

## 35 W **Constant Current** LED driver

Product code: 5725

**35 W 220 – 240 V 0 / 50 – 60 Hz**

- Very high efficiency up to 93%
- Very low current ripple, complying with IEEE 1789 recommendation
- Suitable for use in emergency lighting applications
- Long lifetime up to 100 000 h
- Maximum output voltage limited to 250 V
- Active open load protection
- 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: 120 mA (default) to 450mA
- Current setting with external resistors

### Mains Characteristics

Voltage range	198 VAC – 264 VAC Withstands max. 330 VAC (max. 1 hour)
DC range	176 VDC – 280 VDC
starting voltage	> 190 VDC
Mains current at full load	0,13 – 0,18 A
Frequency	0 / 50 Hz – 60 Hz
THD at full power	< 14 %
Leakage current to earth	< 0.3 mA
Tested surge protection	1 kV L-N, 2 kV L-GND (IEC 61000-4-5)
Tested fast transient protection	2 kV (IEC 61000-4-4)

### Insulation between circuits & driver case

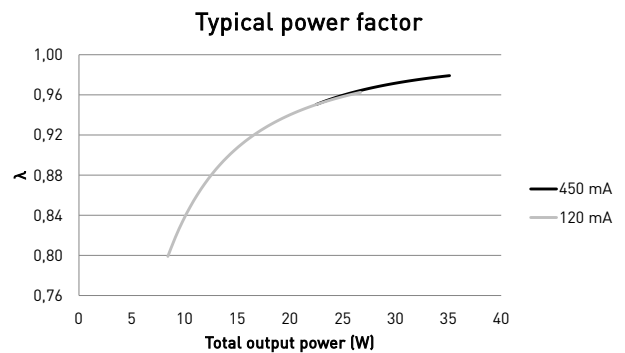
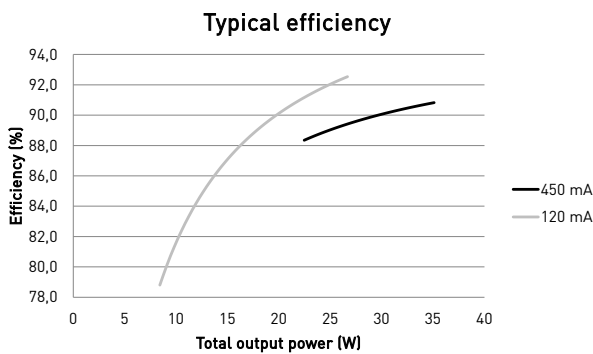
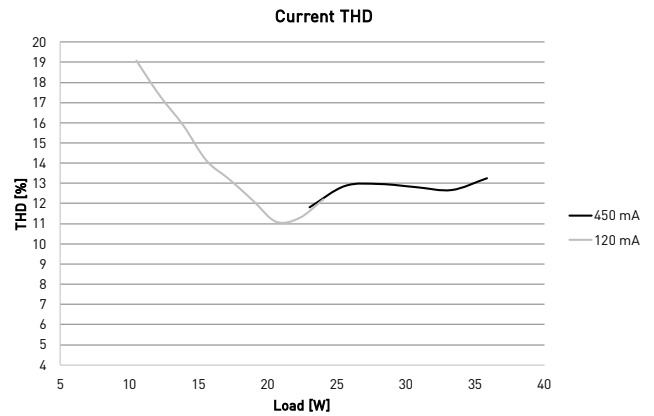
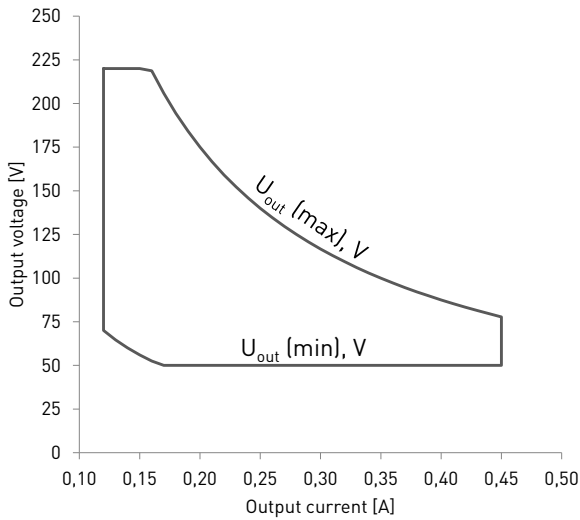
Mains circuit - Output	Non-isolated
Mains and output - Driver case	Basic insulation

