

150 W **Dimmable DALI** LED driver

150 W 220 – 240 V 0 / 50 – 60 Hz

- DALI-2 certified LED driver, 1-100 % dimming range
- Filtered hybrid dimming technology
- Very high efficiency up to 96 %
- Low ripple and flicker (according to IEEE 1789)
- Suitable for use in emergency lighting applications
- Long lifetime up to 100 000 h
- Driver protection Class I
- Ideal solution for closed luminaires where protection done with luminaire construction (Class I or II)
- Helvar Driver Configurator support

**Functional Description**

- Adjustable constant current output: 350 mA (default) to 700 mA
- Current setting programmable via DALI or with external resistors
- Filtered hybrid dimming for high-quality light in every application
- Switch-Control functionality for easy-to-use intensity control
- Adaptive LED overload protection, reduces output current if overvoltage is detected
- Full load recognition with automatic recovery, open and short circuit protection
- Multipurpose terminal Iset/NTC for current setting or overtemperature protection
- Constant Light Output (CLO), adjustable up to 100 000 h (default disabled)
- Power consumption monitor (real time), running hour monitor (accumulative), energy management (accumulative)

**Mains Characteristics**

Voltage range	198 VAC – 264 VAC
DC range	176 VDC – 280 VDC
starting voltage	> 190 VDC
Mains current at full load	0.53 - 0.71 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	< 0.5 W
THD at full power	< 10 %
Leakage current to earth	< 0.5 mA
Tested surge protection	1 kV L-N, 2 kV L-GND (IEC 61000-4-5)
Tested fast transient protection	4 kV (IEC 61000-4-4)

**Insulation between circuits & driver case**

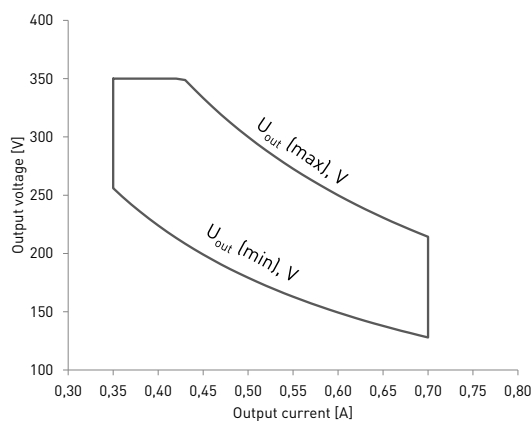
Mains circuit - Output	Non-isolated
DALI circuit - Output	Basic insulation
Mains circuit - DALI circuit	Basic insulation
Mains, DALI and output - Driver case	Basic insulation

**Load Output**

Output current ( $I_{out}$ )	350 mA (default) – 700 mA
Accuracy	± 5 %
Ripple	< 2 %* at ≤ 120 Hz
	*] Low frequency, LED load: Cree XM-L LEDs
$U_{out}$ (max) (abnormal)	400 V
Outrush current	1100 mA*
	*] When starting driver with short-circuited load or connecting load to running driver
EOFx (EL use)	> 0.98

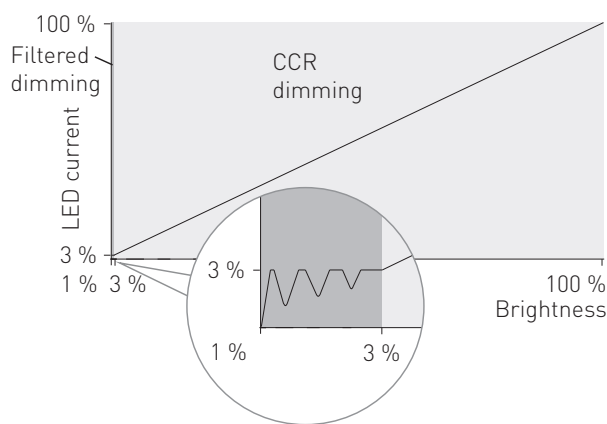
$I_{out}$	350 mA	700 mA
$P_{out}$ (max)	122.5 W	150 W
$U_{out}$	257 V – 350 V	128 V – 214 V
PF (λ) at full load	0.97	0.98
Efficiency (η) at full load	96 %	95 %

