TRIDONIC

Engine STARK SLE PREMIUM system data sheet
STARK SLE

Product description

- Tunable White system with adjustable colour temperature along the planck's curve from 2.700 to 6.500 K
- New DALI device Type 8 for Tunable White
- Noise-free precise control via switchDIM, DALI, DSI or Colour Control Interface for local operation
  Necessary system components:
- STARK SLE PREMIUM (LED module)
- LCAU 2x20 W one4all (LED Driver)
- 5-year guarantee

→

STARK SLE PREMIUM system

STARK SLE-PRE-KIT

STARK SLE-PRE-W/OH-KIT

LCAU 2x20 W one4all

Ordering data

Type	Article number	System components
STARK SLE 1400-927-965-PRE-KIT	**89601740**	LMAI + SLE1400 with housing
STARK SLE 1400-927-965-PRE-W/OH-KIT	**89601741**	LMAI + SLE1400 without housing
STARK SLE 2000-927-965-PRE-KIT	**89601742**	LMAI + SLE2000 with housing
STARK SLE 2000-927-965-PRE-W/OH-KIT	**89601743**	LMAI + SLE2000 without housing
LCAU 2x020/0048 L010 one4all	**28000907**	In-built LED Driver
LCAU 2x020/0048 L020 one4all	**28000887**	Remote LED Driver

◇ ▲ EAT CE RoHS

STARK SLE PREMIUM KIT – part 1
SLE module system component

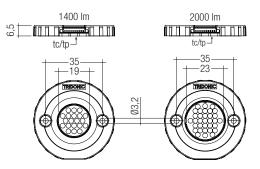## Product description
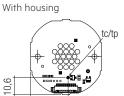
- Tunable White module with adjustable colour temperature along the planck's curve from 2.700 to 6.500 K[®]
- For spotlights and downlights
- Built-in LED module
- Diameter: 50 mm
- High efficiency
- High colour rendering index CRI > 90
- Low colour temperature tolerances (MacAdam 3)
- Low tolerances for luminous flux
- Plug & play plug connection
- Excellent thermal management by COB technology[④]
- Dimming range 15 to 100 %
- Constant luminous flux about colour temperature

Technical data

Beam angle	140°
Ambient temperature ta[④]	-25 … 55 °C
tp rated	65 °C
tc	75 °C
Risk group (EN 62471:2008)	1

→

Standards, page 7

Colour temperature and tolerances, page 9

Product description, page 7

With housing

Without housing

1400 lm 6,5 tc/tp

2000 lm tc/tp

35 19 Ø3,2

35 23

With housing

10,6 23,3 tc/tp

9,5 26,2 tc/tp

Without housing

Specific technical data

Type	Photometric code	Luminous flux[①][⑤]	Power consumption system[②][③]	Luminous efficacy system	Colour rendering index CRI[⑤]	Energy classification
STARK SLE 1400 PRE	927/3x9 to 965/3x9	1,350 lm	22.2 W	61 lm/W	> 90	B
STARK SLE 2000 PRE	927/3x9 to 965/3x9	2,050 lm	31.7 W	65 lm/W	> 90	A

All values at ta = 25 °C, tp rated = 65 °C, 2,700 K.

[①] Tolerance range for optical data: ±10 %.

[②] Tolerance range for electrical data: ±10 %.

[③] The stated power consumption refer to the system which consists of: LCAU + STARK SLE PRE-(W/OH)-KIT.

[④] 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 LED module at the tc-point is to be measured in the thermally stable state with a temperature sensor or a temperature sensitive sticker according to EN 60598-1. For the precise position of the tc point see the above diagram.

[⑤] Colour temperature and CRI according to CIE 1931.

[®] Tunable White is based on the PI-LED® technology. PI-LED® is a trademark of Lumitech.

