bam	Technical Submission	Form: 332-203 Rev: 1

Project Title:	**Kings Cross S3 Building.**	**Submission no:**	**BAMSE-TS-E- 049 Rev 01**
Contract No:	**HLN - 0284.**		

To:	**A Thelwell S Longhi Brian Patey Genesis Gomez**	**Company:**	**BAM Design - For Approval Bennetts – For information Sweco – For information Sweco – For information**

Approval of the following equipment is required:

Equipment:	**Luminaires**
Manufacturer:	**Fagurhult lighting (LED Linear)**
Description:	**Type X4E**

Specification References:
BAMD Particular Specification E1 A4-005
BAMD Luminaire schedule 10 Rev A4 - 007

Attached Detail Documents:	
BAM equipment schedule:	**Luminaire schedule 10 Rev 007**
Manufacturers details:	As Above – Architainmnet product replaced for LED Linear supplied by Fagerhult.
Data sheets:	BAMD Specification detail & manufacturers literature for the luminaire, Dali driver, suspension kits where applicable and emergency battery unit info where external from luminaire all appended to this submittal.
Quantities 1 x	800mm long delivered 755mm
16 x	1000mm delivered 1005mm
6 x	1500mm delivered 1505mm

Electrical requirements for equipment: na.

Planned site delivery: 2021 As programme

Issued by: BAM Construction Ltd.	**A Ambrose**	**Date**	**15/10/2021**

Please return comments by: **29/10/2021** **to achieve construction delivery dates.**

To be completed and returned by Consultant Design Engineer

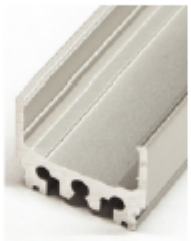
Technical submission is ** approved / ~~approved with comments / not approved.~~
(delete as appropriate)**

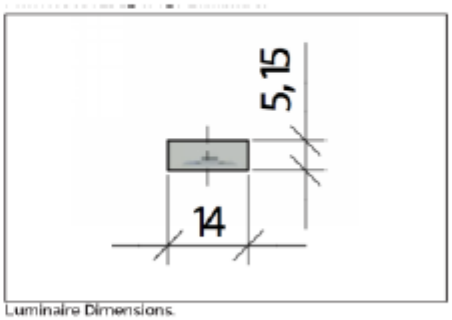
Returned by:	Andrew Thelwell	**Company:**	Bam Design
Signature:		**Date:**	01/11/2021

Luminaire reference

X4E

Flex HYDRA LD15 W830 Luminaire.





Luminaire Dimensions.

Location

Exit doors (surface mounted)

Luminaire specification

Description

Manufacturer	**LED-Linear**
Type	**Flex Hydra LD15 W822/1005 OL MP**
Finish	Silver
IP rating	IP 67

Light Source

Type	LED
Wattage	15.36 W/m
Colour temp /CRI	2900 K - > 80
Lamp lumens	**690 lm/m**

Control Gear / Transformer

Type	DALI control gear
Dimmable	No
Location (Remote / Integral)	Remote
	W:19.5xH:21.9mm

Accessories

Louvre/Lens	**Diffused cover**
Efficiency (LOR)	100%
Efficacy	**63 lm/m**
Other	

Additional Information

1. For the purposes of this document efficacy is defined as “Luminaire Lumens per Circuit Watt” and is a function of the useful light output (LLm) / total consumed power (CctW)
2. Equipment supplied to be as specified or equal approved.
3. All emergency luminaires to have 3 hour battery backup and to have control gear that is EmPro or equivalent to allow communication and monitoring from central lighting control system.

