

100 W Constant Current LED driver

Product code: 5799

100 W 220 – 240 V 0 / 50 – 60 Hz

- Very high efficiency up to 94 %
- Low current ripple, complying with IEEE 1798 recommendation
- Suitable for DC use
- Long lifetime up to 100 000 h
- Maximum output voltage limited to 250 V
- Active open load protection
- Improved surge protection up to 4 kV at L-GND
- Driver protection Class I
- Ideal solution for Class I luminaires, suitable for Class II luminaires too*



* See page 4 for details.



Functional Description

- Adjustable constant current output: 250 mA (default) to 700 mA
- Additional 350 mA fixed current output.
- Current setting with external resistors

Mains Characteristics

| | |
|----------------------------------|---------------------------------------|
| Nominal rated voltage range | 220 V – 240 V, 0 / 50 – 60 Hz |
| AC voltage range | 198 VAC – 264 VAC |
| | Withstands max. 320 VAC (max. 1 hour) |
| DC voltage range | 176 VDC – 280 VDC |
| DC starting voltage | > 190 VDC |
| Mains current at full load | 0.40 – 0.54 A |
| Frequency | 0 / 50 Hz – 60 Hz |
| THD at full power | < 10 % |
| Leakage current to earth | < 0.3 mA |
| Tested surge protection | 1 kV L-N, 4 kV L-GND (IEC 61000-4-5) |
| Tested fast transient protection | 2 kV (IEC 61000-4-4) |

Insulation between circuits & driver case

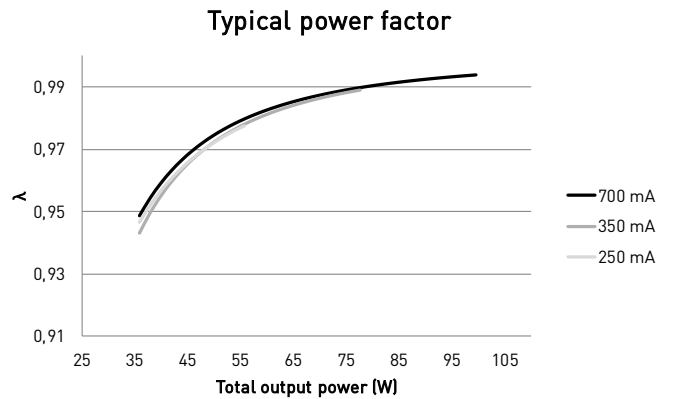
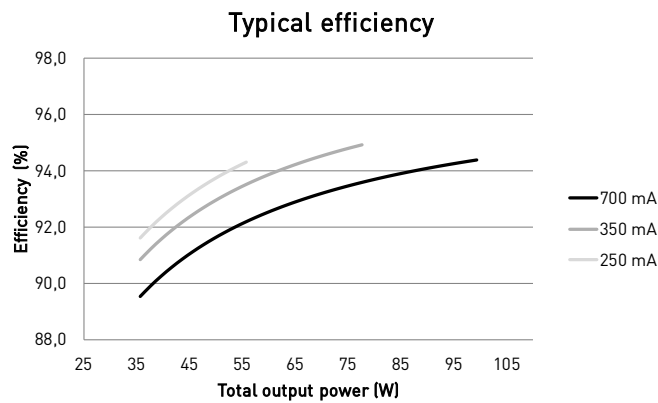
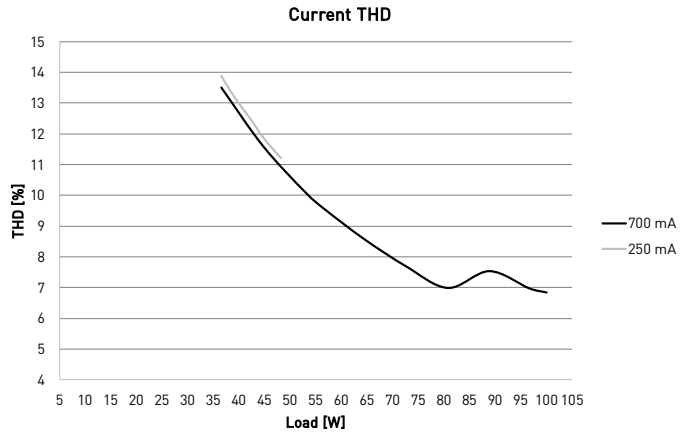
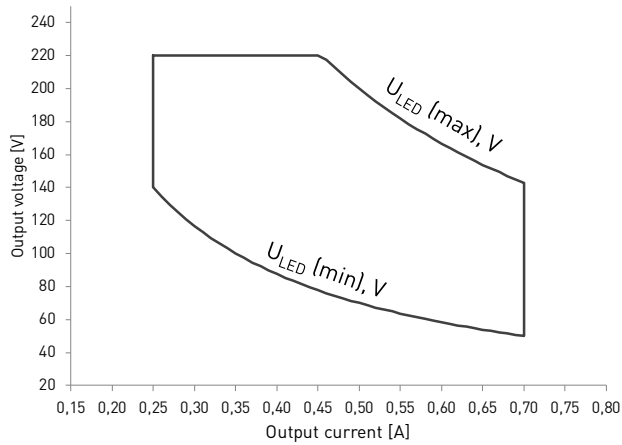
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|--------------------------------|------------------|
| Mains circuit - Output | Non-isolated |
| Mains and output - Driver case | Basic insulation |