IP20 ◎ ▽ EL ⚠ CE ⚡ RoHS

Product description

- 500 mA PWM output signal
- Short-circuit protection with automatic restart
- No-load detection with automatic restart
- Intelligent temperature management for LED and LMAI (protection against thermal damage)
- Connecting cable, cable cross-section 0.5 – 2.5 mm²
- Power input on standby 0 W
- Output power max. 44 W
- Strain relief for snap in (only for LMAI with strain-relief set)

Properties

- Use only with LED Driver and LED module possible
- Dimming range 15 to 100 %
- Dimming curve adapted to the sensitivity of the eye
- Max. acceptable cable lenght between LMAI and module 500 mm
- SELV
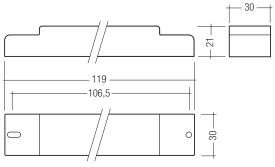- Type of protection IP20 (for LMAI with strain-relief set)

Technical data

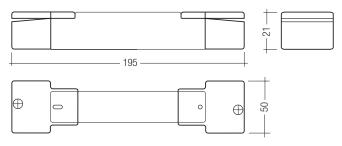|	
Rated supply voltage DC	48 V
Input voltage, DC	47 – 51 V
Rated current (at 48 V DC)	0,9 A
Max. input power (with FAN)	45,5 W
Standby power	0 W
Output voltage range	14 – 44 V
Output current tolerance	± 7 %
Output current	500 mA
Output power	44 W
Dimming range	15 – 100 %
PWM frequency	312 Hz
Voltage FAN DC	12 V
Max. operating current FAN	100 mA
Max. switch-on current FAN	200 mA (< 5 ms)
Max. permitted capacity FAN	58 µF
Ambient temperature ta (at life-time 50,000 h)	–20 … +45 °C
Max. casing temperature tc	55 °C
Storage temperature	–40 … +80 °C

→

Product description, page 10

LMAI without strain relief set

LMAI with strain relief set

LMAI without strain relief set

LMAI with strain relief set

IP20 SELV ⧠ ⊞ EL ⚠ C E ⧈ RoHS

Driver LCAU 2x20 W one4all

Product description

- LED Driver for PREMIUM modules
- Output power: 2 x 25 W or 1 x 40 W
- Max. output power 44 W
- Connecting cable, cable cross-section 0.5 – 2.5 mm²
- Power input on standby < 0.5 W
- Strain relief by remote LED Driver
- RJ45 connector for plug & play

In-built LED Driver

Properties

- switchDIM (with memory function)
- colourSWITCH 2,700 – 6,500 K (with memory function)[1]
- New DALI device Type 8 for Tunable White
- Noise-free precise control via switchDIM or DALI/DSI
- Powerless switching via a digital interface
  (no need for switching via mains)
- Intelligent Temperature Guard (protection against thermal damage)
- Short-circuit shutdown feature with automatic restart (every 7 s)
- No-load shutdown feature with automatic restart (every 7 s)
- Overload protection by restricting output[3]
- SELV
- Plastic casing black
- Type of protection IP20 (remote LED Driver)

Remote LED Driver

In-built LED Driver

Technical data

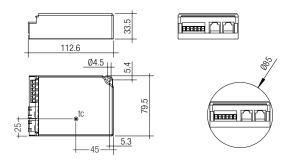|	
Rated supply voltage	220 – 240 V
Input voltage range, AC	198 – 264 V
Input voltage range, DC	170 – 264 V
Rated current (at 230 V 50 Hz)	0.21 A
Mains frequency	0 / 50 / 60 Hz
Efficiency	90 %
λ (at 230 V 50 Hz, full load)	0.95
Control input[1] [2]	DSI, DALI, switchDIM, colourSWITCH
Stand-by power[4]	< 0.5 W
Output voltage	49 V ±2 V
Output power	2 x 25 W / 1 x 40 W
Dimming range	15 – 100 %
Set up time (at 230 V 50 Hz)	< 1 s
Switchover time AC/DC and DC/AC	< 1 s
Leakage current (FE)	0.25 mA
ta operating (at life-time 50,000 h)	-20 … +45 °C
Max. casing temperature tc (at life-time 50,000 h)	65 °C

[1] In DC operation the last set colour is used.

[2] No colourSWITCH at DC operation.

[3] If the overload is too high the LED Driver switches off and tries to restart every 7 s.

[4] No fan operation on standby.

Remote LED Driver

Ordering data

Type	Article number	Packaging carton	Packaging pallet	Weight per pc.
LCAU 2x020/0048 L010 one4all	28000907	10 pc(s).	560 pc(s).	0.2 kg
LCAU 2x020/0048 L020 one4all	28000887	10 pc(s).	560 pc(s).	0.2 kg

→

Product description, page 11

Data sheet 02/18-LED032-22
Subject to change without notice.
www.tridonic.com
4

ACCES-SORIES

CONNECT – RJ45 U

Product description

• Connection cable 1 or 2 m for connectingLMAI and LCAU
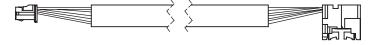
• RJ45 unshielded

