



Driver LC 10W 150–400mA flexC SR EXC

excite series

Product description

- Independent constant current LED driver
- Adjustable output current between 150 and 400 mA via ready2mains™ Programmer or I-SELECT 2 plugs
- Max. output power 10 W
- Up to 81 % efficiency
- Nominal lifetime up to 100,000 h
- 5 years guarantee (conditions at www.tridonic.com)

Housing properties

- Casing: polycarbonate, white
- Type of protection IP20
- Strain relief with loop through function

Interfaces

- ready2mains™ (configuration via mains)
- Terminal blocks: 0° / 45° push terminals (input / output)

Functions

- Adjustable output current in 1-mA-steps (ready2mains™, I-SELECT 2)
- Protective features (overtemperature, short-circuit, overload, no-load, input voltage range)
- Intelligent Voltage Guard (overvoltage and undervoltage monitoring)
- Suitable for emergency escape lighting systems acc. to EN 50172
- For cable cross-sections up to 2.5 mm²

Benefits

- Application-oriented operating window for maximum compatibility
- Best energy savings due to high efficiency
- Flexible configuration via ready2mains™ and I-SELECT 2
- No tools required for installation

Typical applications

- For downlight, spotlight and decorative applications



Standards, page 4

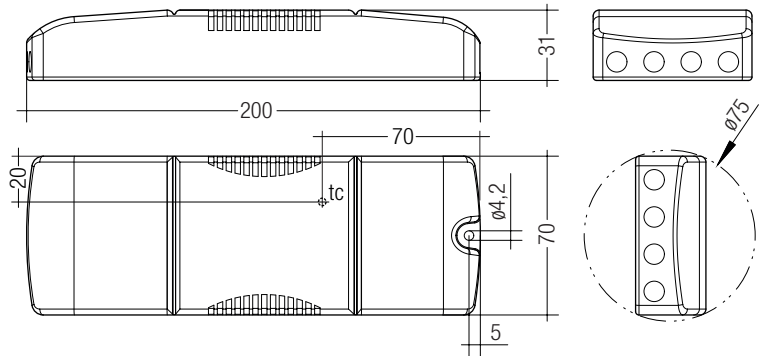


Driver LC 10W 150–400mA flexC SR EXC

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Technical data

| | |
|---|-------------------------|
| Rated supply voltage | 220 – 240 V |
| AC voltage range | 198 – 264 V |
| DC voltage range | 176 – 280 V |
| Mains frequency | 0 / 50 / 60 Hz |
| Overvoltage protection | 320 V AC, 48 h |
| Typ. current (at 230 V, 50 Hz, full load) ^① ② | 56.8 mA |
| Typ. current (220 V, 0 Hz, full load, 100 % dimming level) ^② | 54.3 mA |
| Leakage current (at 230 V, 50 Hz, full load) ^① ② | < 250 µA |
| Max. input power | 12 W |
| Typ. efficiency (at 230 V / 50 Hz / full load) ^② | 81 % |
| λ (at 230 V, 50 Hz, full load) ^① | 0.92C |
| Typ. input current in no-load operation | 12 mA |
| Typ. input power in no-load operation | 0.6 W |
| In-rush current (peak / duration) | 17 A / 231 µs |
| THD (at 230 V, 50 Hz, full load) ^① | < 10 % |
| Starting time (at 230 V, 50 Hz, full load) ^① | < 500 ms |
| Starting time (DC mode) | < 500 ms |
| Switchover time (AC/DC) ^③ | < 0.2 s |
| Turn off time (at 230 V, 50 Hz, full load) | < 50 ms |
| Output current tolerance ^④ ⑤ ⑥ | ± 5 % |
| Max. output current peak (non-repetitive) | ≤ output current + 35 % |
| Output LF current ripple (< 120 Hz) | ± 5 % |
| Output P _{ST} ^{LM} (at full load) | ≤ 1 |
| Output SVM (at full load) | ≤ 0.4 |
| Max. output voltage (no-load voltage) | 60 V |
| Dimming range ^⑦ | 15 – 100 % |
| Mains surge capability (between L - N) | 1 kV |
| Mains surge capability (between L/N - PE) | 2 kV |
| Surge voltage at output side (against PE) | < 500 V |
| Type of protection | IP20 |
| Lifetime | up to 100,000 h |
| Guarantee (conditions at www.tridonic.com) | 5 years |
| Dimensions L x W x H | 200 x 70 x 31 mm |