LED Linear™ GmbH · Dr.-Alfred-Herrhausen-Allee 20 · 47228 Duisburg · Germany
Phone +49 2065 94322-100 · info@led-linear.com
Edition: Wednesday, 13. October 2021 · Reserve technical changes.
Online: https://www.led-linear.com/products/xooline-ip67

LED LINEAR™
A Fagerhult Group Company

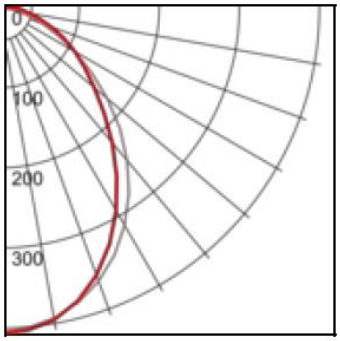
XOOLINE™ White High Efficiency LD IP67

Order code: XOOLINE HYD LD15 W822/755-DL-MP IP67

TECHNICAL SPECIFICATIONS

Length	**755 mm**
Color temperature (CCT)	**2900 K**
CRI	**up to 86**
R9	**up to 33**
Lumen (Luminaire)	**710 lm**
Lumen/Meter	**940 lm/m**
Power of luminaire	**11.6 W**
Power	**15 W/m**
Efficiency	**63 lm/W**
Optics	**Low square cover, diffuse**
Case Temperature (Tc_{min} & Tc_{max})	**Tc_{min} = -25°C, Tc_{max} = 70°C**
Storage Temperature (Ts_{min} & Ts_{max})	**Ts_{min} = -30°C, Ts_{max} = 85°C**
Ambient Temperature (Ta_{min} & Ta_{max})	**Ta_{min} = -25°C, Ta_{max} = 50°C**
Ingress protection	**IP67**

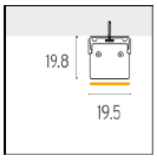
Emergency Information
Supplied with a remote box and 1m wiring loom
Operation: Maintained 3hr
Testing: DALI
Emergency Output: 336lm
Emergency box dimmensions: 490mm x 151mm x 50mm



Key Features

Technical Data/Performance

1. Surface-mounted*, horizontal

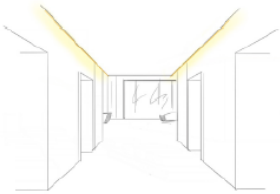


Mounting accessories

Full length mounting channel

Description

Example of application



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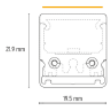
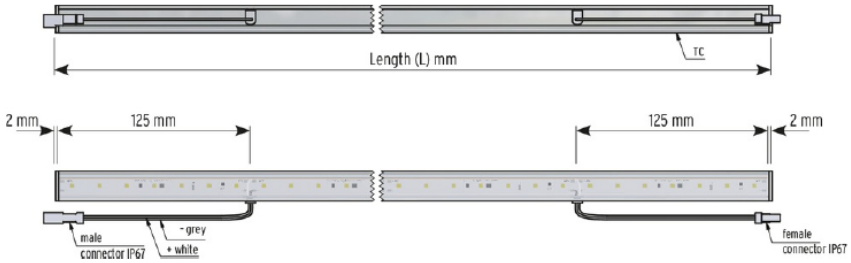
DIMENSIONS & AVAILABLE LENGTHS

Low cover





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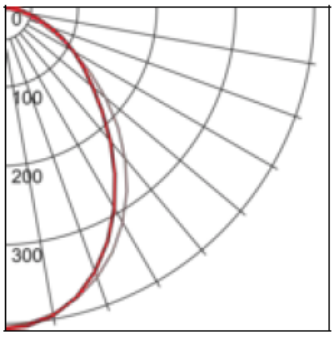
XOOLINE™ White High Efficiency LD IP67

Order code: XOOLINE HYD LD15 W822/1005-DL-MP IP67

TECHNICAL SPECIFICATIONS

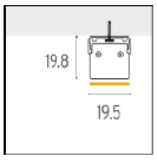
Length	**1,005 mm**
Color temperature (CCT)	**2900 K**
CRI	**up to 86**
R9	**up to 33**
Lumen (Luminaire)	**940 lm**
Lumen/Meter	**940 lm/m**
Power of luminaire	**15.4 W**
Power	**15 W/m**
Efficiency	**63 lm/W**
Optics	**Low square cover, diffuse**
Case Temperature (Tc_{min} & Tc_{max})	**Tc_{min} = -25°C, Tc_{max} = 70°C**
Storage Temperature (Ts_{min} & Ts_{max})	**Ts_{min} = -30°C, Ts_{max} = 85°C**
Ambient Temperature (Ta_{min} & Ta_{max})	**Ta_{min} = -25°C, Ta_{max} = 50°C**
Ingress protection	**IP67**



