	19.5 W	34.3 V	38.6 V	100 lm/W	94 lm/W	84 lm/W	90	A+
STARK-SLE-19-2000 – Operating mode HO at 1,050 mA												
STARK-SLE-G3-19-2000-930-SEL	930/349	1,050 mA	3,060 lm	2,800 lm	40.9 W	37.7 V	42.1 V	73 lm/W	68 lm/W	62 lm/W	90	A
STARK-SLE-G3-19-2000-940-SEL	940/349	1,050 mA	3,480 lm	3,170 lm	40.9 W	37.7 V	42.1 V	83 lm/W	78 lm/W	70 lm/W	90	A
STARK-SLE-19-3000 – Operating mode HE at 350 mA												
STARK-SLE-G3-19-3000-930-SEL	930/349	350 mA	1,200 lm	1,110 lm	11.7 W	32.2 V	36.5 V	101 lm/W	95 lm/W	85 lm/W	90	A+
STARK-SLE-G3-19-3000-940-SEL	940/349	350 mA	1,330 lm	1,230 lm	11.7 W	32.2 V	36.5 V	112 lm/W	105 lm/W	95 lm/W	90	A+
STARK-SLE-19-3000 – Operating mode BLO												
STARK-SLE-G3-19-3000-930-SEL	930/349	–	2,820 lm	2,590 lm	32.5 W	34.9 V	39.2 V	85 lm/W	80 lm/W	72 lm/W	90	A
STARK-SLE-G3-19-3000-940-SEL	940/349	–	2,830 lm	2,600 lm	28.5 W	34.4 V	38.7 V	97 lm/W	91 lm/W	82 lm/W	90	A+
STARK-SLE-19-3000 – Operating mode HO at 1,400 mA												
STARK-SLE-G3-19-3000-930-SEL	930/349	1,400 mA	4,040 lm	3,680 lm	54.0 W	37.4 V	41.8 V	73 lm/W	68 lm/W	61 lm/W	90	A
STARK-SLE-G3-19-3000-940-SEL	940/349	1,400 mA	4,490 lm	4,090 lm	54.0 W	37.4 V	41.8 V	81 lm/W	76 lm/W	68 lm/W	90	A
STARK-SLE-23-3000 – Operating mode HE at 500 mA												
STARK-SLE-G3-23-3000-930-SEL	930/349	500 mA	1,710 lm	1,520 lm	16.9 W	32.6 V	36.9 V	99 lm/W	90 lm/W	81 lm/W	90	A+
STARK-SLE-G3-23-3000-940-SEL	940/349	500 mA	1,940 lm	1,790 lm	16.9 W	32.6 V	36.9 V	112 lm/W	106 lm/W	95 lm/W	90	A+
STARK-SLE-23-3000 – Operating mode BLO												
STARK-SLE-G3-23-3000-930-SEL	930/349	–	2,750 lm	2,430 lm	30.0 W	34.1 V	38.5 V	90 lm/W	81 lm/W	73 lm/W	90	A
STARK-SLE-G3-23-3000-940-SEL	940/349	–	2,950 lm	2,700 lm	28.1 W	33.9 V	38.2 V	103 lm/W	96 lm/W	86 lm/W	90	A+
STARK-SLE-23-3000 – Operating mode HO at 1,400 mA												
STARK-SLE-G3-23-3000-930-SEL	930/349	1,400 mA	4,240 lm	3,680 lm	52.8 W	36.5 V	40.9 V	79 lm/W	70 lm/W	63 lm/W	90	A
STARK-SLE-G3-23-3000-940-SEL	940/349	1,400 mA	4,700 lm	4,270 lm	52.8 W	36.5 V	40.9 V	87 lm/W	81 lm/W	73 lm/W	90	A
STARK-SLE-23-4000 – Operating mode HE at 700 mA												
STARK-SLE-G3-23-4000-930-SEL	930/349	700 mA	2,460 lm	2,260 lm	23.8 W	32.9 V	37.2 V	101 lm/W	95 lm/W	85 lm/W	90	A+
STARK-SLE-G3-23-4000-940-SEL	940/349	700 mA	2,670 lm	2,410 lm	23.8 W	32.9 V	37.2 V	110 lm/W	101 lm/W	91 lm/W	90	A+
STARK-SLE-23-4000 – Operating mode BLO												
STARK-SLE-G3-23-4000-930-SEL	930/349	–	3,800 lm	3,520 lm	41.0 W	34.4 V	38.8 V	91 lm/W	86 lm/W	77 lm/W	90	A
STARK-SLE-G3-23-4000-940-SEL	940/349	–	4,050 lm	3,600 lm	39.0 W	34.3 V	38.6 V	102 lm/W	92 lm/W	83 lm/W	90	A+
STARK-SLE-23-4000 – Operating mode HO at 1,750 mA												
STARK-SLE-G3-23-4000-930-SEL	930/349	1,750 mA	5,400 lm	5,020 lm	66.0 W	36.5 V	40.9 V	80 lm/W	76 lm/W	68 lm/W	90	A
STARK-SLE-G3-23-4000-940-SEL	940/349	1,750 mA	6,020 lm	5,200 lm	66.0 W	36.5 V	40.9 V	89 lm/W	79 lm/W	71 lm/W	90	A

® If the max. temperature limits are exceeded, the life of the system will be greatly reduced or the system may be damaged.

The temperature of the TALEX® module at the tp-point is to be measured in the thermally stable state with a temperature sensor or or temperature-sensitive sticker as per EN 60598-1. For the precise position of the tp point see the drawing above.

® Tolerance range for optical data: ±10 %.

® Exceeding the max. operating current leads to an overload on the TALEX® module. This may in turn result in a significant reduction in life-time or even destruction of the TALEX® module.

® Max. permissible surge current: 3 A, duration max. 10 µs.

® Max. permissible repetitive peak current for STARK-SLE-G3-19-2000 is 1,200 mA. Max. permissible repetitive peak current for STARK-SLE-G3-19-3000 is 1,680 mA. Max. permissible repetitive peak current for STARK-SLE-G3-23-3000 is 1,920 mA. Max. permissible repetitive peak current for STARK-SLE-G3-23-4000 is 2,400 mA.

® HE ... high efficiency, BLO ... best LED operation (see page 4), HO ... high output.

® Assumed efficiency for the LED control gear is 0.9.

® All values at tp = 65 °C.

Standards

EN 62031
EN 62471
EN 61547
EN 55015
IEC 62717

Glow wire test

according to EN 62031 with increased temperature of 960 °C passed.

Photometric code

Key for photometric code, e. g. 930 / 349

1 st digit	2 nd + 3 rd digit	4 th digit	5 th digit	6 th digit
Code CRI	Colour temperature in Kelvin x 100	McAdams initial	McAdams after 25% of the life-time (max.6000h)	Luminous flux after 25% of the life-time (max.6000h)
7 67 – 76				Code Luminous flux
8 77 – 86				7 ≥ 70 %
9 87 – ≥90				8 ≥ 80 % 9 ≥ 90 %

Thermal design and heat sink

The rated life of TALEX products depends to a large extent on the temperature. If the permissible temperature limits are exceeded, the life of the TALEXmodule STARK SLE G3 will be greatly reduced or the TALEXmodule STARK SLE G3 may be destroyed.