Ordering data

| Type | Article number | Packaging carton | Packaging pallet | Weight per pc. |
|-------------------------------|----------------|------------------|------------------|----------------|
| LC 10W 150–400mA flexC SR EXC | 28000698 | 10 pc(s). | 400 pc(s). | 0.186 kg |

Specific technical data

| Type | Output current ^① ② | Min. forward voltage | Max. forward voltage | Max. output power | Typ. power consumption (at 230 V, 50 Hz, full load) | Typ. current consumption (at 230 V, 50 Hz, full load) | Max. casing temperature t _c | Ambient temperature t _a max. | I-SELECT 2 resistor value ^⑧ |
|-------------------------------|-------------------------------|----------------------|----------------------|-------------------|---|---|--|---|--|
| LC 10W 150–400mA flexC SR EXC | 150 mA | 15 V | 40.0 V | 6 W | 7.3 W | 40 mA | 75 °C | -25 ... +60 °C | open |
| | 175 mA | 15 V | 40.0 V | 7 W | 8.4 W | 44 mA | 75 °C | -25 ... +60 °C | 28.75 kΩ |
| | 200 mA | 15 V | 40.0 V | 8 W | 9.6 W | 48 mA | 75 °C | -25 ... +60 °C | 25.00 kΩ |
| | 225 mA | 15 V | 40.0 V | 9 W | 10.6 W | 53 mA | 75 °C | -25 ... +60 °C | 22.22 kΩ |
| | 250 mA | 15 V | 40.0 V | 10 W | 11.7 W | 57 mA | 75 °C | -25 ... +60 °C | 20.00 kΩ |
| | 275 mA | 15 V | 36.3 V | 10 W | 11.8 W | 57 mA | 75 °C | -25 ... +60 °C | 18.18 kΩ |
| | 300 mA | 15 V | 33.3 V | 10 W | 11.7 W | 57 mA | 75 °C | -25 ... +60 °C | 16.67 kΩ |
| | 325 mA | 15 V | 30.7 V | 10 W | 11.9 W | 57 mA | 75 °C | -25 ... +60 °C | 15.38 kΩ |
| | 350 mA | 15 V | 28.6 V | 10 W | 11.8 W | 57 mA | 75 °C | -25 ... +60 °C | 14.29 kΩ |
| | 375 mA | 15 V | 26.7 V | 10 W | 11.9 W | 57 mA | 75 °C | -25 ... +60 °C | 13.33 kΩ |
| | 400 mA | 15 V | 25.0 V | 10 W | 12.0 W | 57 mA | 75 °C | -25 ... +60 °C | short circuit (0 Ω) |

^① Depending on the selected output current.

^② Valid for immediate change of power supply type otherwise the starting time is valid.

^③ Output current is mean value.

^④ At output current < 200 mA the output current tolerance increases to max. ± 10 %.

^⑤ The table only lists a number of possible operating points but does not cover each single point. The output current can be set within the total value range in 1-mA-steps.

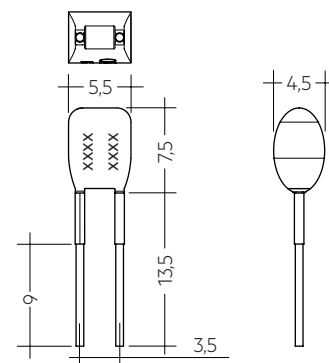
^⑧ Not compatible with I-SELECT (generation 1). Calculated resistor value.

