LL1x80-DA-350-700

Helvar Components

80 W **Dimmable DALI** LED driver

Product code: 5556

80 W 220 – 240 V 0 / 50 – 60 Hz

- DALI dimmable LED driver, 1 - 100 % dimming range
- Enhanced Hybrid dimming, with varying PWM frequency for high quality light, complying with IEEE1789 recommendation*
- Very high efficiency up to 94 %
- Low current ripple
- Suitable for use in emergency lighting applications
- Long lifetime up to 100 000 h
- Driver protection Class I
- Ideal solution for Class I luminaires, suitable for Class II luminaires too*

* See pages 3-5 for details.

SWITCH-CONTROL 2

Functional Description

- Adjustable constant current output: 350 mA (default) to 700 mA
- Current setting programmable via DALI or with external resistors
- Latest technology Switch-Control 2 functionality for easy-to-use intensity control
- Full load recognition with automatic recovery and adaptive LED overload / open circuit / 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)
- Helvar Driver Configurator Support

Mains Characteristics

Voltage range	198 VAC – 264 VAC
	Withstands max. 320 VAC (max. 1 hour)
DC range	176 VDC – 280 VDC
starting voltage	> 190 VDC
Mains current at full load	0.34 – 0.44 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	< 0.3 W
THD at full power	< 12 %
Leakage current to earth	< 0.4 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

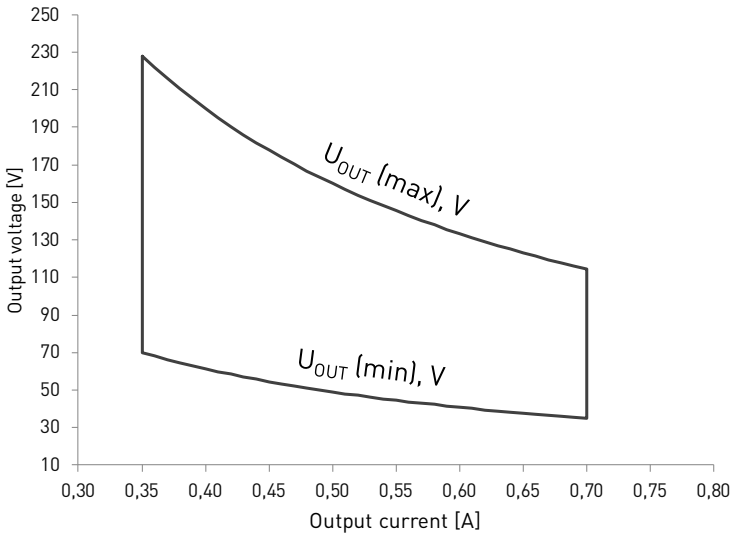
Mains circuit - Output	Non-isolated
DALI circuit - Output	Basic insulation
Mains circuit - DALI circuit	Basic insulation
Mains, DALI and output - Driver case	Basic insulation

Load Output (non-isolated)

Output current (I_{out})	350 mA (default) – 700 mA	
Accuracy	± 5 %	
Ripple	< 2 %* at ≤ 120 Hz	*) Low frequency, LED load: Cree MX3 LEDs
PstLM	< 0.01*	
SVM	< 0.01*	*) At full power
U_{out} (max) (abnormal)	400 V	
Outrush current	1200 mA*	*) When starting driver with short-circuited load or connecting load to running driver
EOF_I (EL use)	> 0.98 x output current with AC supply	

I_{out}	350 mA	700 mA
$P_{OUT(MAX)}$	80 W	80 W
U_{OUT}	71 – 228 V	35 – 114 V
PF (λ) at full load	0.98	0.98
Efficiency (η) at full load	94 %	92 %

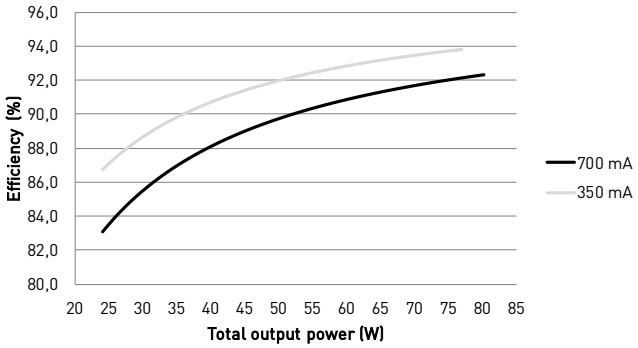
Operating window



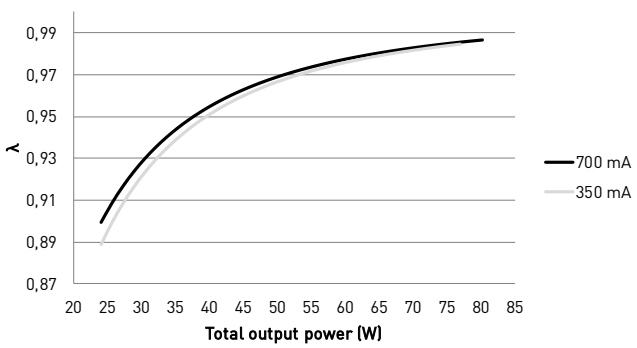
Note: Dimming between 1 % - 100 % possible across the whole operating window