Load Output (non-isolated)

| | |
|------------------------------|---|
| Output current (I_{out}) | 250 mA (default) – 700 mA |
| Accuracy | $\pm 5 \%$ |
| Ripple | < 1 % ¹⁾ at ≤ 120 Hz |
| | 1) Low frequency, LED load: Cree MX3 LEDs |
| PstLM | $\leq 1^{2)}$ |
| SVM | $\leq 0,4^{2)}$ |
| | 2) At full power |
| U_{OUT} (max) (abnormal) | 250 V |

| I_{LED} | 250 mA | 350 mA | 700 mA |
|------------------------------------|-------------|-------------|------------|
| P_{Rated} | 55 W | 77 W | 100 W |
| U_{LED} | 140 – 220 V | 100 – 220 V | 50 – 142 V |
| PF (λ) at full load | 0.98 | 0.98 | 0.98 |
| Efficiency (η) at full load | 94 % | 95 % | 94 % |

Operating window and driver performance



Operating Conditions and Characteristics

| | |
|--|--|
| Highest allowed tc point temperature | 75 °C |
| t _c life (60 000 h) temperature | 75 °C |
| Ambient temperature range* | -25 °C ... +50 °C* |
| Storage temperature range | -40 °C ... +80 °C |
| Maximum relative humidity | No condensation |
| Lifetime (90 % survival rate) | 100 000 h, at t _c = 65 °C 90 000 h, at t _c = 70 °C 60 000 h, at t _c = 75 °C |

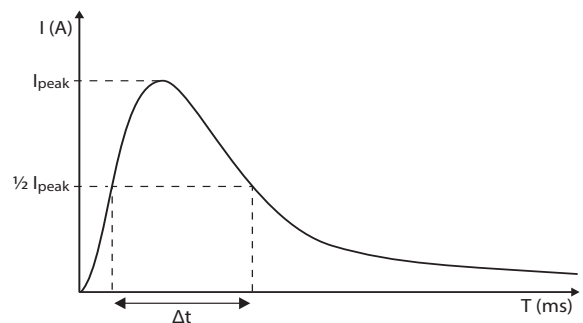
*) For other than independent use, higher t_a of the controlgear possible as long as highest allowed t_c point temperature is not exceeded

Quantity of drivers per miniature circuit breaker 16 A Type C

| Based on inrush current I _{peak} | Typ. peak inrush current I _{peak} | 1/2 value time, Δt | Calculated energy, I _{peak} ² Δt |
|---|--|--------------------|--|
| 40 pcs. | 37 A | 169 μs | 0.173 A ² s |

CONVERSION TABLE FOR OTHER TYPES OF MINIATURE CIRCUIT BREAKER

| MCB type | Relative quantity of LED drivers |
|----------|----------------------------------|
| B 10 A | 37 % |
| B 16 A | 60 % |
| B 20 A | 75 % |
| C 10 A | 62 % |
| C 16 A | 100 % (see table above) |
| C 20 A | 125 % |