Product description

- Ready-for-use resistor to set output current value
- Compatible with LED driver featuring I-SELECT 2 interface; not compatible with I-SELECT (generation 1)
- Resistor is base insulated
- Resistor power 0.25 W
- Current tolerance $\pm 2\%$ to nominal current value
- Compatible with LED driver series PRE and EXC

Example of calculation

- $R [k\Omega] = 5 V / I_{out} [mA] \times 1000$
- E96 resistor value used
- Resistor value tolerance $\leq 1\%$; resistor power $\geq 0.1 W$; base insulation necessary
- When using a resistor value beyond the specified range, the output current will automatically be set to the minimum value (resistor value too big), respectively to the maximum value (resistor value too small)



Ordering data

| Type | Article number | Colour | Marking | Current | Resistor value | Packaging bag | Weight per pc. |
|---------------------------------|-----------------|--------|---------|---------|------------------|---------------|----------------|
| I-SELECT 2 PLUG 150MA BL | 28001102 | Blue | 0150 mA | 150 mA | 33.20 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 175MA BL | 28001103 | Blue | 0175 mA | 175 mA | 28.70 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 200MA BL | 28001104 | Blue | 0200 mA | 200 mA | 24.90 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 225MA BL | 28001105 | Blue | 0225 mA | 225 mA | 22.10 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 250MA BL | 28001106 | Blue | 0250 mA | 250 mA | 20.00 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 275MA BL | 28001107 | Blue | 0275 mA | 275 mA | 18.20 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 300MA BL | 28001108 | Blue | 0300 mA | 300 mA | 16.50 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 325MA BL | 28001109 | Blue | 0325 mA | 325 mA | 15.40 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 350MA BL | 28001110 | Blue | 0350 mA | 350 mA | 14.30 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 375MA BL | 28001111 | Blue | 0375 mA | 375 mA | 13.30 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG 400MA BL | 28001112 | Blue | 0400 mA | 400 mA | 12.40 k Ω | 10 pc(s). | 0.001 kg |
| I-SELECT 2 PLUG MAX BL | 28001099 | Blue | MAX | MAX | 0.00 k Ω | 10 pc(s). | 0.001 kg |

1. Standards

EN 55015
EN 61000-3-2
EN 61000-3-3
EN 61347-1
EN 61347-2-13
EN 62384
EN 61547

According to EN 50172 for use in central battery systems

According to EN 60598-2-22 suitable for emergency lighting installations

2. Thermal details and lifetime

2.1 Expected lifetime

| Expected lifetime | | | | | | | |
|-------------------------------|----------------|----------|-------------|-------------|-------------|-------------|----------|
| Type | Output current | t_a | 40 °C | 50 °C | 55 °C | 60 °C | 65 °C |
| LC 10W 150-400mA flexC SR EXC | 150 – 400 mA | t_c | 60 °C | 65 °C | 70 °C | 70 °C | 75 °C |
| | | Lifetime | > 100,000 h | > 100,000 h | > 100,000 h | > 100,000 h | 90,000 h |

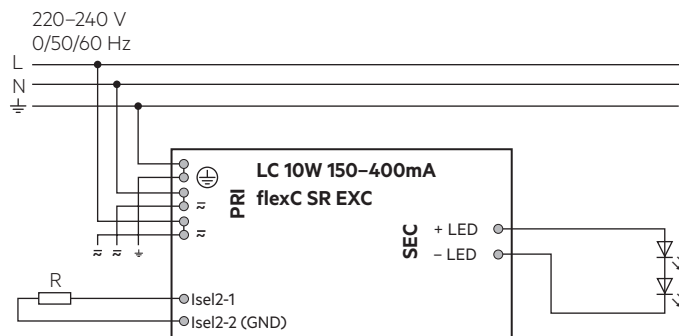
The LED driver is designed for a lifetime stated above under reference conditions and with a failure probability of less than 10 %.

The relation of t_c to t_a temperature depends also on the luminaire design.

If the measured t_c temperature is approx. 5 K below t_c max., t_a temperature should be checked and eventually critical components (e.g. ELCAP) measured. Detailed information on request.

3. Installation / wiring

3.1 Circuit diagram



Device with loop through wiring function.

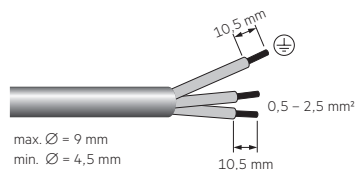
3.2 Wiring type and cross section

Mains supply wires

For wiring use stranded wire with ferrules or solid wire from 0.5–2.5 mm². Strip 10–11 mm of insulation from the cables to ensure perfect operation of the push terminals.