### Load Output (non-isolated)

Output current ( $I_{out}$ )	120 mA (default) – 450 mA
Accuracy	$\pm 5 \%$
Ripple	< 1 %* at $\leq 120$ Hz
	*] Low frequency, LED load: Cree MX3 LEDs
PstLM	< 0.06*
SVM	< 0.01*
	*] At full power, measured with Cree XP-G LED modules.
$U_{OUT}$ (max) (abnormal)	250 V
EOF <sub>I</sub> (EL use)	> 0.98 x output current with AC supply

$I_{LED}$	120 mA	450 mA
$P_{Rated}$	26.4 W	35.1 W
$U_{LED}$	70 – 220 V	50 – 78 V
PF ( $\lambda$ ) at full load	0.96	0.98
Efficiency ( $\eta$ ) at full load	93 %	91 %

## Operating window and driver performance



## Operating Conditions and Characteristics

Highest allowed $t_c$ point temperature	80 °C
Ambient temperature range*	-25 °C ... +50 °C*
in independent use	-25 °C ... +40 °C
Storage temperature range	-40 °C ... +80 °C
Maximum relative humidity	No condensation
Lifetime (90 % survival rate)	100 000 h, at $t_c = 70$ °C
	90 000 h, at $t_c = 75$ °C
	60 000 h at $t_c = 80$ °C

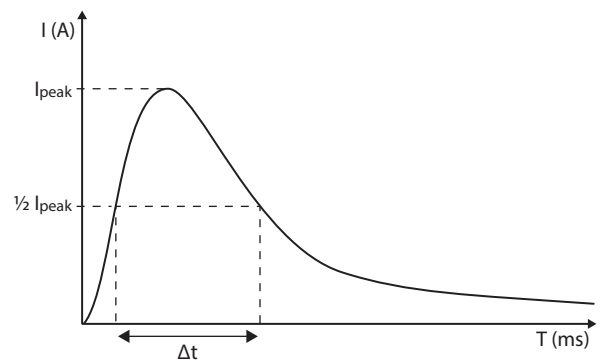
\*) For other than independent use, higher  $t_a$  of the controlgear possible as long as highest allowed  $t_c$  point temperature is not exceeded

## Quantity of drivers per miniature circuit breaker 16 A Type C

Based on $I_{cont}$	Based on inrush current $I_{peak}$	Typ. peak inrush current $I_{peak}$	1/2 value time, $\Delta t$	Calculated energy, $I_{peak}^2 \Delta t$
64 pcs.	79 pcs.	23 A	140 $\mu s$	< 0.06 A <sup>2</sup> 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 %

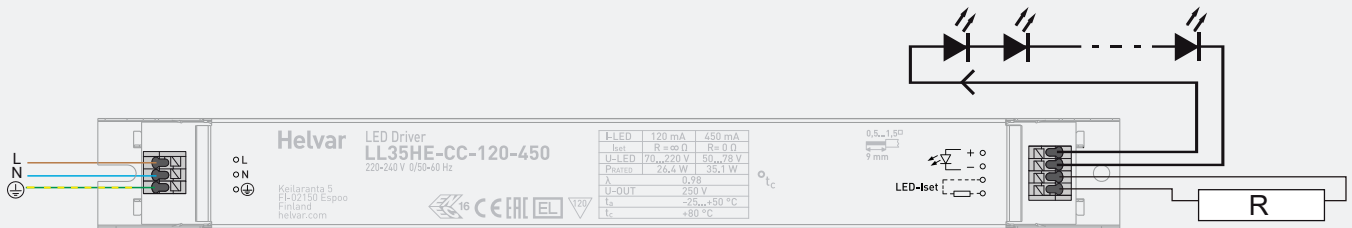


Type C MCB's are strongly recommended to use with LED lighting. Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