CONTINUOUS CURRENT

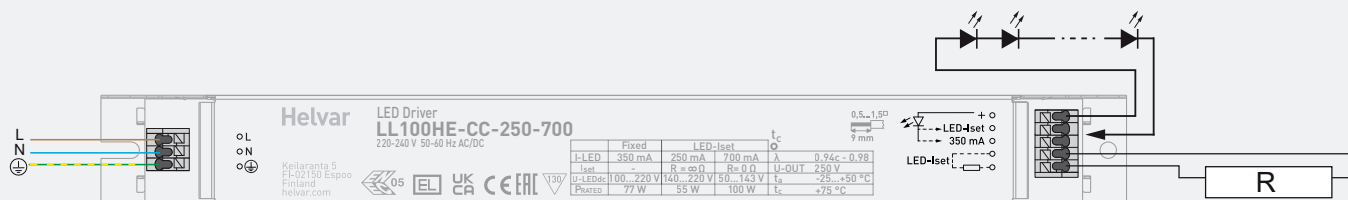
Total continuous current of the drivers and installation environment must always be considered and taken into calculations when installing drivers behind miniature circuit breaker. Example calculation of total drivers amount limited by continuous current: $I_{cont} = (16 A (I_{nom, Ta}) / \text{"nominal mains current with full load"}) \times 0.76$. This calculation is an example according to recommended precautions due to multiple adjacent circuit breakers (> 9 MCBs) and installation environment (T_a 30 degrees); variables may vary according to the use case. Both inrush current and continuous current calculations are based on ABB S200 series circuit breakers. More specific information in ABB series S200 circuit breaker documentation.

NOTE! Type C MCB's are strongly recommended to use with LED lighting. Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

Connections and Mechanical Data

| | |
|-----------------------------------|---|
| Wire size | 0.5 mm ² – 1.5 mm ² |
| Wire type | Solid core and fine-stranded |
| Wire insulation | According to EN 60598 |
| Maximum driver to LED wire length | 1.5 m |
| Weight | 205 g |
| IP rating | IP20 |

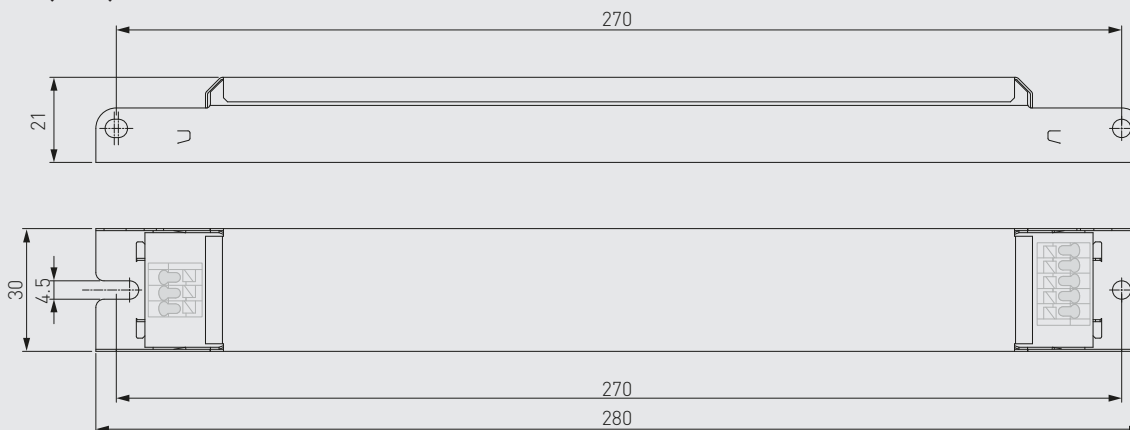
Connections



Note:

- Not suitable for load side switching operation
- Label may differ if the unit is preset to fixed current

Dimensions (mm)



The LED-Iset resistor/current setting values are adjusted according to the LEDset specification. The resistor value for each required output current can thus be calculated from the formula $R [\Omega] = (5 [V] / I_{out} [A]) * 1000$. Below are the available LED-Iset resistors from Helvar, pre-adjusted for the most common output currents.

Helvar LED-Iset resistors and currents (Nominal I_{out} (±5 % tol.))

| LED-Iset resistor model | MAX | 650 mA | 600 mA | 550 mA | 500 mA | 475 mA | 450 mA | 425 mA | 400 mA | 375 mA | 350 mA | 325 mA | 300 mA | 275 mA | No resistor |
|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| I _{out} (mA) | 700 | 650 | 600 | 550 | 500 | 475 | 450 | 425 | 400 | 375 | 350 | 325 | 300 | 275 | 250 |
| Order code | T90000 | T90650 | T90600 | T90550 | T90500 | T90475 | T90450 | T90425 | T90400 | T90375 | T90350 | T90325 | T90300 | T90275 | N/A |
| Resistance values (Ω) | 0 | 7.68k | 8.25k | 9.09k | 10k | 10.5k | 11k | 11.8k | 12.4k | 13.3k | 14.3k | 15.4k | 16.5k | 18.2k | ∞ |

The current can be adjusted also with normal resistors by selecting suitable resistor value (formula $R [\Omega] = (5 [V] / I_{out} [A]) * 1000$). Reference resistor values can be found below order code in the table above.