Key Features

Technical Data/Performance

1. Surface-mounted*, horizontal

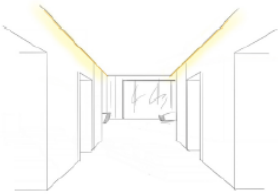


Mounting accessories

Full length mounting channel

Description

Example of application



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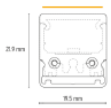
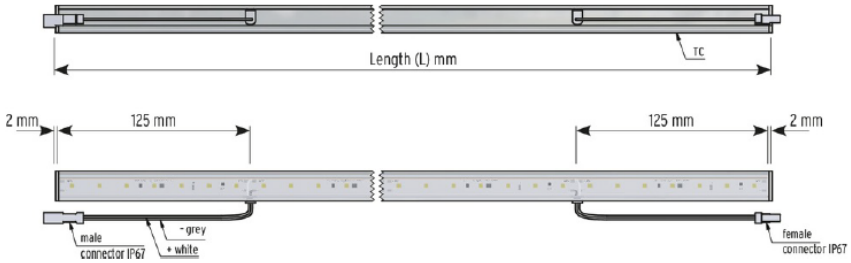
Order code: XOOLINE HYD LD15 W822/755-DL-MP IP67

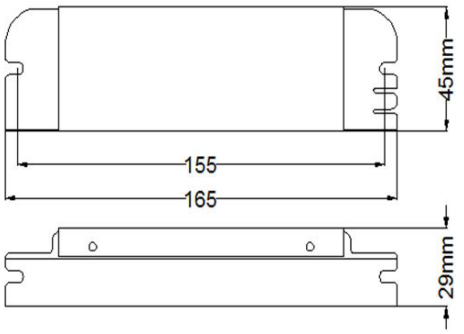
DIMENSIONS & AVAILABLE LENGTHS

Low cover





Technical Specification
NED/6 Conversion Range



The NED/6 range is supplied as a high output conversion kit for integral use within a luminaire. If required, it can be provided within a suitable remote enclosure where space inside the fitting is limited.

- Deep discharge protection
- Automatically Provides Maximum BLF to Load
- High Temperature NiCd Batteries
- Converts LED Loads from 6-80 Volts
- Can be Provided in Various Remote Enclosures
- Lower Output Versions Available
- Average Emergency Power - 5.2W

A 3 hour emergency lighting conversion kit which operates with high temperature NiCd batteries. The unit is designed to suit an extremely wide range of LED types and circuits. The NED/6 automatically adjusts the output LED current to provide the best match between the battery and the load, providing maximum illumination whilst ensuring full battery duration.

Please see separate datasheets for Remote Enclosure details.

There are 2 main versions available -

Order Codes

NED/6/80-K	For LED loads operating in voltage range of 6 - 80 Volts
	Supplied as a Module, Twin Stick NiCd Battery and Charge LED as a Kit.
NED/6/80/SP160	As Above, However Housed Within a Suitable Remote Enclosure for 160mm Aperture
	Remote Enclosure Measures 375mm long x 151mm wide x 50mm high.

Technical Details:

Mains Supply	230-240V AC 50/60 Hz	Max Ta and Tc	Ta - 50 °C - Tc - 70 °C
Power Rating	22mA $\lambda = 0.85$	Max Battery temperature	55 °C
Duration	3 Hours	Battery Discharge Current	1000mA nominal
Recharge Period	24-Hours	Maximum Load Current	2 Amps
Battery Size & Type	7.2V 4.5Ah NiCd Cells	Ingress Protection	IP20
Charge Current	200mA	Terminal - Screw & Push	1.0mm^2 - 1.5 mm^2
Battery Cut-Off Voltage	6V	Module Dimensions (LxWxH)	165x 45 x 29 (f/c 155mm)
Kit Weight	1.08Kg (M-0.29 B-0.79)	Battery Stick Dimensions (LxØ)	2No. 220 x 38 (f/c 205mm)