## Connections and Mechanical Data

Wire size	0.5 mm <sup>2</sup> – 1.5 mm <sup>2</sup>
Wire type	Solid core and fine-stranded
Wire insulation	According to EN 60598
Maximum driver to LED wire length	1.5 m
Weight	166 g
IP rating	IP20

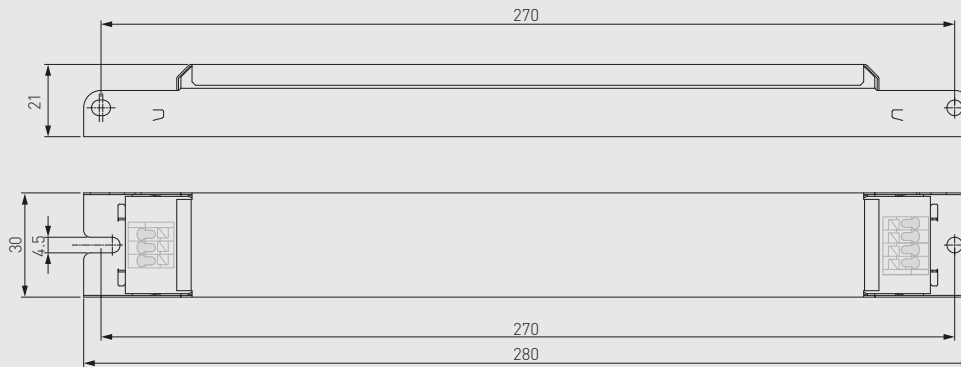
## Connections



**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  $R (\Omega) = (5 V) / I_{out} * 1000$ . Below are the available LED-Iset resistors from Helvar, pre-adjusted for the most common output currents.

### Helvar LED-Iset resistors and currents (Nominal $I_{out}$ ( $\pm 5\%$ tol.))

LED-Iset resistor model	MAX	425 mA	400 mA	375 mA	350 mA	325 mA	300 mA	275 mA	250 mA	225 mA	200 mA	150 mA	No resistor
$I_{out}$ (mA)	450	425	400	375	350	325	300	275	250	225	200	150	120
Order code	T90000	T90425	T90400	T90375	T90350	T90325	T90300	T90275	T90250	T90225	T90200	T90150	N/A
Resistance values ( $\Omega$ )	0	11.8k	12.4k	13.3k	14.3k	15.4k	16.5k	18.2k	20k	22.1k	24.9k	33.2k	$\infty$

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

LL35HE-CC-120-450 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

LL35HE-CC-120-450 LED driver features a constant current output adjustable via current setting resistor.

- An external resistor can be inserted in to the current setting terminal, 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.
- Always connect the current setting resistor only into the terminals marked with Iset/Rset/LEDset/GNDset on the LED driver label.
- 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

- LL35HE-CC-120-450 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.
- If used inside **Class II** luminaires, the safety of the luminaire shall be ensured through double/reinforced insulation of live parts. This LED driver is only basic insulated, and provided that luminaire insulation is done according to the latest standards (e.g. IEC/EN 60598-1), the earth terminal of the driver shall be left unconnected. However, the EMC performance of Class I LED drivers change when left unearthed, so it is always the responsibility of the integrator to take measures to ensure that the assembled luminaire complies with latest EMC standards. Driver RFI measurement data will be provided by request.

### 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.

### Installation site

- The general preferred installation position of LED drivers for independent use is to have the top cover facing upwards.

## 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).

### Short circuit

Driver can withstand output short circuit.

## Conformity & standards

General and safety requirements	EN 61347-1
Particular safety requirements for DC or AC supplied electronic control gear for LED modules	EN 61347-2-13
Additional safety requirements for AC or DC supplied electronic controlgear for emergency lighting	EN 61347-2-13, Annex J
Thermal protection class	EN 61347, C5e
Mains current harmonics	EN 61000-3-2
Limits for voltage fluctuations and flicker	EN 61000-3-3
Radio frequency interference	EN 55015
Immunity standard	EN 61547
Performance requirements	EN 62384
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	
ENEC and CE / UKCA 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 120 °C.