Driver performance

Typical efficiency



Typical power factor



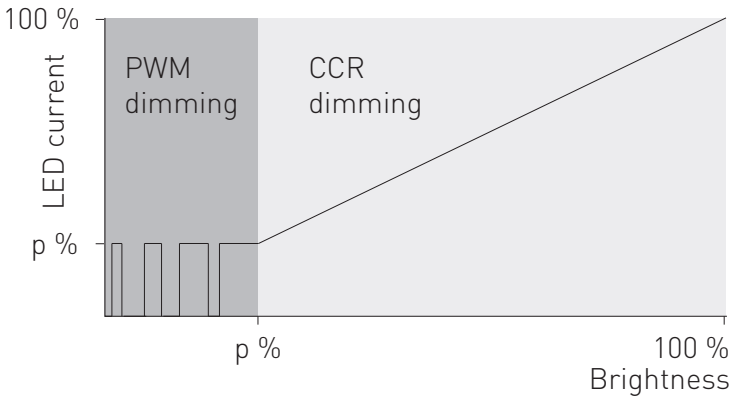
Operating Conditions and Characteristics

Highest allowed t_c point temperature*	85 °C
t_c life (50 000 h) temperature	75 °C
Ambient temperature range**	–20 °C ... +50 °C
in independent use	–20 °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 = 65 °C 50 000 h, at t_c = 75 °C 25 000 h, at t_c = 85 °C

**) ENEC certified only up to t_c life temperature*

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

Hybrid dimming technique



Dimming range/ch	Dimming technique
1 % – 20 %	Pulse Width Modulation (PWM)*
20 % – 100 %	Constant Current Reduction (CCR)

* PWM dimming frequency 1 kHz - 8 kHz

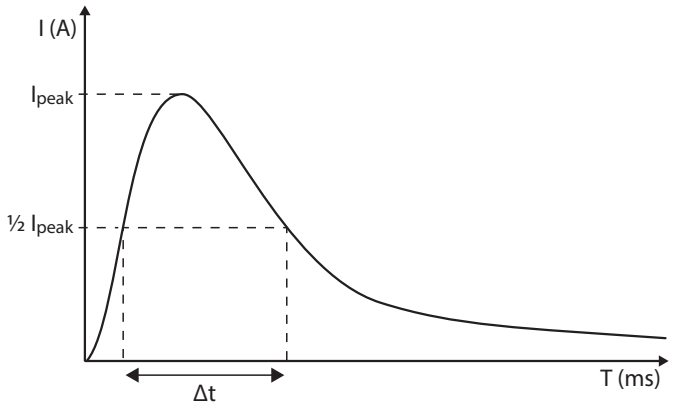
Helvar Components hybrid dimming products combines both Constant Current Reduction (CCR) amplitude dimming and Pulse Width Modulation (PWM) dimming. CCR is a very efficient technique for dimming the light output, especially on higher range. On lower range, the hybrid dimming products implement high-frequency PWM dimming according to the table above. The dimming technology complies with IEEE
1789-2015 recommendation about current modulation percent and frequency in the dimming range between 3 % - 100 %.

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, Δt	Calculated energy, $I_{peak}^2 \Delta t$
30 pcs.	30 pcs.	42 A	186 µs	0.24 A^2s

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 %

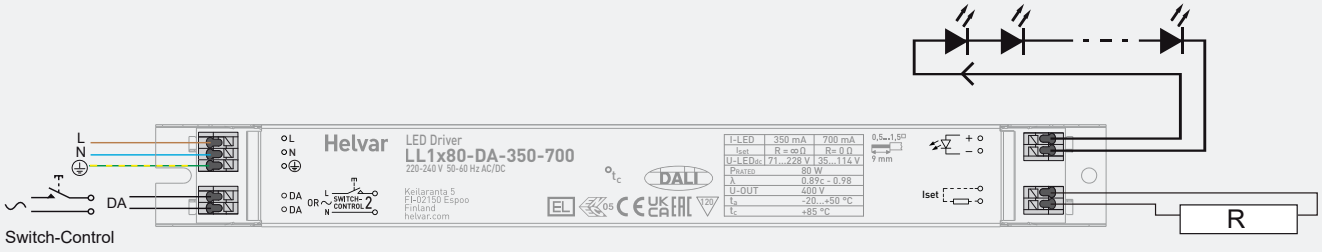


Type C MCB's are strongly recommended to use with LED lighting. Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