Tel +44 (0)1708 372223 | www.liteplan.com | customerservice@liteplan.com | RM3 0AP. UK

ISS 100120

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XOOLINE™ White High Efficiency LD IP67

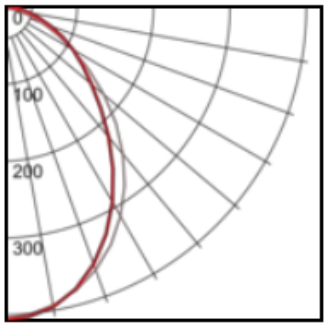
Order code: XOOLINE HYD LD15 W822/1505-DL-MP IP67

TECHNICAL SPECIFICATIONS

EU ECO-DESIGN guidelines

Attention! According to the new EU ECODESIGN guidelines, some variants of this product may no longer be sold in the EU as of 1st September 2021, but remain available for sale outside the EU. Please get in touch with our sales team for further information.

Length	**1,505 mm**
Color temperature (CCT)	**2900 K**
CRI	**up to 86**
R9	**up to 33**
Lumen (Luminaire)	**1410 lm**
Lumen/Meter	**940 lm/m**
Power of luminaire	**23.1 W**
Power	**15 W/m**
Efficiency	**63 lm/W**
Optics	**Low square cover, diffuse**
Case Temperature (Tc_{min} & Tc_{max})	**Tc_{min} = -25°C, Tc_{max} = 70°C**
Storage Temperature (Ts_{min} & Ts_{max})	**Ts_{min} = -30°C, Ts_{max} = 85°C**
Ambient Temperature (Ta_{min} & Ta_{max})	**Ta_{min} = -25°C, Ta_{max} = 50°C**
Ingress protection	**IP67**

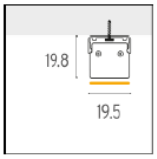


Key Features

Technical Data/Performance

White | IP67 | L80/B10 >60,000 h | Wxxx / 339 | SDCM3 | S-025 | LM80

1. Surface-mounted*, horizontal

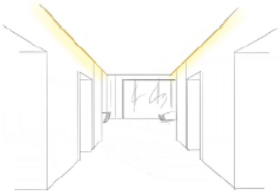


Mounting accessories

Full length mounting channel

Description

Example of application



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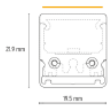
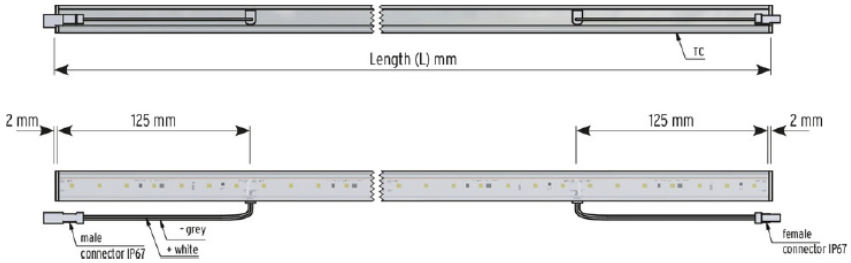
XOOLINE™ White High Efficiency LD IP67

Order code: XOOLINE HYD LD15 W822/755-DL-MP IP67

DIMENSIONS & AVAILABLE LENGTHS

Low cover





Driver LC 60W 24V SC SNC
essence series

Product description
- Constant voltage LED Driver
- Output voltage 24 V
- Max. output power 60 W
- Dimmable via external PWM LED dimmers attached on output site
- Nominal lifetime up to 50,000 h
- 5 years guarantee (conditions at www.tridonic.com)

Typical application
- Cove lighting, facade accent lighting, ceiling integration, refrigerated displays

Technical details
- 24 V, 60 W
- Small design (225 x 43 x 30 mm) with stretched-compact strain relief
- Very good THD performance in wide load range < 5 %
- Output LF voltage ripple (< 120 Hz) ± 1.5 %
- Small cross section
- Push terminal for simple wiring