Therefore the TALEXmodule STARK SLE G3 needs to be mounted onto a heat sink heat sink which does not exceed the value for $R_{th,max}$.

Tridonic's excellent thermal design for the TALEXmodule STARK SLE G3 products provides the lowest thermal resistance and therefore allowing new compact designs without sacrificing quality, safety and life-time.

tp point, ambient temperature and life-time

The temperature at tp reference point is crucial for the light output and life-time of a TALEX product.

The operating temperature of a Talex product is crucial for the light output, the product life-time but also for the product safety.

The thermal limits can be checked at the tp/tc point and at tr.

On page 10 the lumen maintenance is shown in relation to the temperature at tp. tp,rated shows the temperature at which the rated values are reached.

tc shows the thermal limit for safety reason und must never be exceeded under normal conditions.

For the interchangeability with othe Zhaga products, $t_{r,max}$ is specified directly at the thermal interface to the heatsink of the luminaire.

For TALEXmodule STARK SLE G3 a tp temperature of 65 °C has to be complied in order to achieve an optimum between heat sink requirements, light output and life-time.

Compliance with the maximum permissible reference temperature at the tp point must be checked under operating conditions in a thermally stable state. The maximum value must be determined under worst-case conditions for the relevant application.

**Mounting instruction**

TALEXmodule STARK SLE G3 from Tridonic which have to be installed on a heat sink have to be connected with heat-conducting paste or heat conducting adhesive film and fixed with M3 screws.

The fixing/cooling surface must be cleaned before installing the TALEX modules to remove all dirt, dust and grease.



None of the components of the TALEXmodule STARK SLE G3 (substrate, LED, electronic components etc.) may be exposed to tensile or compressive stresses.

Max. torque for fixing: 0.5 Nm.

The PURE modules are mounted with 2 screws per module. In order not to damage the modules only rounded head screws and an additional plastic flat washer should be used.

For further information please refer to to the brochure entitled "Technical Design-In-Guide SLE GEN3".



Chemical substance may harm the LED module. Chemical reactions could lead to colour shift, reduced luminous flux or a total failure of the module caused by corrosion of electrical connections.

Materials which are used in LED applications (e.g. sealings, adhesives) must not produce dissolver gas. They must not be condensation curing based, acetate curing based or contain sulfur, chlorine or phthalate. Avoid corrosive atmosphere during usage and storage.

**EOS/ESD safety guidelines**

The device / module contains components that are sensitive to electrostatic discharge and may only be installed in the factory and on site if appropriate EOS/ESD protection measures have been taken. No special measures need be taken for devices/modules with enclosed casings (contact with the pc board not possible), just normal installation practice. Please note the requirements set out in the document EOS / ESD guidelines (Guideline_EOS_ESD.pdf) at: <http://www.tridonic.com/esd-protection>

Electrical supply/choice of LED control gear

TALEXmodule STARK SLE G3 from Tridonic are not protected against overvoltages, overcurrents, overloads or short-circuit currents. Safe and reliable operation can only be guaranteed in conjunction with a LED control gear which complies with the relevant standards. The use of TALEX LED control gears from Tridonic in combination with TALEXmodule STARK SLE G3 guarantees the necessary protection for safe and reliable operation.



TALEXmodule STARK SLE G3 are basic isolated up to 110 V against ground and can be mounted directly on earthed metal parts of the luminaire. If the max. output voltage of the led control gear (also against earth) is above 110 V, an additional isolation between LED module and heat sink is required (for example by isolated thermal pads) or by a suitable luminaire construction.

At voltages > 60 V an additional protection against direct touch (test finger) to the light emitting side of the module has to be guaranteed. This is typically achieved by means of a non removable light distributor over the module.

If a LED control gear other than Tridonic TALEXconverter is used, it must provide the following protection:

- Short-circuit protection
- Overload protection
- Overtemperature protection



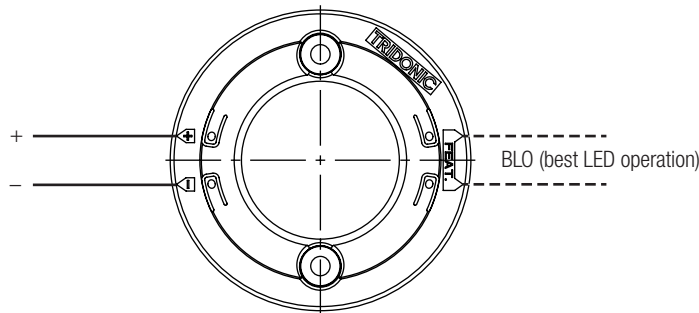
TALEXmodule STARK SLE G3 must be supplied by a constant current LED control gear.

Operation with a constant voltage LED control gear will lead to an irreversible damage of the module.

Wrong polarity can damage the TALEXmodule STARK SLE G3.

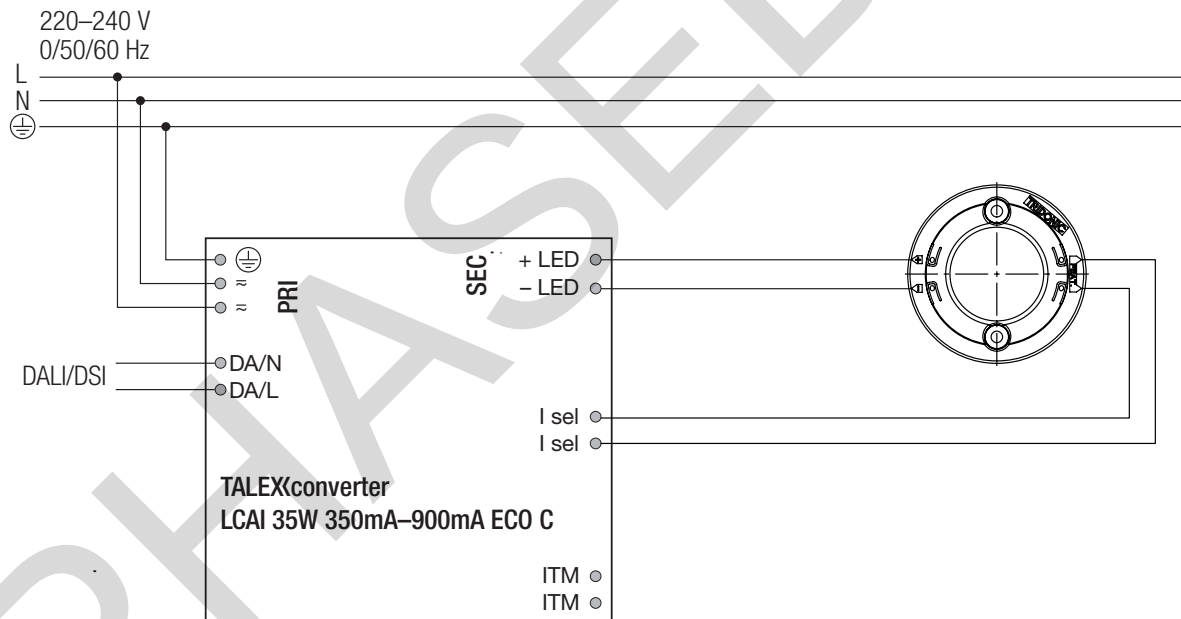
BLO function (Best LED Operation)

The BLO function is available for Tridonic LED control gear of ECO and TOP series.
The function ensures that the LED light module is operated with an optimal balance between luminous flux, efficiency and power.
To achieve this the I-select terminal of the LED control gear is connected to the FEAT terminal of the LED light module. The current is set via the resistor which is integrated at the FEAT terminal. Connecting a resistor to the I-select terminal of the LED control gear is not necessary anymore.