Ordering data

Type	Article number	Lenght	Packaging	Weight per pc.
RJ45/RJ45 U 1.0m	**24166480**	1 m	1 pc(s).	0.040 kg
RJ45/RJ45 U 2.0m	**24166481**	2 m	1 pc(s).	0.079 kg

ACCES-SORIES

CONNECT 10PIN PLUG / 10PIN PLUG

Product description

• Connection cable 0.2 m for connecting STARK and REMOTE LMAI

• 10-pin plug to 10-pin plug Molex

• Halogen free

Ordering data

Type	Article number	Lenght	Packaging carton	Weight per pc.
Connection calbe 0.2 m	**24166482**	0.2 m	10 pc(s).	0.008 kg

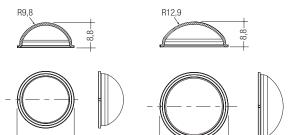**Mixing cap**

Product description

- Mixing chamber for homogenous light distribution
- To push on the SLE housing
- Glow wire test acc. IEC 60695-2-11 at 700 °C passed

R9,8   8,8   R12,9   8,8

20 (d)   24 (d)

Ordering data

Type	Article number	Diameter d	Packaging carton	Weight per pc.
LED Mixing Cap STARK SLE	**88167564**	20 mm	2,000 pc(s).	0.001 kg
LED Mixing Cap STARK SLE	**88167565**	24 mm	2,000 pc(s).	0.001 kg

Strain-relief set

Product description

- 5 year guarantee

21   195   50

Ordering data

Type	Article number	Packaging carton
Strain-relief set	**28000881**	10 pc(s).

STARK SLE PREMIUM KIT – part 1
SLE module system component

Standards
EN 62031
EN 62471
EN 61347-1
EN 61547
EN 55015

Glow wire test
according to EN 61347-1 with increased temperature of 850 °C passed.

Photometric code

Key for photometric code, e. g. 930 / 359

1ˢᵗ digit		2ⁿᵈ + 3ʳᵈ digit	4ᵗʰ digit	5ᵗʰ digit	6ᵗʰ digit	
Code	CRI	Colour tempera-ture in Kelvin x 100	McAdam initial	McAdam after 25% of the life-time (max.6000h)	Luminous flux after 25% of the life-time (max.6000h)	
					Code	Luminous flux
7	70 – 79				7	≥ 70 %
8	80 – 89				8	≥ 80 %
9	≥90				9	≥ 90 %

Thermal design and heat sink
The rated life of LED products depends to a large extent on the temperature. If the permissible temperature limits are exceeded, the life of the STARK SLE will be greatly reduced or the STARK SLE may be destroyed.

Therefore the STARK SLE needs to be mounted onto a heat sink.

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

tc point, ambient temperature and life-time
The temperature at tc reference point is crucial for the light output and life-time of a LED module.

For STARK SLE a tc temperature of max. 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 tc 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.

The tc and tp temperature of LED modules from Tridonic are measured at the same reference point.

Mounting instruction

⚠️ STARK SLE from Tridonic which needs cooling for corret operation, has to be connected with heat-conducting paste and fixed with M3 screws to the heat sink or fan.

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

Max. torque for fixing: 0.5 Nm.

The LED modules without housing 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 Premium".

⚠️ 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

Temperature monitoring
There is an integrated thermal management system that automatically reduces luminous flux when the critical temperature is reached. It returns to normal operation by itselfs.
This protects the STARK SLE PRE KIT and ensures it reaches its full life-time.

⚠️ STARK SLE PRE KIT has to be supplied by LED Driver LCAU.

Operation with other LED Drivers are not allowed.

Heat sink values

STARKT SLE PREMIUM 1,400 lm

ta	tc	$R_{th, hs-a}$
25 °C	65 °C	2.4 K/W
35 °C	65 °C	1.9 K/W
45 °C	65 °C	1.3 K/W
55 °C	65 °C	0.7 K/W

STARKT SLE PREMIUM 2,000 lm

ta	tc	$R_{th, hs-a}$
25 °C	65 °C	1.0 K/W
35 °C	65 °C	0.7 K/W
45 °C	65 °C	0.4 K/W
55 °C	65 °C	0.1 K/W

Notes

The actual cooling surface can differ because of outside influences and the installation situation. A thermal connection between LED module and heat sink with heat-conducting paste or heat conducting adhesive film is absolutely necessary.
Additionally the LED module has to be fixed on the heat sink with M3 screws to optimise the thermal connection.