System solution
- Tridonic LLE-FLEX ADV G2 600, 1,200, 1,800 lm/m
- Tridonic LLE-FLEX EXC 600, 1,200, 1,800, 2,500 lm/m
- In connection with Flex accessories wire to PCB plug

Standards, page 3

System solution

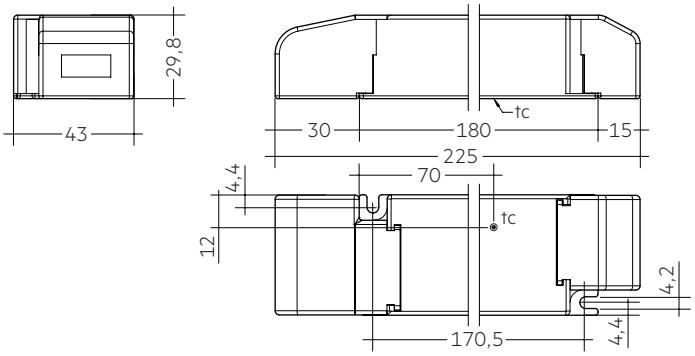
IP20 SELV RoHS

Driver LC 60W 24V SC SNC

essence series

Technical data

Rated supply voltage	220 – 240 V
AC voltage range	198 – 264 V
Mains frequency	50 / 60 Hz
Overvoltage protection	320 V, 48 h
Typ. current (at 230 V, 50 Hz, full load)[1]	291 mA
Max. input power	67 W
Typ. efficiency (at 230 V / 50 Hz / full load)	92 %
λ (at 230 V, 50 Hz, full load)[1]	0.98
Typ. input current in no-load operation	47 mA
Typ. input power in no-load operation	1.5 W
In-rush current (peak / duration)	27.7 A / 198 µs
THD (at 230 V, 50 Hz, full load)[1]	< 4 %
Starting time (at 230 V, 50 Hz, full load)[1]	< 0.5 s
Turn off time (at 230 V, 50 Hz, full load)	< 0.5 s
Hold on time at power failure (output)	0 s
Output voltage tolerance	± 1 V
Output LF voltage ripple (< 120 Hz)	± 1.5 %
Max. output voltage (no-load voltage)	25 V
Burst capability	1 kV
Mains surge capability (between L – N)	1 kV
Mains surge capability (between L/N – PE)	2 kV
Lifetime	up to 50,000 h
Guarantee (conditions at www.tridonic.com)	5 years
Dimensions L x W x H	225 x 43 x 29.8 mm



Ordering data

Type	Article number	Packaging carton[2]	Packaging, low volume	Packaging, high volume	Weight per pc.
Multi packaging					
LC 60W 24V SC SNC	**87500665**	10 pc(s).	120 pc(s).	1,200 pc(s).	0.18 kg
Single packaging					
LC 60W 24V SC SNC SP	**87500667**	10 pc(s).	80 pc(s).	800 pc(s).	0.18 kg

[2] The strain relief is included in both packaging variants.
In the single packaging each Driver has also an individual packaging.

Specific technical data

Type	Load	Forward voltage	Output current	Max. output power	Typ. power consumption	Typ. current consumption	Max. casing temperature tc	Ambient temperature ta max.
LC 60W 24V SC SNC	30 %	24 V	750 mA	18 W	20.6 W	109 mA	75 °C	-20 … +50 °C
	55 %	24 V	1,375 mA	33 W	36.6 W	171 mA	80 °C	-20 … +50 °C
	80 %	24 V	2,000 mA	48 W	52.5 W	237 mA	85 °C	-20 … +50 °C
	100 %	24 V	2,500 mA	60 W	66.0 W	292 mA	85 °C	-20 … +50 °C

[1] Valid at 100 % dimming level.