TALEXmodule STARK SLE G3 has no temperature monitoring (NTC).
The temperature monitoring is available with Tridonic LED control gear series TOP (up to 35 W) and ECO with the ITM feature in combination with the thermal sensor KTY82/210.

Wiring diagram: Example with TALEXconverter LCAI 35W 350mA–900mA ECO C



Control gears for BLO function

Module	Forward current	Power consumption module	Min. forward voltage module	Max. Forward voltage module	Dimmable LED control gear	Non-dimmable LED control gear
LES19-2000-930-SEL	600 mA	21.5 W	34.6 V	38.9 V	LCAI 35W 350-900mA ECO	LCI 35W 350-900mA TOP
LES19-2000-940-SEL	550 mA	19.5 W	34.3 V	38.6 V	LCAI 35W 350-900mA ECO	LCI 35W 350-900mA TOP
LES19-3000-930-SEL	900 mA	32.5 W	34.9 V	39.2 V	LCAI 35W 350-900mA ECO	LCI 35W 350-900mA TOP
LES19-3000-940-SEL	800 mA	28.5 W	34.4 V	38.7 V	LCAI 35W 350-900mA ECO	LCI 35W 350-900mA TOP
LES23-3000-930-SEL	850 mA	30.0 W	34.1 V	38.5 V	LCAI 35W 350-900mA ECO	LCI 35W 350-900mA TOP
LES23-3000-940-SEL	800 mA	28.1 W	33.9 V	38.2 V	LCAI 35W 350-900mA ECO	LCI 35W 350-900mA TOP
LES23-4000-930-SEL	1,150 mA	41.0 W	34.4 V	38.8 V	LCAI 55W 900-1750mA ECO	LCI 55W 900-1750mA TOP
LES23-4000-940-SEL	1,100 mA	39.0 W	34.3 V	38.6 V	LCAI 55W 900-1750mA ECO	LCI 55W 900-1750mA TOP

Heat sink values

TALEXmodule STARK-SLE-G3-19-2000 SELECT

ta	tp	Operation mode	Colour temperature	R _{th, hs-a}
25 °C	65 °C	HE	3,000 / 4,000 K	4.91 K/W
30 °C	65 °C	HE	3,000 / 4,000 K	4.29 K/W
40 °C	65 °C	HE	3,000 / 4,000 K	3.05 K/W
50 °C	65 °C	HE	3,000 / 4,000 K	1.81 K/W
25 °C	65 °C	BLO	3,000 K	2.56 K/W
30 °C	65 °C	BLO	3,000 K	2.24 K/W
40 °C	65 °C	BLO	3,000 K	1.58 K/W
50 °C	65 °C	BLO	3,000 K	0.93 K/W
25 °C	65 °C	BLO	4,000 K	3.00 K/W
30 °C	65 °C	BLO	4,000 K	2.61 K/W
40 °C	65 °C	BLO	4,000 K	1.85 K/W
50 °C	65 °C	BLO	4,000 K	1.09 K/W
25 °C	65 °C	HO	3,000 / 4,000 K	1.23 K/W
30 °C	65 °C	HO	3,000 / 4,000 K	1.07 K/W
40 °C	65 °C	HO	3,000 / 4,000 K	0.75 K/W
50 °C	65 °C	HO	3,000 / 4,000 K	0.43 K/W

TALEXmodule STARK-SLE-G3-19-3000 SELECT

ta	tp	Operation mode	Colour temperature	R _{th, hs-a}
25 °C	65 °C	HE	3,000 / 4,000 K	5.07 K/W
30 °C	65 °C	HE	3,000 / 4,000 K	4.43 K/W
40 °C	65 °C	HE	3,000 / 4,000 K	3.15 K/W
50 °C	65 °C	HE	3,000 / 4,000 K	1.87 K/W
25 °C	65 °C	BLO	3,000 K	1.65 K/W
30 °C	65 °C	BLO	3,000 K	1.44 K/W
40 °C	65 °C	BLO	3,000 K	1.01 K/W
50 °C	65 °C	BLO	3,000 K	0.59 K/W
25 °C	65 °C	BLO	4,000 K	2.01 K/W
30 °C	65 °C	BLO	4,000 K	1.75 K/W
40 °C	65 °C	BLO	4,000 K	1.24 K/W
50 °C	65 °C	BLO	4,000 K	0.72 K/W
25 °C	65 °C	HO	3,000 / 4,000 K	0.92 K/W
30 °C	65 °C	HO	3,000 / 4,000 K	0.80 K/W
40 °C	65 °C	HO	3,000 / 4,000 K	0.55 K/W
50 °C	65 °C	HO	3,000 / 4,000 K	0.31 K/W

TALEXmodule STARK-SLE-G3-23-3000 SELECT

ta	tp	Operation mode	Colour temperature	R _{th, hs-a}
25 °C	65 °C	HE	3,000 / 4,000 K	3.51 K/W
30 °C	65 °C	HE	3,000 / 4,000 K	3.06 K/W
40 °C	65 °C	HE	3,000 / 4,000 K	2.17 K/W
50 °C	65 °C	HE	3,000 / 4,000 K	1.28 K/W
25 °C	65 °C	BLO	3,000 K	1.86 K/W
30 °C	65 °C	BLO	3,000 K	1.62 K/W
40 °C	65 °C	BLO	3,000 K	1.14 K/W
50 °C	65 °C	BLO	3,000 K	0.66 K/W
25 °C	65 °C	BLO	4,000 K	2.09 K/W
30 °C	65 °C	BLO	4,000 K	1.83 K/W
40 °C	65 °C	BLO	4,000 K	1.29 K/W
50 °C	65 °C	BLO	4,000 K	0.75 K/W
25 °C	65 °C	HO	3,000 / 4,000 K	0.97 K/W
30 °C	65 °C	HO	3,000 / 4,000 K	0.84 K/W
40 °C	65 °C	HO	3,000 / 4,000 K	0.59 K/W
50 °C	65 °C	HO	3,000 / 4,000 K	0.33 K/W

TALEXmodule STARK-SLE-G3-23-4000 SELECT

ta	tp	Operation mode	Colour temperature	R _{th, hs-a}
25 °C	65 °C	HE	3,000 / 4,000 K	2.45 K/W
30 °C	65 °C	HE	3,000 / 4,000 K	2.14 K/W
40 °C	65 °C	HE	3,000 / 4,000 K	1.51 K/W
50 °C	65 °C	HE	3,000 / 4,000 K	0.89 K/W
25 °C	65 °C	BLO	3,000 K	1.34 K/W
30 °C	65 °C	BLO	3,000 K	1.17 K/W
40 °C	65 °C	BLO	3,000 K	0.82 K/W
50 °C	65 °C	BLO	3,000 K	0.47 K/W
25 °C	65 °C	BLO	4,000 K	1.46 K/W
30 °C	65 °C	BLO	4,000 K	1.27 K/W
40 °C	65 °C	BLO	4,000 K	0.90 K/W
50 °C	65 °C	BLO	4,000 K	0.52 K/W
25 °C	65 °C	HO	3,000 / 4,000 K	0.77 K/W
30 °C	65 °C	HO	3,000 / 4,000 K	0.67 K/W
40 °C	65 °C	HO	3,000 / 4,000 K	0.46 K/W
50 °C	65 °C	HO	3,000 / 4,000 K	0.26 K/W

Notes

The actual cooling can differ because of the material, the structural shape, outside influences and the installation situation. A thermal connection between TALEXmodule STARK SLE G3 and heat sink with heat-conducting paste or heat conducting adhesive film is absolutely necessary.