Use one wire for each terminal connector only.

Use each strain relief channel for one cable only.



1.1 Glow wire test

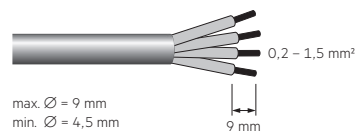
according to EN 61347-1 with increased temperature of 850 °C passed.

Secondary wires (LED module)

For wiring use stranded wire with ferrules or solid wire from 0.2–1.5 mm². Strip 8.5–9.5 mm of insulation from the cables to ensure perfect operation of the push-wire terminals.

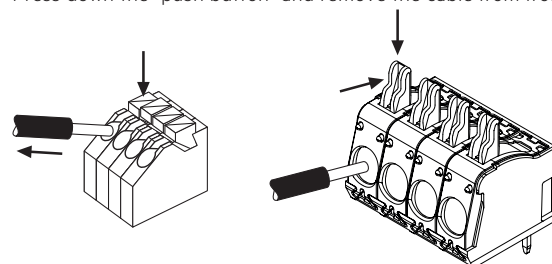
Use one wire for each terminal connector only.

Use each strain relief channel for one cable only.



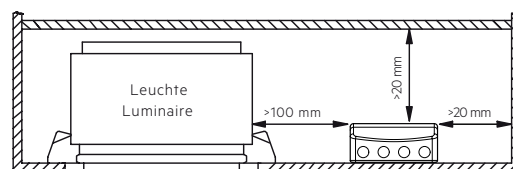
3.3 Loose wiring

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



3.4 Fixing conditions

Dry, acidfree, oilfree, fatfree. It is not allowed to exceed the maximum ambient temperature (t_a) 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

- Run the secondary lines separately from the mains connections and lines to achieve good EMC performance.
- The max. secondary cable length is 2 m (4 m circuit).
- For good EMC performance, keep the LED wiring as short as possible.
- To comply with the EMC regulations run the secondary wires (LED module) in parallel.
- Secondary switching is not permitted.
- The LED driver has no inverse-polarity protection on the secondary side. Wrong polarity can damage LED modules with no inverse-polarity protection.
- Wrong wiring of the LED driver can lead to malfunction or irreparable damage.
- Through wiring of mains is for connecting additional LED control gear only. Max. permanent current of 12 A may not be exceeded.
- 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 Hot plug-in

Hot plug-in is not supported due to residual output voltage of > 0 V. When connecting an LED load, restart the device to activate the LED output. This can be done via mains reset.

3.7 Earth connection

The earth connection is conducted as protection earth (PE). If the LED driver will be earthed, protection earth (PE) has to be used. There is no earth connection required for the functionality of the LED driver. Earth connection is recommended to improve following behaviour:

- Electromagnetic interferences (EMI)
- Transmission of mains transients to the LED output

In general it is recommended to earth the LED driver if the LED module is mounted on earthed luminaire parts respectively heat sinks and thereby representing a high capacity against earth.

3.8 I-SELECT 2 resistors connected via cable

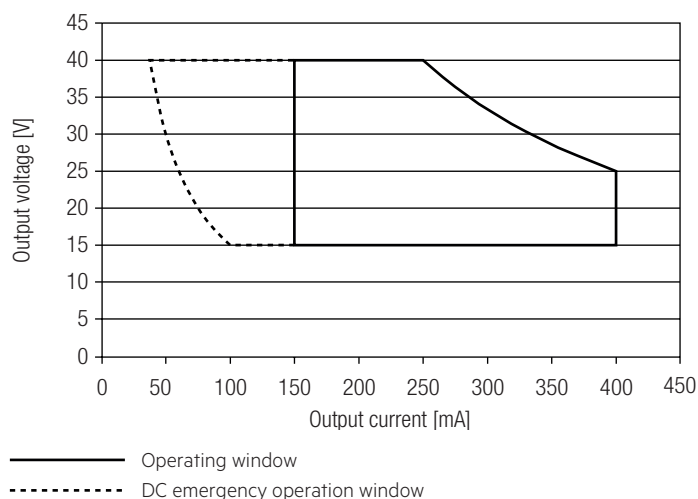
For details see:
http://www.tridonic.com/com/en/download/technical/LCA_PRE_LC_EXC_ProductManual_en.pdf.