1. Standards

EN 55015
EN 61000-3-2
EN 61000-3-3
EN 61347-1
EN 61347-2-13
EN 62384
EN 61547
IEC 60335-1
IEC 60335-2-89

1.1 Glow wire test

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

2. Thermal details and lifetime

2.1 Expected lifetime

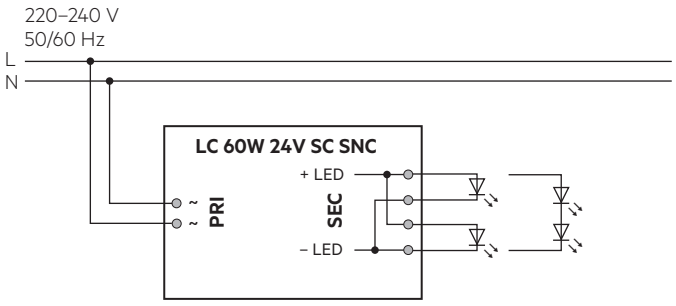
Expected lifetime

Type	Output load	ta	40 °C	45 °C	50 °C
LC 60W 24V SC SNC	> 33 … ≤ 60 W	tc	75 °C	80 °C	85 °C
		Lifetime	90,000 h	65,000 h	45,000 h
	≤ 33 W	tc	70 °C	75 °C	80 °C
		Lifetime	>100,000 h	>100,000 h	75,000 h

The LED control gear is designed for a lifetime stated above under reference conditions and with a failure probability of less than 10 %.
The relation of tc to ta temperature depends also on the luminaire design.
If the measured tc temperature is approx. 5 K below tc max., ta temperature should be checked and eventually critical components (e.g. ELCAP) measured. Detailed information on request.

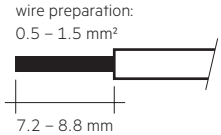
3. Installation / wiring

3.1 Circuit diagram

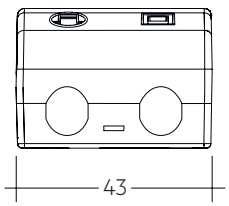


3.2 Mains supply wiring

The wiring can be in stranded wires with ferrules or solid from 0.5 – 1.5 mm². For perfect function of the push-wire terminals (WAGO 250) the strip length should be 7.2 – 8.8 mm.

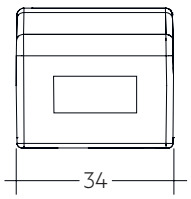


Primary strain relief for cables with bigger cable sheath



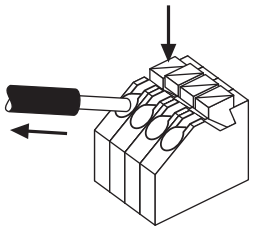
Permissible cable jacket diameter: 2.2 – 9 mm

Secondary strain relief for cable with smaller cable sheath



Permissible cable jacket diameter: 3 – 9 mm

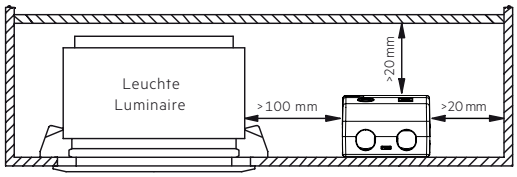
3.3 Loose wiring



Release of the wiring
Press down the “push button” and remove the cable from front.

3.4 Fixing conditions when using as independent Driver with Clip-On

Dry, acidfree, oilfree, fatfree. It is not allowed to exceed the maximum ambient temperature (ta) stated on the device. Minimum distances stated below are recommendations and depend on the actual luminaire.
Is not suitable for fixing in corner.



3.5 Wiring guidelines

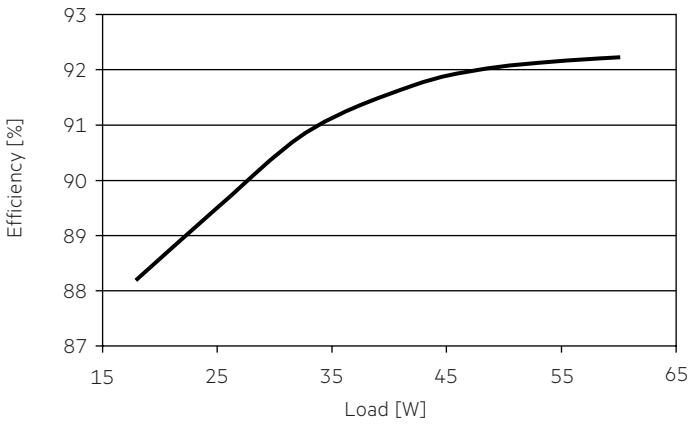
- The cables should be run separately from the mains connections and mains cables to ensure good EMC conditions.
- The LED wiring should be kept as short as possible to ensure good EMC. The max. secondary cable length is 2 m (4 m circuit).
- To comply with the EMC regulations run the secondary wires (LED module) in parallel.
- The LED Driver has no inverse-polarity protection on the secondary side. Wrong polarity can damage LED modules with no inverse-polarity protection.
- Secondary switching is not permitted.
- Wrong wiring of the LED Driver can lead to malfunction or irreparable damage.
- To avoid the damage of the Driver, the wiring must be protected against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.).