Additionally the TALEXmodule STARK SLE G3 has to be fixed on the heat sink with M3 screws to optimise the thermal connection.

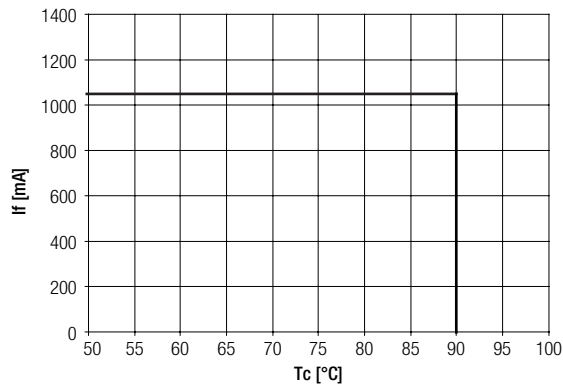
Use of thermal interface material with thermal conductivity of $\lambda > 1 \text{ W/mK}$ and layer thickness of interface material with max. 50 μm or a similar interface material where the quotient of layer thickness and thermal conductivity $b < 50 \mu\text{mmK/W}$.

Thermal behaviour

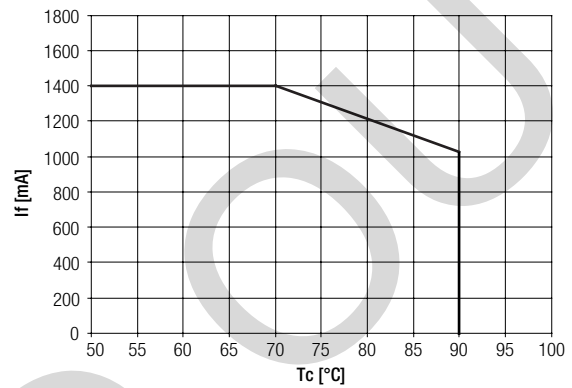
storage temperature	-30 ... +80 °C
operating temperature t_a	-25 ... +50 °C
t_p (at typ. current)	65 °C
t_c max. (at typ. current)	acc. to the derating curves
max. humidity*	0 ... 80 %

* not condensed

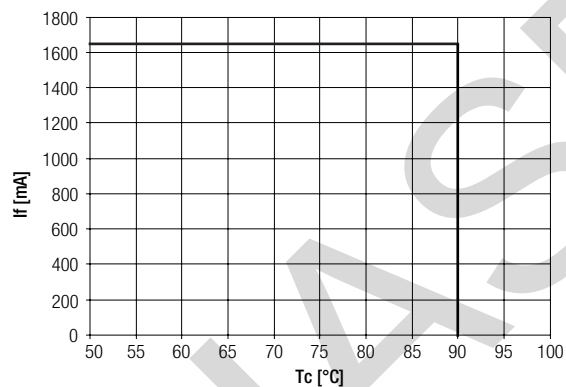
Derating curve for TALEXmodule STARK SLE G3 19-2000 SELECT



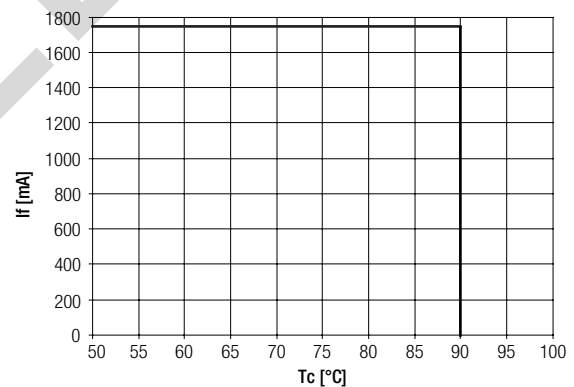
Derating curve for TALEXmodule STARK SLE G3 19-3000 SELECT



Derating curve for TALEXmodule STARK SLE G3 23-3000 SELECT



Derating curve for TALEXmodule STARK SLE G3 23-4000 SELECT



Life-time, lumen maintenance and failure rate

The light output of an LED Module decreases over the life-time, this is characterized with the L value.

L70 means that the LED module will give 70 % of its initial luminous flux. This value is always related to the number of operation hours and therefore defines the life-time of an LED module.

As the L value is a statistical value and the lumen maintenance may vary over the delivered LED modules.

The B value defines the amount of modules which are below the specific L value, e.g. L70B10 means 10 % of the LED modules are below 70 % of the initial luminous flux, respectively 90 % will be above 70 % of the initial value. In addition the percentage of failed modules (fatal failure) is characterized by the C value.

The F value is the combination of the B and C value. That means for F degradation and complete failures are considered, e.g. L70F10 means 10 % of the LED modules may fail or be below 70 % of the initial luminous flux.

Lumen maintenance for TALEXmodule STARK SLE G3 19-2000 SELECT

Operating mode	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
HE	65 °C	55,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	41,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	31,000 h	47,000 h	60,000 h	60,000 h	60,000 h	60,000 h
BLO	65 °C	44,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	33,000 h	49,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	25,000 h	37,000 h	53,000 h	60,000 h	60,000 h	60,000 h
HO	65 °C	24,000 h	36,000 h	51,000 h	60,000 h	60,000 h	60,000 h
	75 °C	18,000 h	27,000 h	38,000 h	57,000 h	60,000 h	60,000 h
	85 °C	14,000 h	20,000 h	29,000 h	43,000 h	46,000 h	60,000 h

Lumen maintenance for TALEXmodule STARK SLE G3 19-3000 SELECT

Operating mode	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
HE	65 °C	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	44,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	33,000 h	50,000 h	60,000 h	60,000 h	60,000 h	60,000 h
BLO	65 °C	42,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	31,000 h	47,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	24,000 h	36,000 h	50,000 h	60,000 h	60,000 h	60,000 h
HO	65 °C	26,000 h	40,000 h	56,000 h	60,000 h	60,000 h	60,000 h
	75 °C	20,000 h	30,000 h	42,000 h	60,000 h	60,000 h	60,000 h
	85 °C	15,000 h	22,000 h	32,000 h	47,000 h	50,000 h	60,000 h