## Operating window



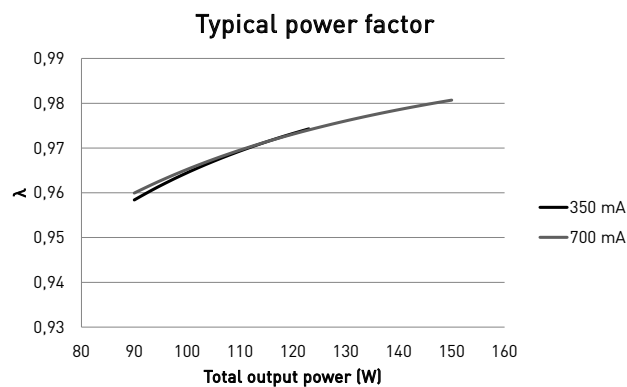
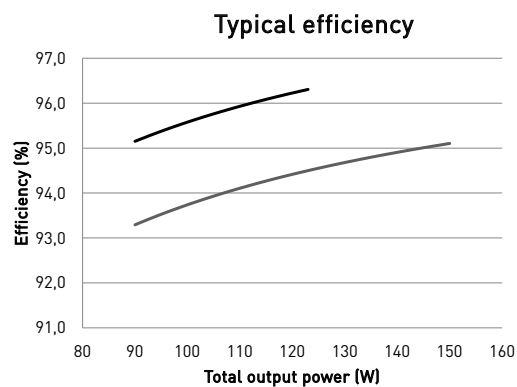
Note: Dimming between 1 % - 100 % possible across the whole operating window

## Filtered hybrid dimming technology



Dimming range	Modulation frequency	Modulation index
100 % - 3 %	0 Hz (DC)	< 1 %
3 % - 1 %	> 2 kHz	< 20 %

## Driver performance



## Operating Conditions and Characteristics

Absolute highest allowed $t_c$ point temperature	90 °C
60 000 h lifetime reference $t_c$ point temperature	80 °C
Ambient temperature range	-20 °C ... +50 °C
in independent use	-20 °C ... +50 °C
Storage temperature range	-40 °C ... +80 °C
Maximum relative humidity	No condensation
Lifetime (90 % survival rate)	100 000 h, at $t_c = 70$ °C
	60 000 h, at $t_c = 80$ °C
	30 000 h, at $t_c = 90$ °C

## 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, $I_{peak}^2 \Delta t$
17 pcs.	13 pcs.	49 A	336 $\mu s$	0.48 A <sup>2</sup> s

## 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	5 m
Weight	306 g
IP rating	IP20

## Connections

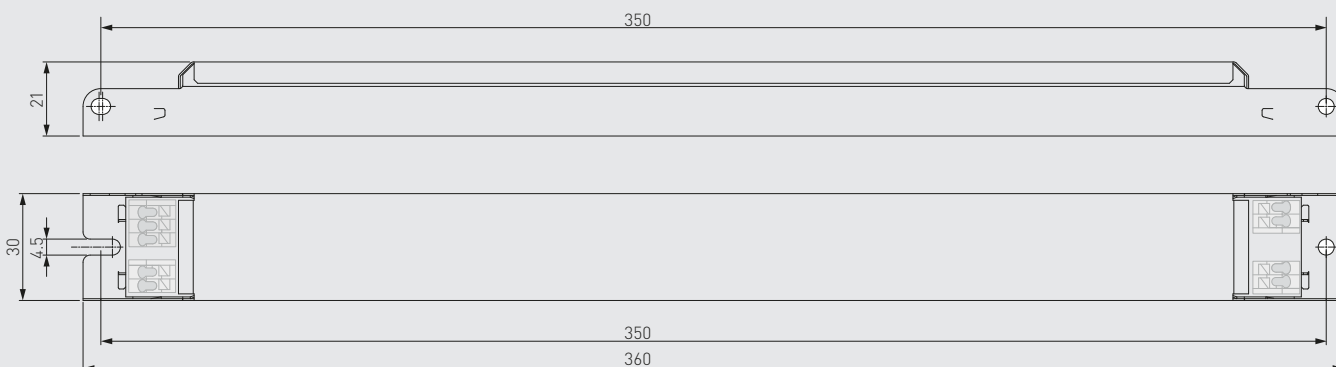


The resistor/current setting values are then adjusted according to the LEDset specification. The resistor value for each required output current can thus be calculated from the formula  $R (\Omega) = [5 \text{ V}] / I_{\text{out}} * 1000$ . In the table below are presented some resistor values across the whole current range.