3.6 Installation instructions

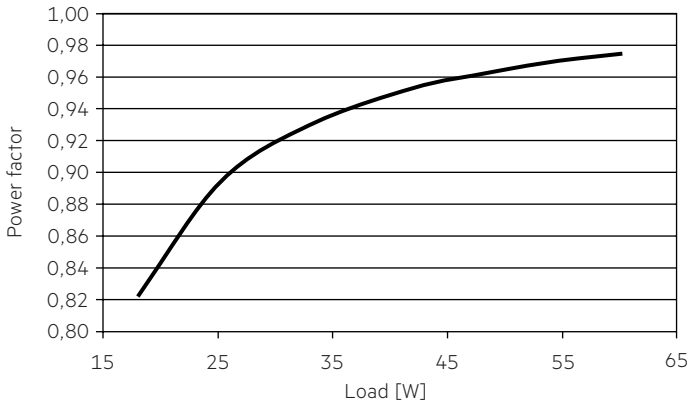
The LED module and all contact points within the wiring must be sufficiently insulated against 3 kV surge voltage.
Air and creepage distance must be maintained.

4. Electrical values

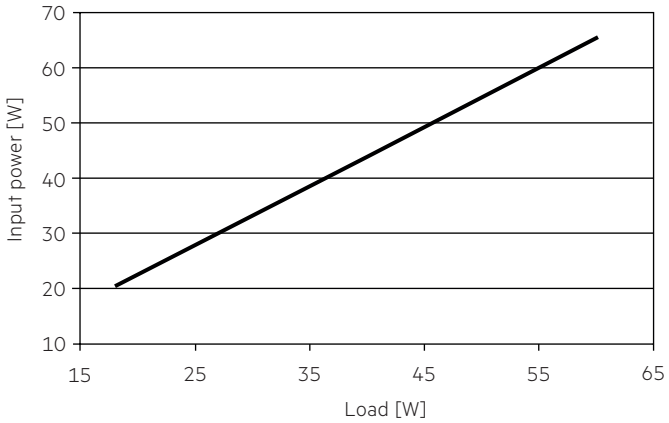
4.1 Efficiency vs. load



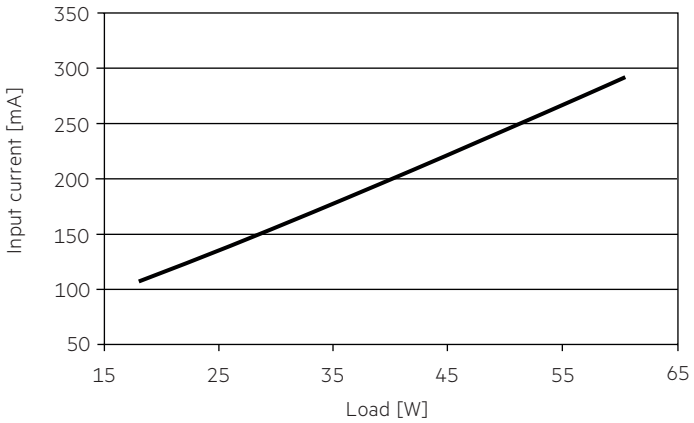
4.2 Power factor vs. Load



4.3 Input power vs. Load

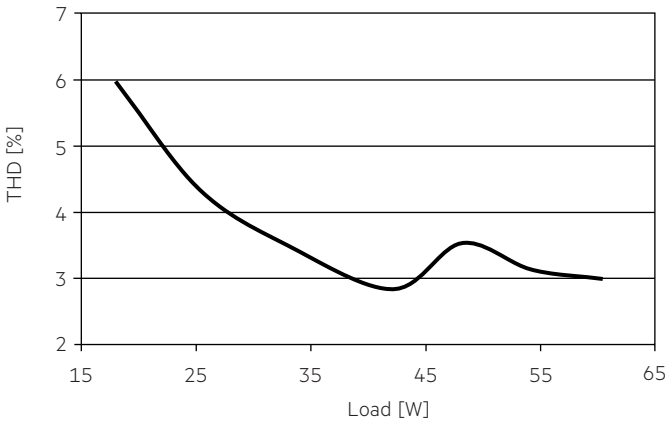


4.4 Input current vs. Load



4.5 THD vs. Load

THD without harmonic < 5 mA (0.6 %) of the input current:



4.6 Maximum loading of automatic circuit breakers in relation to inrush current

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
LC 60W 24V SC SNC	28	37	47	58	17	22	28	35	27.7 A	198 µs

This are max. values calculated out of inrush current! Please consider not to exceed the maximum rated continuous current of the circuit breaker.
Calculation uses typical values from ABB series S200 as a reference.
Actual values may differ due to used circuit breaker types and installation environment.

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

	THD	3.	5.	7.	9.	11.
LC 60W 24V SC SNC	< 4	< 3	< 2	< 2	< 2	< 2

Acc. to 6100-3-2. Harmonics < 5 mA or < 0.6 % (whatever is greater) of the input current are not considered for calculation of THD.

5. Functions

5.1 Overload protection

If the maximum load is exceeded by a defined internal limit, the LED will flicker, and output voltage will be reduced.
When fault is removed, the driver can go back to work automatically without resetting input main power.

5.2 Overtemperature protection

The LED Driver is protected against temprorary thermal overheating. If the temperature limit is exceeded the LED will flicker, and restart automatically after the driver cold down. The temperature protection is activated approx. + 15 °C above Tc max.

5.3 Short-circuit behaviour

In case of a short circuit at the LED output the LED output is switched off. When fault is removed, the driver can go back to work automatically without resetting input main power.

5.4 No-load operation