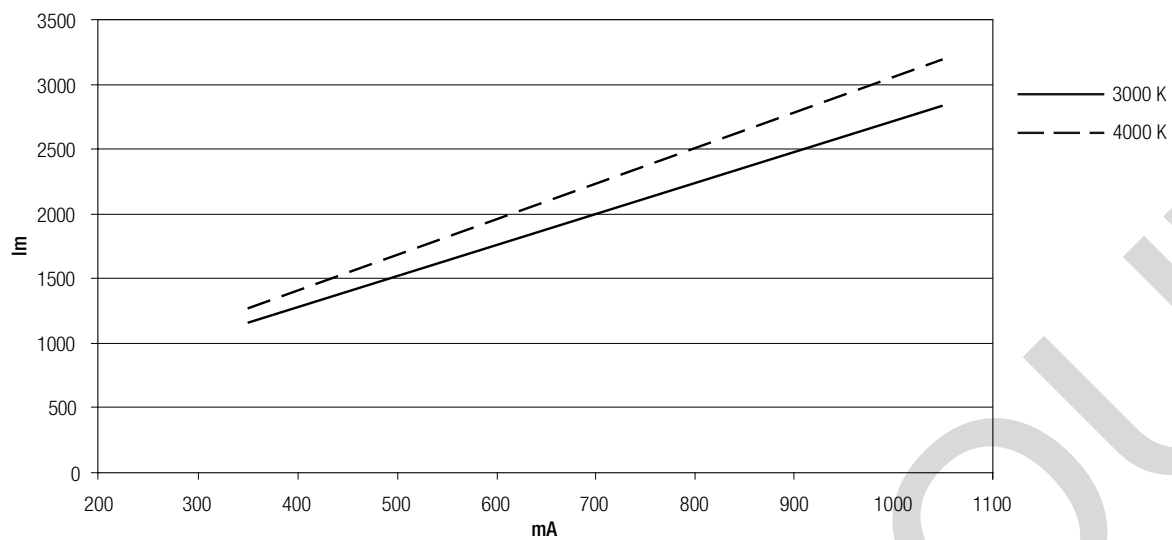
Lumen maintenance for TALEXmodule STARK SLE G3 23-3000 SELECT

Operating mode	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
HE	65 °C	57,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	42,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	32,000 h	48,000 h	60,000 h	60,000 h	60,000 h	60,000 h
BLO	65 °C	46,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	34,000 h	51,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	26,000 h	39,000 h	55,000 h	60,000 h	60,000 h	60,000 h
HO	65 °C	32,000 h	48,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	24,000 h	36,000 h	50,000 h	60,000 h	60,000 h	60,000 h
	85 °C	18,000 h	27,000 h	38,000 h	57,000 h	60,000 h	60,000 h

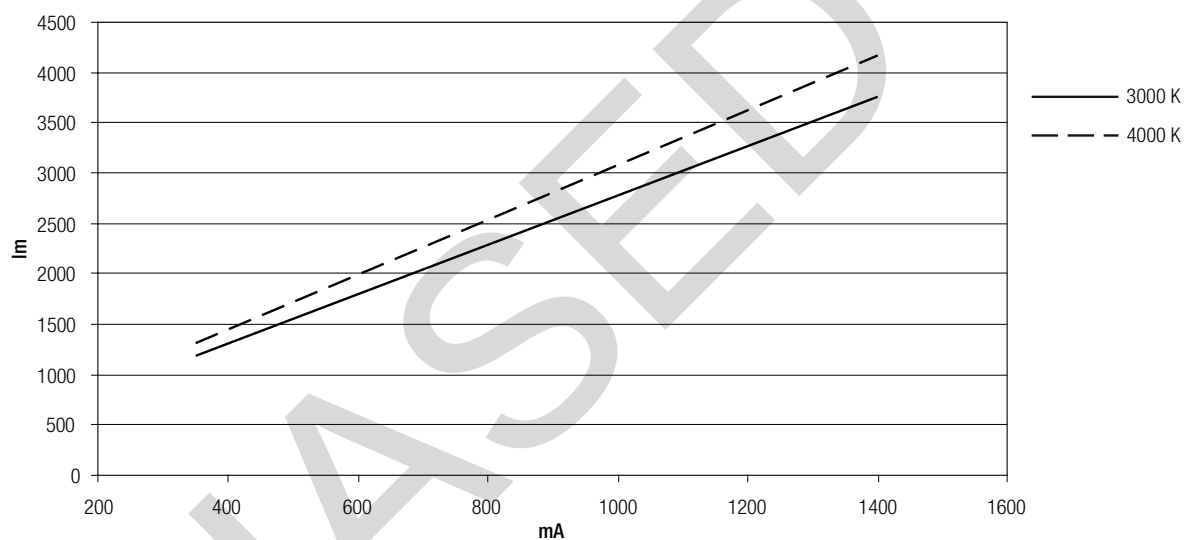
Lumen maintenance for TALEXmodule STARK SLE G3 23-4000 SELECT

Operating mode	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
HE	65 °C	55,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	41,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	31,000 h	47,000 h	60,000 h	60,000 h	60,000 h	60,000 h
BLO	65 °C	45,000 h	60,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	34,000 h	50,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	85 °C	25,000 h	38,000 h	54,000 h	60,000 h	60,000 h	60,000 h
HO	65 °C	32,000 h	48,000 h	60,000 h	60,000 h	60,000 h	60,000 h
	75 °C	24,000 h	36,000 h	50,000 h	60,000 h	60,000 h	60,000 h
	85 °C	18,000 h	27,000 h	38,000 h	57,000 h	60,000 h	60,000 h

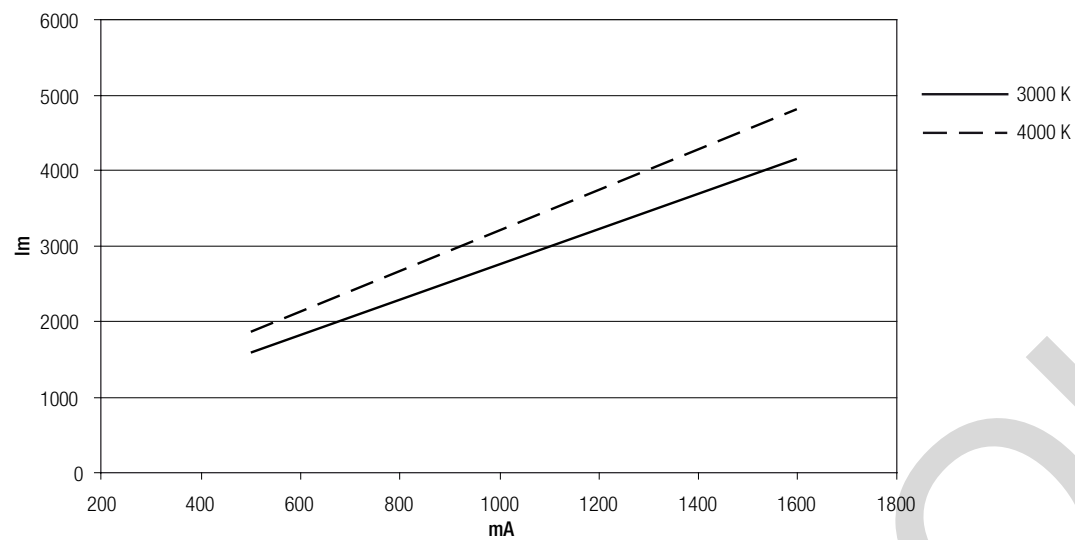
Luminous flux and operating current for TALEX(module STARK-SLE-G3-19-2000 SELECT at $t_p = 65^\circ\text{C}$