Default current setting resistor values according to LEDset (Nominal  $I_{\text{out}}$  ( $\pm 5\%$  tol.))

Resistor ( $\Omega$ )	0	7680	8250	9090	10k	11k	12k4	Open
$I_{\text{out}}$ (mA)	700	651	606	550	500	454	403	350
Order code	T70000	T77681	T78251	T79091	T70103	T70113	T71242	N/A

## Dimensions (mm)



By using the Helvar Driver Configurator tool, it is possible to set the current setting resistor functionality from the default LEDset mode to the Helvar specific setting. In the table below are presented some resistor values across the whole current range.

Helvar specific current setting resistor values, E48 series (Nominal  $I_{\text{out}}$  ( $\pm 5\%$  tol.))

Resistor ( $\Omega$ )	0	220	470	820	1k2	1k5	2k2	2k7	3k9	5k6	6k8	10k	18k	39k	Open
$I_{\text{out}}$ (mA)	700	675	650	625	600	575	550	525	500	475	450	425	400	375	350
Order code	T70000	T70221	T70471	T70821	T70122	T70152	T70222	T70272	T70392	T70562	T70682	T70102	T70183	T70393	N/A

LL1x150-CR-DA LED driver is suited for built-in usage in luminaires. 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 $t_c$ temperature:

- Reliable operation and lifetime is only guaranteed if the maximum  $t_c$  point temperature is not exceeded under the conditions of use
- Ensure that the  $t_c$  point temperature does not rise higher than specified on the product datasheets

### Current setting resistor

LL1x150-CR-DA LED driver features a constant current output adjustable via current setting resistor or software.

- 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.
- Specific resistor/current values are illustrated in the operating window on page 2 and presented on page 3. The values follow LEDset specification by default. The function can also be configured with Helvar Driver Configurator to follow Helvar specific resistor/current values.

## Helvar Driver Configurator -support

LL1x150-CR-DA LED driver is supported by Helvar Driver configurator software. The LL1x150-CR-DA driver supports output current setting with software, the output current of the driver can be programmed using Helvar Driver Configurator. Also the operation of the multifunction Iset terminal usage can be changed from LEDset specific current setting resistors (default) to Helvar specific resistors or to NTC overtemperature protection operation.

## Lamp failure functionality

### No load

When open load is detected, driver will go to standby. Automatic recovery is on during the first 10 minutes. If open load is still detected after the first 10 minutes, driver goes to standby mode and recovers through mains reset.

### Short circuit

When short circuit is detected, driver goes to standby mode and returns through mains reset or DALI command.

### Overload

When high overload is detected, driver goes to standby mode and follows the same logic as described in the short circuit condition. When low overload is detected, output current will be reduced to have maximum rated output power.

### Underload

When undervoltage is detected, driver goes to standby mode and returns through mains reset.

## Conformity & standards

General and safety requirements	EN 61347-1: 2008+ A1:2011+A2:2013
Particular safety requirements for DC or AC supplied electronic control gear for LED modules	EN 61347-2-13: 2014
Additional safety requirements for AC or DC supplied electronic controlgear for emergency lighting	EN 61347-2-13: 2014, Annex J
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
Immunity standard	EN 61547: 2009
Performance requirements	EN 62384: 2006+ A1:2009
<b>Digital addressing lighting interface:</b>	
General requirements for DALI system	EN 62386-101 (DALI-2)
Requirements for DALI control gear	EN 62386-102 (DALI-2)
Requirements for control gear of LED modules (DALI Device Type 6)	EN 62386-207 (DALI-2)
Compliant with relevant EU directives	
RoHS / REACH compliant	
ENEC (pending) and CE marked	

## Label symbols



AC/DC supplied electronic control gear for emergency lighting purposes intended for connection to a centralized emergency power supply.



Thermally controlled control gear, incorporating means of protection against overheating to prevent the case temperature under any conditions of use from exceeding 120 °C.



DALI-2 certified control gear.