LL100HE-CC-250-700 LED driver is suited for built-in usage in luminaires. With LL1x2130-SR strain reliefs, independent use is possible too (see the LL1x2130-SR datasheet for details). In order to have safe and reliable LED driver operation, the LED luminaires will need to comply with the relevant standards and regulations (e.g. IEC/EN 60598-1). The LED luminaire shall be designed to adequately protect the LED driver from dust, moisture and pollution. The luminaire manufacturer is responsible for the correct choice and installation of the LED drivers according to the application and product datasheets. Operating conditions of the LED drivers may never exceed the specifications as per the product datasheet.

Installation & operation

Maximum ambient and t_c temperature:

- For built-in components inside luminaires, the t_a ambient temperature range is a guideline given for the optimum operating environment. However, integrator must always ensure proper thermal management (i.e. mounting base of the driver, air flow etc.) so that the t_c point temperature does not exceed the t_c maximum limit in any circumstance.
- Reliable operation and lifetime is only guaranteed if the maximum t_c point temperature is not exceeded under the conditions of use.

Current setting resistor

LL100HE-CC-250-700 LED driver features a constant current output adjustable via current setting resistor.

- An external resistor can be inserted in to the current setting terminal marked with LED-Iset on the LED driver label., allowing the user to adjust the LED driver output current.
- When no external resistor is connected, then the LED drivers will operate at their default lowest current level.
- A standard through-hole resistor can be used for the current setting. To achieve the most accurate output current it is recommended to select a quality low tolerance resistor. Minimum diameter for resistor leg is 0.51mm.
- For the resistor/current value selection, refer to the table on page 3.
- For drivers not providing isolation (non-isolated), current setting resistor must be insulated according safety regulations.

LED driver earthing

- LL100HE-CC-250-700 LED driver is a protective Class I device and designed for Class I luminaires.
- If used inside **Class I** luminaires, this LED driver must always have the protective earth cable connected for safety reasons.
- The driver is designed to be used inside Class I luminaires. For usage inside **Class II** luminaires, the safety of the luminaire shall be ensured through double/reinforced insulation of live parts and through supplementary insulation of conductive parts of the casing, or any conductive parts connected to the casing, as the casing is only basic insulated from the live parts. The earth connector of the driver shall be left unconnected and there shall be no protective earth terminals in the luminaire terminal block to fulfill the requirements of IEC/EN 60598-1 for Class II luminaires. The EMC performance of the driver change when left unearthed, so it is always the responsibility of the integrator to take measures and necessary actions, for example by luminaire design to ensure the assembled luminaire complies with latest EMC standard.

Miniature Circuit Breakers (MCB)

- Type-C MCB's with trip characteristics in according to EN 60898 are recommended.
- Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

Lamp failure functionality

No load

When open load is detected, driver limits output voltage according to U_{out} (max) (abnormal) and goes into low power consumption stand-by mode. After resolving the fault, the normal driver operation can be resumed through a mains reset (> 2 seconds).

Overload

Driver can withstand overload, however reliable operation is only guaranteed in specified voltage range.

Underload

Reliable operation of the driver is only guaranteed in specified voltage range.

Short circuit

Driver can withstand output short circuit.

Conformity & standards

| | |
|---|-------------------------------|
| General and safety requirements | EN 61347-1: 2015 |
| Particular safety requirements for DC or AC supplied electronic control gear for LED modules | EN 61347-2-13: 2014 + A1:2017 |
| Thermal protection class | EN 61347, C5e |
| Mains current harmonics | EN 61000-3-2: 2014 |
| Limits for voltage fluctuations and flicker | EN 61000-3-3: 2013 |
| Radio frequency interference | EN 55015: 2013 + A1:2015 |
| Immunity standard | EN 61547: 2009 |
| Performance requirements | EN 62384: 2006 + A1:2009 |
| Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers | IEEE 1789-2015 |
| Compliant with relevant EU directives | |
| RoHS/REACH compliant | |
| CE/UKCA and ENEC marked | |

Label symbols



Thermally controlled control gear, incorporating means of protection against overheating to prevent the case temperature under any conditions of use from exceeding 130 °C.