3.9 Installation note

Max. torque at the clamping screw: 0.5 Nm / M4

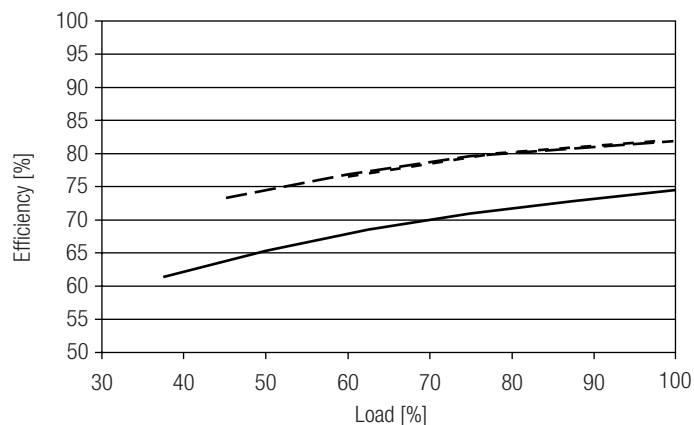
4. Electrical values

4.1 Operating window

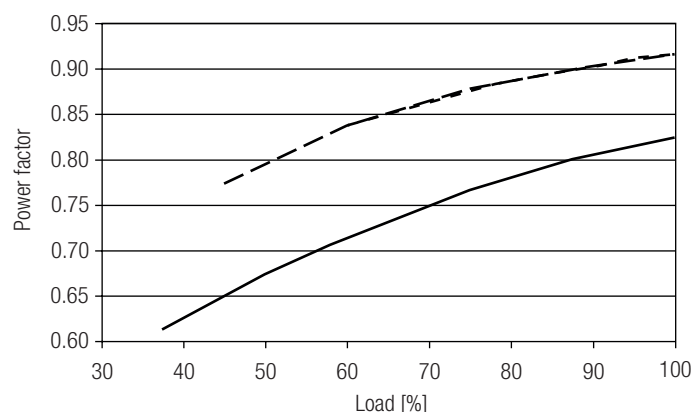


Make sure that the LED driver is operated within the given window under all operating conditions. Special attention needs to be paid at dimming and DC emergency operation as the forward voltage of the connected LED modules varies with the dimming level, due to the implemented amplitude dimming technology. Coming below the specified minimum output voltage of the LED driver may cause the device to shut-down. See chapter "6.7 DC emergency operation" for more information.

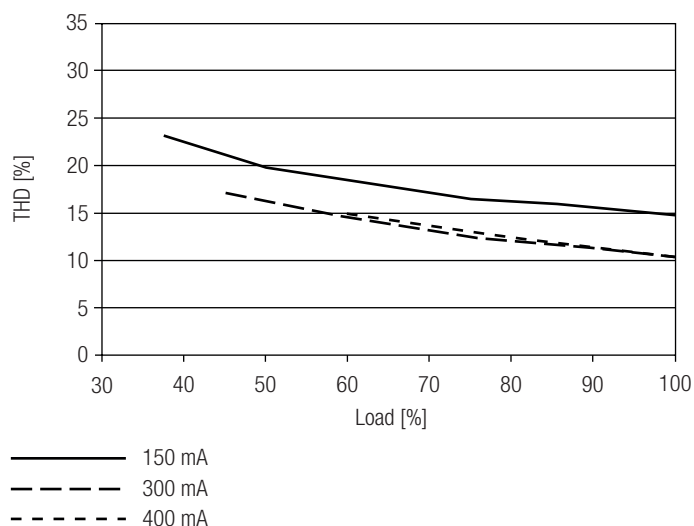
4.2 Efficiency vs load



4.3 Power factor vs load



4.4 THD vs load



100 % load corresponds to the max. output power (full load) according to the table on page 2.