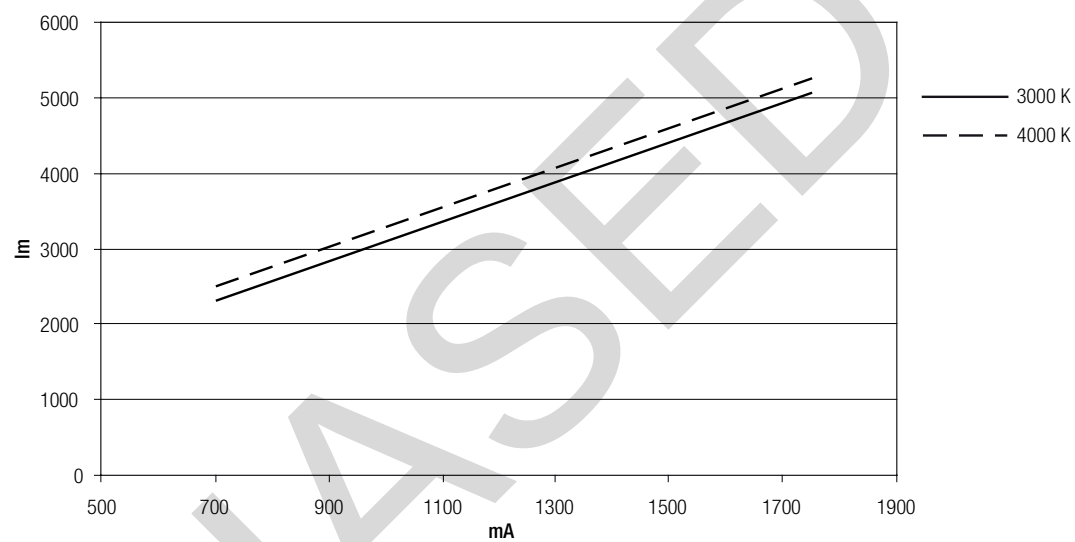
Luminous flux and operating current for TALEX(module STARK-SLE-G3-19-3000 SELECT at $t_p = 65^\circ\text{C}$



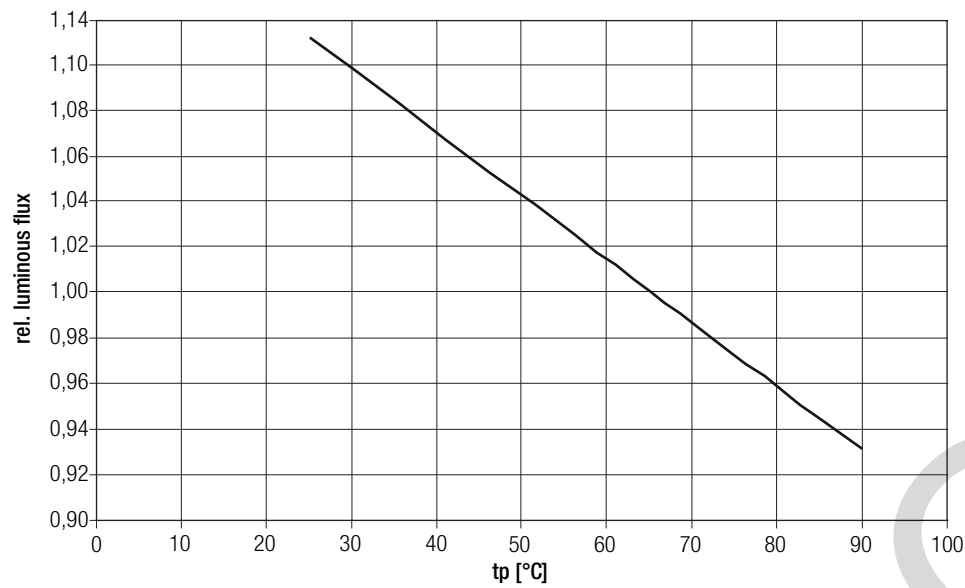
Luminous flux and operating current for TALEX(module STARK-SLE-G3-23-3000 SELECT at $t_p = 65^\circ\text{C}$



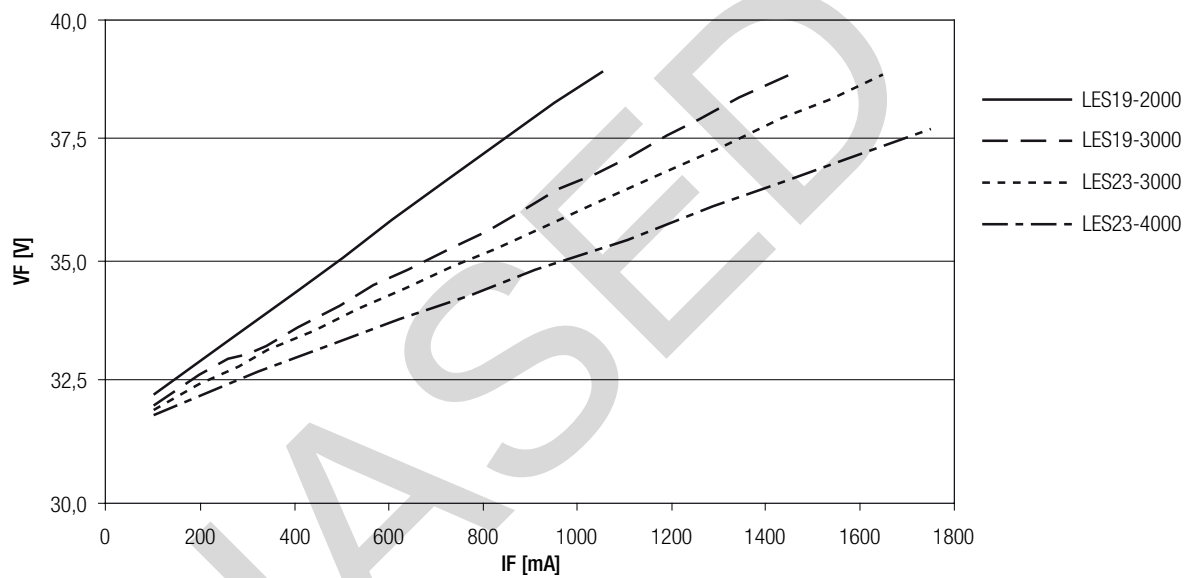
Luminous flux and operating current for TALEX(module STARK-SLE-G3-23-4000 SELECT at $t_p = 65^\circ\text{C}$