Thermal behaviour

storage temperature	-30 … +80 °C
operating temperature	-25 … +55 °C
tp rated	65 °C
tc	75 °C
max. humidity	0 … 80 %

Environment

STARK SLE has been designed for interior applications and does not have IP protection.
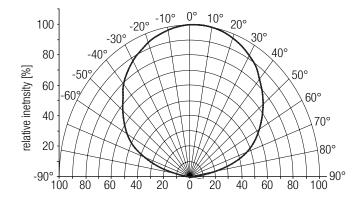
Lumen maintenance

Life-time declarations are informative and represent no warranty claim.

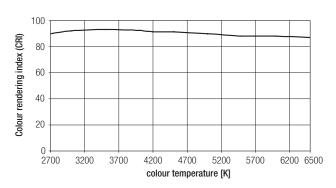| tc temperature in °C	luminous flux in %	operating time in h
	80	60.000
25	70	81.000
	50	132.000
	80	44.000
45	70	64.000
	50	110.000
	80	32.000
65	70	50.000
	50	91.000

Optical characteristics STARK SLE

The optical design of the STARK SLE product line ensures optimum homogenity for the light distribution.

Light distribution

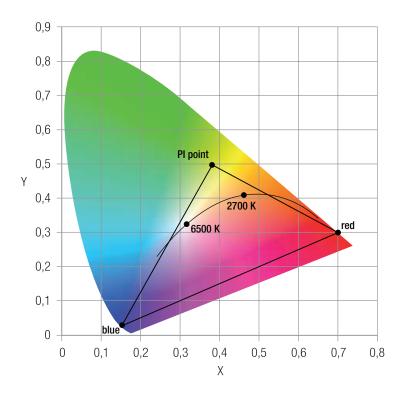**Colour rendering index vs. colour temperature**

The diagrams are based on statistic values.

For further information see Design-in Guide, 3D data and photometric data on www.tridonic.com or on request.
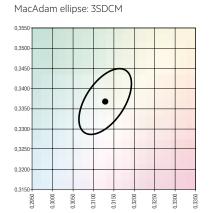
Data sheet 02/18-LED032-22
Subject to change without notice.

www.tridonic.com

8

Coordinates and tolerances according to CIE 1931
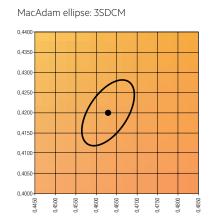
The ambient temperature of the measurement is ta = 25 °C.
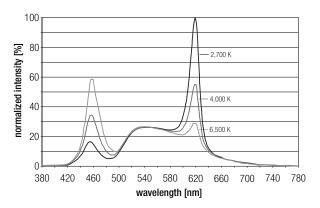The measurement tolerance of the colour coordinates are ± 0.01.

6,500 K		
	x0	y0
Centre	0.3130	0.3370

2,700 K		
	x0	y0
Centre	0.4630	0.4200

MacAdam ellipse: 3SDCM

MacAdam ellipse: 3SDCM

Colour spectrum at different colour temperatures

STARK SLE PREMIUM KIT – part 2
LMAI system component

Standards
EN 55015
EN 61347-1
EN 61347-2-13
EN 61547
EN 62384

Glow wire test
according to EN 61347-1 with increased temperature of 960 °C passed.

Thermal monitoring of the LED module
The LED module has a temperature sensor that is evaluated by the LMAI (LED Temperature Guard). This function protects the LED module from overheating. If it gets too hot during operation the LED module is switched off. Thermal monitoring is also used for stabilising the colour location (colour compensation).

Thermal protection of the LMAI
The LMAI is equipped with overtemperature protection (LMAI Temperature Guard). This protects the LMAI from overheating. If the device is operated at too high a temperature the LMAI is switched off.

Dimming
Dimming range 15 to 100 %.

Connections
Input: Power supply and communication via RJ45.
LED output: 10-pole connector
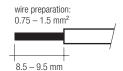(Order nr. for MOLEX connector: 903270310)
FAN output: 2-pole connector
(Type for Neltron connector: 2218H-02-F4)

Colour Control Interface (CCI)
The colour and dimming level of the LED module can be controlled at the CCI input by means of a floating switch (normally open) or with a continously variable potentiometer.
For further information please refer to to the brochure entitled "Technical Design-In-Guide SLE PREMIUM".