The LED Driver will not be damaged in the no-load operation. When the output is floating and doesn't connect the LED modules, the output voltage will keep the max. voltage (< 25 V). After connecting the LED load, the driver works normally without resetting the main power.

5.5 Hot plug-in

Hot plug-in is supported.
If a LED load is connected, the device does not need to be restarted before the output will be activated again.

5.6 Use of PWM dimmers

PWM dimmers are used to dim the attached LED module.
Going to stand-by via PWM dimmer is not supported.
To turn off the luminaire, mains has to be off.

7. Miscellaneous

7.1 Insulation and electric strength testing of luminaires

Electronic devices can be damaged by high voltage. This has to be considered during the routine testing of the luminaires in production.

According to IEC 60598-1 Annex Q (informative only!) or ENEC 303-Annex A, each luminaire should be submitted to an insulation test with 500 V_{DC} for 1 second. This test voltage should be connected between the interconnected phase and neutral terminals and the earth terminal.
The insulation resistance must be at least 2 MΩ.

As an alternative, IEC 60598-1 Annex Q describes a test of the electrical strength with 1500 V_{AC} (or 1.414 x 1500 V_{DC}). To avoid damage to the electronic devices this test must not be conducted.

7.2 Conditions of use and storage

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 acclimatised to the specified temperature range (ta) before they can be operated.

The LED Driver is declared as inbuilt LED controlgear, meaning it is intended to be used within a luminaire enclosure.
If the product is used outside a luminaire, the installation must provide suitable protection for people and environment (e.g. in illuminated ceilings).

7.3 Maximum number of switching cycles

All LED Driver are tested with 50,000 switching cycles.

7.4 Additional information

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

Lifetime declarations are informative and represent no warranty claim.
No warranty if device was opened.