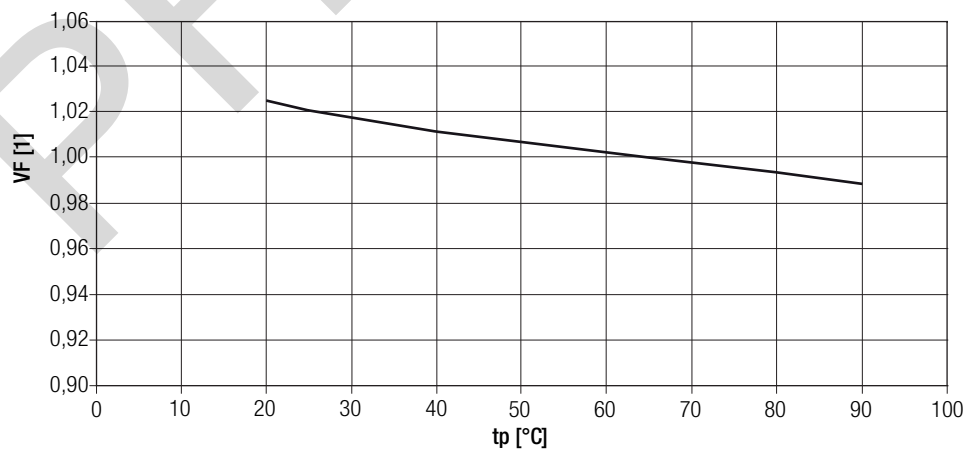
Relative luminous flux



Forward current vs. forward voltage

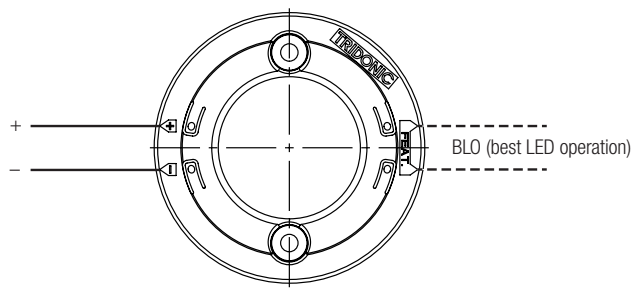


tp temperature vs. forward voltage

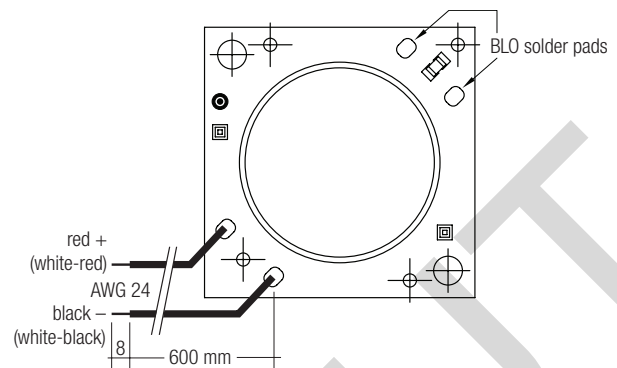


The diagrams based on statistic values.
The real values can be different.

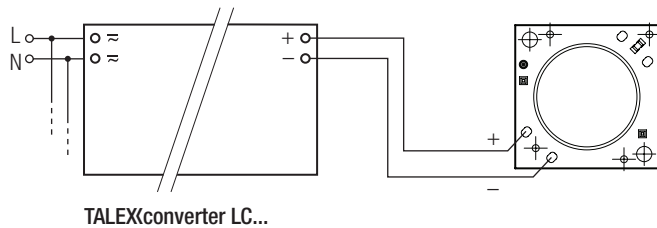
Wiring with housing



Wiring without housing



Wiring example

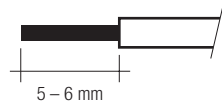


Wiring type and cross section

The wiring has to be solid cable with a cross section of 0.5 to 0.75 mm² or with stranded wire with soldered ends with a cross section of 0.5 mm².
For the push-wire connection you have to strip the insulation (5 – 6 mm).

Removing wires by lightly pressing on the push button.

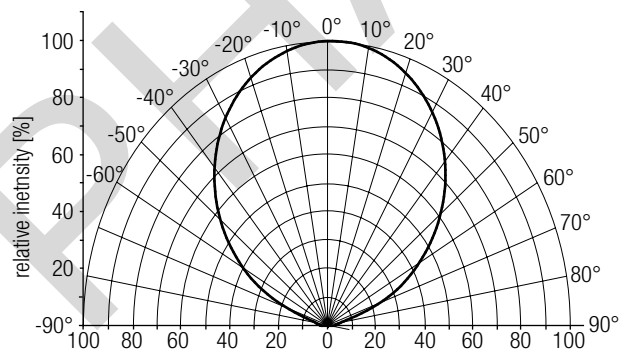
wire preparation:



Optical characteristics TALEXmodule STARK SLE G3

The optical design of the TALEXmodule STARK SLE G3 product line ensures optimum homogeneity for the light distribution.

Light distribution



Coordinates and tolerances according to CIE 1931

The specified colour coordinates are measured integral after a settling time of 200 ms. The current impuls depends on the module type.

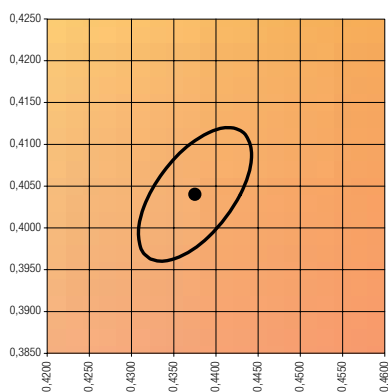
Module type	Current impulse
TALEXmodule STARK-SLE-G3-19-2000 SELECT	700 mA
TALEXmodule STARK-SLE-G3-19-3000 SELECT	1,050 mA
TALEXmodule STARK-SLE-G3-23-3000 SELECT	1,050 mA
TALEXmodule STARK-SLE-G3-23-4000 SELECT	1,400 mA

The ambient temperature of the measurement is $t_a = 25^\circ\text{C}$.

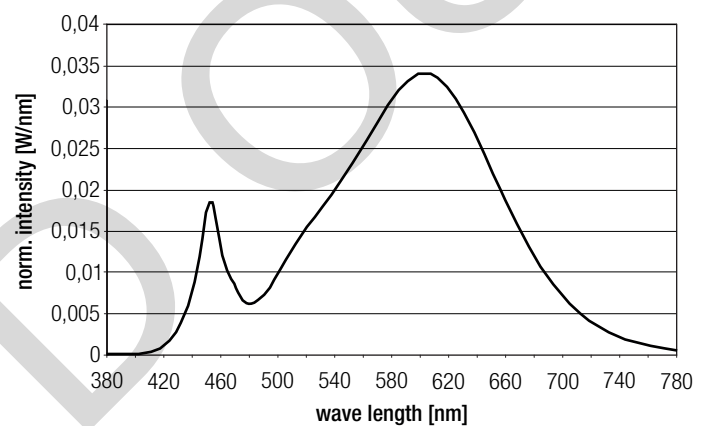
The measurement tolerance of the colour coordinates are ± 0.01 .