Input terminal CCI

wire preparation:
0.75 – 1.5 mm²

8.5 – 9.5 mm

Wiring

to converter LCAU   RJ45   LMAI 044/0500   to LED module

Colour control interface
(CCI)   + / -   to FAN

Notice

⚠ The STARK SLE PRE KIT components form a matched and calibrated unit. Therefore it is not allowed to separate and operate the components in different combinations!

There is a label on the LMAI 044/0500 with the corresponding module information.

Code: **89601742**
Type: **STARK-SLE-2000-927-965-PRE-KIT**
Batch: **654363**

Only use with matching LED module!

Module Nr.: **7.3**   Module Batch.: **1254587**

Date: **31.01.2013**

TALEXconverter LCAU 2x20 W one4all
Product description

Standards
EN 55015
EN 61000-3-2
EN 61000-3-3
EN 61347-1
EN 61347-2-13
EN 62384
EN 62386-101
EN 62386-102
EN 62386-207
EN 62386-209 (DALI DEVICE Type 8)
according to EN 50172 (only valid for central batteries systems)

Glow wire test
according to EN 61347-1 (remote LED Driver) or EN 61347-1 (in-built LED Driver) with increased temperature of 960 °C passed.

Control input (DA/D1, DA/D2)
Digital DALI signal or switchDIM can be wired on the same terminals (DA/D1 and DA/D2).

Digital signal DALI/DSI
The control input is non-polar and protected against accidental connection with a mains voltage up to 264 V. The control signal is not SELV. Control cable has to be installed in accordance to the requirements of low voltage installations.
Different functions depending on each module.

Colour types
Supported colour types according to DALI-Device Type 8:
• xy-coordinates
• colour temperature tc

Thermal protection of the unit
The unit also has an ITG (Intelligent Temperature Guard). This protects the LCAU 2x20 W one4all from thermal overload by reducing the output power or switching off in case of operation above the thermal limits of the luminaire or ballast. Depending on the luminaire design, the ITG operates at about 8 °C (±5 °C) above tc temperature.

Control via switchDIM
A conventional double pushbutton switch can be used for control via switchDIM. One of the pushbuttons is used to set the colour temperature, the other to set the dimming level.

⚠ Pushbuttons with glow lamps affect the switchDIM, colourTEMPERATURE and colourSWITCH functions and should therefore not be used for this purpose.
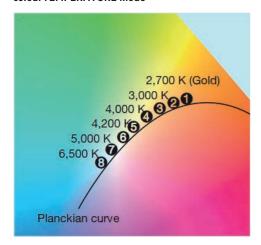
For control via a switchDIM switch different settings can be made:
• Setting for the colour temperature via colourTEMPERATURE mode or colourSWITCH mode with 8 predefined values between 2,700 K and 6,500 K.
• Stepless setting for the dimming level between 15 and 100 %.

The colourTEMPERATURE mode and colourSWITCH mode differ in the position of the individual colour values along the Planckian curve. The colourTEMPERATURE mode is designed to meet the requirements of general and shop illumination, whereas the colourSWITCH mode is designed for food lighting.

On start-up the device first activates colour temperature setting in the colourTEMPERATURE mode. The starting values are a colour temperature of 2,700 K and a dimming level of 100 %.
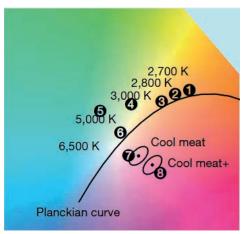
colourTEMPERATURE mode

Location of the colour temperatures along the Planckian curve

1	2,700 K	5	4,500 K
2	3,000 K	6	5,000 K
3	3,500 K	7	5,700 K
4	4,000 K	8	6,500 K

colourSWITCH mode

Location of the defined colour temperatures

1	Gold (2,700 K) for bread and cakes	5	Cheese yellow, x = 0.35, y = 0.38
2	2,800 K, fruit and vegetables	6	5,000 K
3	3,000 K	7	Cool Meat, x = 0.3630, y = 0.3070
4	Fish, x = 0.38, y = 0.38	8	Cool Meat+, x = 0.3827, y = 0.2960

Setting the colour temperature
The procedure for setting the colour temperature is identical for both the colourTEMPERATURE mode and the colourSWITCH mode:
• Press the pushbutton briefly (approx. 1 s) to advance the colour temperature by one value

⚠️ Once the maximum value has been reached, the next press takes you directly back to the minimum value.