4.5 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 mm ² | 1.5 mm ² | 2.5 mm ² | 2.5 mm ² | 1.5 mm ² | 1.5 mm ² | 2.5 mm ² | 2.5 mm ² | I _{max} | time |
| LC 10W 150-400mA flexC SR EXC | 38 | 50 | 61 | 78 | 23 | 30 | 37 | 47 | 17 A | 231 µs |

These 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.

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

| | THD | 3. | 5. | 7. | 9. | 11. |
|--------------------------------------|------|-----|-----|-----|-----|-----|
| LC 10W 150-400mA flexC SR EXC | < 10 | < 4 | < 4 | < 3 | < 3 | < 3 |

5. Interfaces / communication

5.1 Configuration input ready2mains (L, N)

The digital ready2mains protocol is modulated onto the mains signal which is wired to the mains terminal (L and N).

6. Functions

6.1 Function: adjustable current

The output current of the LED driver can be adjusted in a certain range.
For adjustment there are two options available.

Option 1: I-SELECT 2

By inserting a suitable resistor or third party resistor into the I-SELECT 2 interface, the current value can be adjusted. The relationship between output current and resistor value can be found in the chapter "Accessories I-SELECT 2 Plugs".



Please note that the resistor values for I-SELECT 2 are not compatible with I-SELECT (generation 1). Installation of an incorrect resistor may cause irreparable damage to the LED module(s).

Resistors for the main output current values can be ordered from Tridonic (see accessories).

Option 2: ready2mains

Adjustment is done by the ready2mains Programmer and the corresponding configuration software (see ready2mains documentation).



Current adjustment can only be done five times over ready2mains. To program the LED driver a connected load is necessary that is within the operating window of the LED driver.

The priority for current adjustment methods is I-SELECT 2 followed by ready2mains (lowest priority).

6.2 ready2mains – configuration

The ready2mains interface enables the configuration of the mostly used parameters via the mains wiring.
In the case of EXC LED driver, it is the LED output current as well as an optional lockbit to prevent any accidental configuration at a later stage.

The configuration is done via the ready2mains Programmer, either directly at the Programmer itself or via a respective software tool. For details on the configuration via ready2mains see the technical information of the Programmer and its tools.

6.3 Short-circuit behaviour

In case of a short-circuit at the LED output the LED output is switched off. After restart of the LED driver the output will be activated again.
The restart can be done via mains reset.

6.4 No-load operation

The LED driver will not be damaged in no-load operation. The output will be deactivated and is therefore free of voltage. If a LED load is connected the device has to be restarted before the output will be activated again.

6.5 Overload protection

If the maximum load is exceeded by a defined internal limit, the LED driver turns off the LED output.
After restart of the LED driver the output will be activated again.
The restart can be done via mains reset.

6.6 Overtemperature protection

The LED driver is protected against temporary thermal overheating. If the temperature limit is exceeded the output current of the LED module(s) is reduced. The temperature protection is activated above $t_{c\ max}$. The activation temperature differs depending on the LED load. On DC operation this function is deactivated to fulfill emergency requirements.

6.7 DC emergency operation

The LED driver is designed to operate on DC voltage and pulsed DC voltage. For a reliable operation, make sure that also in DC emergency operation the LED driver is run within the specified conditions as stated in chapter "4.1 Operating window".

Light output level in DC operation (EOF_i): 100 % (cannot be adjusted)

The voltage-dependent input current of Driver incl. LED module is depending on the used load.

The voltage-dependent no-load current of Driver (without or defect LED module) is for:

AC: < 14 mA (at 230 V, 50 Hz)

DC: < 5 mA (at 275 – 186 V, 0 Hz)

6.8 Intelligent Voltage Guard

Intelligent Voltage Guard is the name of the electronic monitoring of the mains voltage. It immediately shows if the mains voltage rises above certain thresholds. Measures can then be taken quickly to prevent damage to the LED driver.

- If the mains voltage rises above approx. 280 Vrms (voltage depends on the LED driver type), the LED light starts flashing on and off.
- To avoid a damage of the LED driver the mains supply has to be switched off at this signal.

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 one 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.

7.3 Maximum number of switching cycles

All LED driver are tested with 50,000 switching cycles.
The actually achieved number of switching cycles is significantly higher.

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.