3,000 K

	x0	y0
Centre	0.4369	0.4041

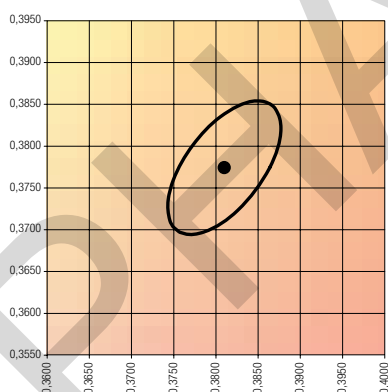


MacAdam ellipse: 3SDCM

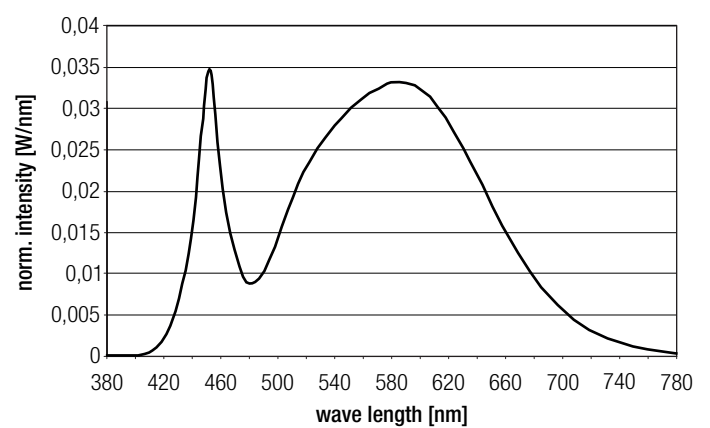


4,000 K

	x0	y0
Centre	0.3804	0.3767



MacAdam ellipse: 3SDCM



ZHAGA relevant technical data

Specific technical data

Type	Photo-metric code	Forward current ^① ④ ⑤	Luminous flux at tp = 25 °C ^②	Luminous flux at tp = 65 °C ^②	Power consumption module ^⑥	Min. forward voltage at tp = 65 °C	Max. forward voltage at tp = 25 °C	Luminous efficacy module at tp = 25 °C	Luminous efficacy module at tp = 65 °C	Luminous efficacy system at tp = 65 °C	Colour rendering index CRI	Energy classification
STARK-SLE-G3-19-2000-930-SEL	930/349	700 mA	2,200 lm	2,030 lm	25.6 W	35.3 V	39.6 V	84 lm/W	79 lm/W	71 lm/W	90	A
STARK-SLE-G3-19-3000-930-SEL	930/349	700 mA	2,270 lm	2,090 lm	24.6 W	33.9 V	38.2 V	90 lm/W	85 lm/W	76 lm/W	90	A
STARK-SLE-G3-23-3000-930-SEL	930/349	1,050 mA	3,310 lm	2,910 lm	38.0 W	35.0 V	39.3 V	85 lm/W	77 lm/W	69 lm/W	90	A
STARK-SLE-G3-23-4000-930-SEL	930/349	1,050 mA	3,510 lm	3,250 lm	37.0 W	34.1 V	38.4 V	93 lm/W	88 lm/W	79 lm/W	90	A+

① If the max. temperature limits are exceeded, the life of the system will be greatly reduced or the system may be damaged.
The temperature of the TALEX module at the tp-point is to be measured in the thermally stable state with a temperature sensor or or temperature-sensitive sticker as per EN 60598-1. For the precise position of the tp point see the drawing above.

② Tolerance range for optical data: ±10 %.

③ Exceeding the max. operating current leads to an overload on the TALEX module. This may in turn result in a significant reduction in life-time or even destruction of the TALEX module.

④ Max. permissible surge current: 3 A, duration max. 10 µs.

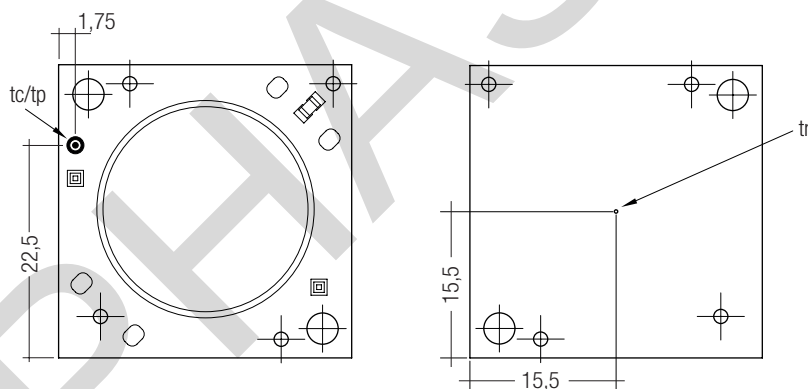
⑤ Max. permissible repetitive peak current for STARK-SLE-G3-19-2000 is 1,200 mA. Max. permissible repetitive peak current for STARK-SLE-G3-19-3000 is 1,680 mA. Max. permissible repetitive peak current for STARK-SLE-G3-23-3000 is 1,920 mA. Max. permissible repetitive peak current for STARK-SLE-G3-23-4000 is 2,400 mA.

⑥ All values at tp = 65 °C.

Heat sink values, thermal power values and thermal resistance values

Type	Forward current	Luminous flux category	P _{th, rear, max}	t _{r, max} at tp = 65 °C	R _{th, rear, max} at ta = 25 °C
STARK-SLE-G3-19-2000-930-SEL	700 mA	C20	17.68 W	66.88 °C	2.28 K/W
STARK-SLE-G3-19-3000-930-SEL	700 mA	C20	17.68 W	59.55 °C	2.03 K/W
STARK-SLE-G3-23-3000-930-SEL	1,050 mA	C30	26.4 W	67.39 °C	1.52 K/W
STARK-SLE-G3-23-4000-930-SEL	1,050 mA	C30	27.6 W	67.68 °C	1.41 K/W

Thermal points tc/tp and tr



Notes

The actual cooling surface can differ because of the material, the structural shape, outside influences and the installation situation.

A thermal connection between TALEX module STARK SLE G3 and heat sink with heat-conducting paste or heat conducting adhesive film is absolutely necessary.

Additionally the TALEX module STARK SLE G3 has to be fixed on the heat sink with M3 screws to optimise the thermal connection. Use of thermal interface material with thermal conductivity of $\lambda > 1 \text{ W/mK}$ and layer thickness of interface material with max. 50 µm or a similar interface material where the quotient of layer thickness and thermal conductivity $b < 50 \text{ µmmK/W}$.

Dimensions

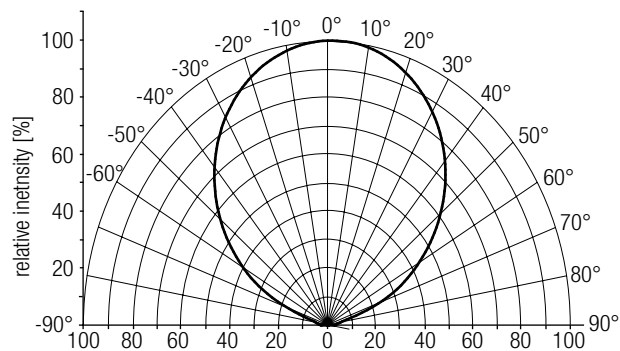
	STARK SLE G3 LES19	STARK SLE G3 LES23
Casing dimensions	50 ± 0.15 mm	50 ± 0.15 mm
LES diameter	18 ± 0.80 mm	22 ± 0.80 mm
OCA classification	OCA B	OCA C

ZHAGA relevant technical data

Optical characteristics TALEX module STARK SLE G3

The optical design of the TALEX module STARK SLE G3 product line ensures optimum homogeneity for the light distribution.

Light distribution



Rational symmetry of luminous intensity

Polar angle	C slices	max. deviation from average curve
- 60° to + 60°	all	± 5.4 %
- 75° to - 62,5° and + 62,5° to + 75°	0° to + 45° and + 135° to + 165°	± 24.18 %
- 75° to - 62,5° and + 62,5° to + 75°	+ 60° to + 120°	NA

Partial luminous flux for flux zones

CIE cumulative flux zone	γ - angle	Minimum of relative partial flux	Maximum of relative partial flux
FC1	0° - 41.4°	47 %	49 %
FC2 - FC1	41.4° - 60°	32 %	33 %
FC3 - FC2	60° - 75.5°	16 %	18 %
FC4 - FC3	75.5° - 90°	2 %	3 %