Changing the mode
To toggle between colourTEMPERATURE mode and colourSWITCH mode you need to hold down the pushbutton. After 10 and 15 seconds the device will flash briefly. These are known as the 1st and 2nd flashing phases. Depending on the flashing phase in which the pushbutton is released (1st or 2nd), the changes are as follows:
• 1st flashing phase (after about 10 s): The device changes from colourTEMPERATURE mode to colourSWITCH mode
• 2nd flashing phase (after about 15 s): The device changes from colourSWITCH mode to colourTEMPERATURE mode

⚠️ If the pushbutton is released more than 5 seconds after the 2nd flashing phase this cannot be assigned to either flashing phase and will be ignored.
This can be used to avoid incorrect entries.
If the right time for releasing the pushbutton has passed all you need to do is to allow the appropriate time to elapse and start the process again.

⚠️ The factory settings for colour temperature and dimming level are 2,700 K and 100 %.

For further information please refer to to the brochure entitled "Technical Design-In-Guide SLE PREMIUM".
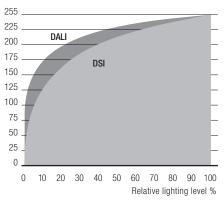
Dimming
Dimming range 15 to 100 %
Digital control with:
• DSI signal: 8 bit Manchester Code
  Speed 15 to 100 % in 1.4 s
• DALI signal: 16 bit Manchester Code
  Speed 15 to 100 % in 0.1 s
  Programmable parameter:
  Minimum dimming level
  Maximum dimming level
  Default minimum = 15 %
  Programmable range 15 % ≤ MIN ≤ 100 %
  Default maximum = 100 %
  Programmable range 100 % ≥ MAX ≥ 15 %

Dimming curve is adapted to the eye sensitiveness.

Dimming characteristics
Digital dimming value

Dimming characteristics as seen by the human eye

Maximum loading of automatic circuit breakers

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20	Inrush current	
Installation Ø	1.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	I_{max}	time
LCAI 2x020/0048 L0xx one4all	10	14	18	24	5	7	9	12	38 A	256 µs

Harmonic distortion in the mains supply (at 230 V / 50 Hz and full load) in %

Type	THD	3	5	7	9	11
LCAI 2x020/0048 L0xx one4all	< 13	9	5	4	3	2

Installation instructions

Wiring type and cross section (mains supply)
Stranded wire with end ferrule with a cross section up to 0.5 mm² or solid wire up to 2.5 mm² may be used for wiring.

For mains-side through-wiring on a single terminal we recommend the use of the same wire cross section.

max. Ø = 9,7 mm
min. Ø = 6,3 mm

Terminals
Screw type M3
Torque 0.5 Nm

Connection earth
To keep the EMV guidlines the earth has to be connected.

Storage conditions
Humidity: 5 % up to max. 85 %,
                   not condensed
                   (max. 56 days/year at 85 %)

Storage temperature: -40 °C up to max. +80 °C

The devices have to be within the specified temperature range (ta) before they can be operated.

Connection STARK SLE PREMIUM KIT (SEC)

Connection: 2x RJ45

For the connection between Driver LCAU and STARK SLE PREMIUM KIT you have to use Tridonic specific cables.
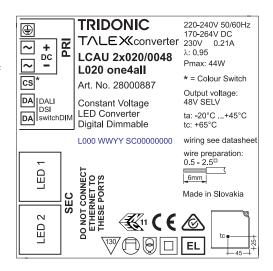Don't use a standard ethernet cable.

art.-no.: 24166480   (length: 1 m)
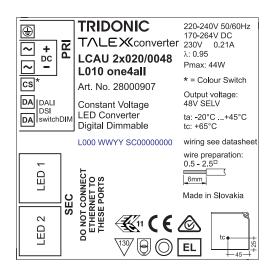art.-no.: 24166481   (length: 2 m)

LCAU 2x20/0048 L0xx is suitable for operating the following LED modules:

• STARK SLE 1400 PRE KIT (art.-no. 89601740, 89601741)
• STARK SLE 2000 PRE KIT (art.-no. 89601742, 89601743)

Product label 28000887

Product label 28000907

Possible connections

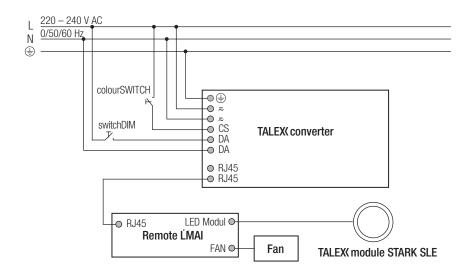|	Number of STARK SLE PREMIUM KIT per LED Driver		Operation with fan possible
	SLE 1400 PRE KIT	**SLE 2000 PRE KIT**	
combination 1	2	–	NO
combination 2	1	–	YES
combination 3	–	1	YES

Note
The operation with a fan is only possible with one STARK SLE PREMIUM KIT connected.
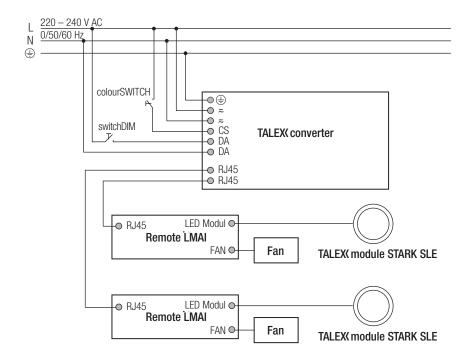No fan operation on standby.

Wiring diagram for switchDIM and colourSWITCH for STARK SLE PREMIUM
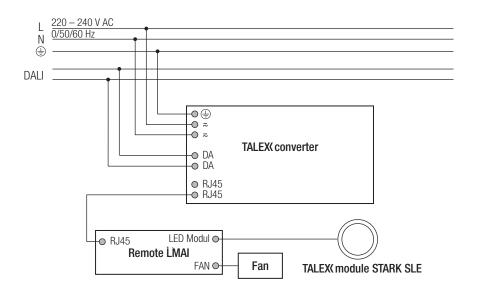
Operating with one STARK SLE PREMIUM
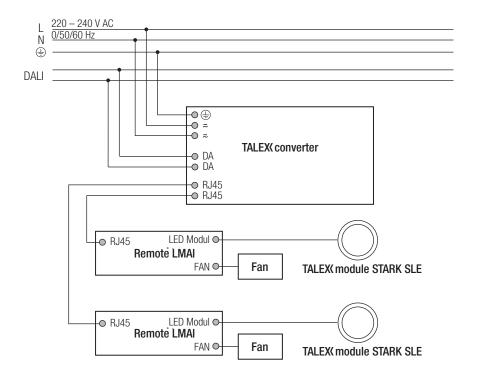

Operating with two STARK SLE PREMIUM

Wiring diagram for DALI for STARK SLE PREMIUM

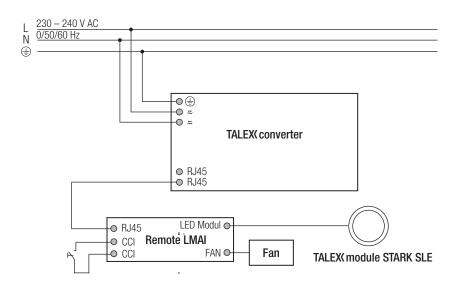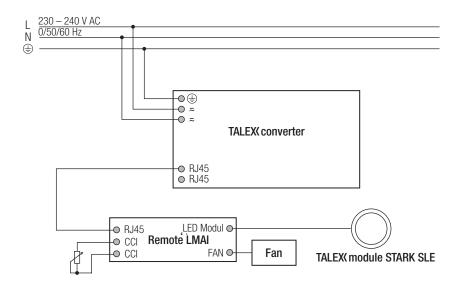Operating with one STARK SLE PREMIUM

Operating with two STARK SLE PREMIUM

Wiring diagram for STARK SLE PREMIUM to control by CCI (Colour Control Interface)

Operating with single momentary-action switch

L 230 – 240 V AC
N 0/50/60 Hz
⏚

TALEXX converter

⏚
≈
≈

RJ45
RJ45

RJ45
CCI
CCI
Remote LMAI
LED Modul
FAN

Fan

TALEXX module STARK SLE

Operating with continously variable potentiometer

L 230 – 240 V AC
N 0/50/60 Hz
⏚

TALEXX converter

⏚
≈
≈

RJ45
RJ45

RJ45
CCI
CCI
Remote LMAI
LED Modul
FAN

Fan

TALEXX module STARK SLE

Additional information

Additional technical information at www.tridonic.com → Technical Data

Guarantee conditions at www.tridonic.com → Services

Life-time declarations are informative and represent no warranty claim.