Connections and Mechanical Data

Wire size	0.5 mm^2 – 1.5 mm^2
Wire type	Solid core and fine-stranded
Wire insulation	According to EN 60598
Maximum driver to LED wire length	5 m
Weight	220 g
IP rating	IP20

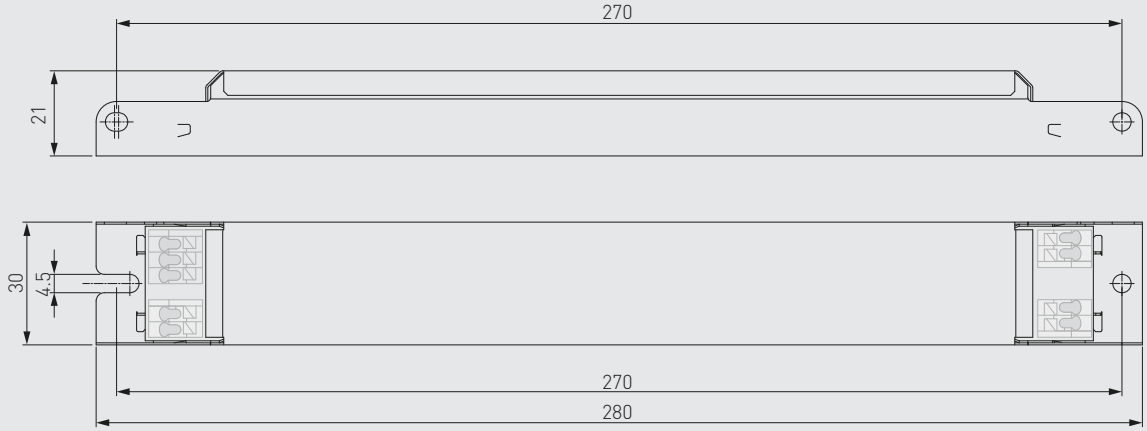
Connections



Note:

- *Label may differ if the unit is preset to fixed current*

Dimensions (mm)



Output current can be set with the current setting resistor connected to the Iset terminal. Example current and resistor values across the range can be found in the following table. More information about the current setting resistor is given on page 5.

Iset current setting resistor values

Resistor (Ω)	0	220	470	820	1,2k	1,5k	2,2k	2,74k	3,9k	5,6k	6,8k	10k	18k	39k	∞
I_{out} (mA)	700	675	650	625	600	575	550	525	500	475	450	425	400	375	350
Order code	T70000	N/A	T70471	T70821	N/A	T70152	T70222	T72741	T70392	T70562	T70682	T70103	T70183	N/A	N/A

LL1x80-DA-350-700 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

LL1x80-DA-350-700 LED driver features a constant current output adjustable via current setting resistor or software.

- 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 on the LED driver label.
- For the resistor / current value selection, refer to the table on page 4.

LED driver earthing

- LL1x80-DA-350-700 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.

Installation site

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

Helvar Driver Configurator support

LL1x80-DA-350-700 LED driver is supported by Helvar Driver configurator software. The driver supports output current setting with software, the output current of the driver can be programmed using Helvar Driver Configurator, as well as parameters for functions such as CLO. Also the operation of the multifunction Iset terminal usage can be changed from current setting resistor (default) 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.

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 (up to 85 W), 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.

Short circuit: When short circuit is detected, driver goes to standby mode and returns through mains reset.

NTC trigger: When NTC is enabled via Helvar Driver Configurator, driver follows NTC feature behaviour. Default NTC trigger point is 8,2 kΩ, after which the driver starts to decrease the output level.

Switch-Control 2

Before installation and for troubleshoot and guidance, refer to Switch-Control User Guide at www.helvarcomponents.com.

Use of Switch-Control functionality

- Maximum numbers of LED drivers to be connected to one switch is 60. Wire length is not restricted by the driver technology.
- Ensure that all components connected to Switch-Control circuitry are mains rated.
- The X2 rated (1 µF) capacitor has to be installed between control lines in case of unwanted behavior of lights. See details and guidance from the user guide.

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
Digital addressing lighting interface:	
General requirements for DALI system	EN 62386-101
Requirements for DALI control gear	EN 62386-102
Requirements for control gear of LED modules (DALI Device Type 6)	EN 62386-207
Compliant with relevant EU directives	
RoHS / REACH compliant	
ENEC and CE / UKCA 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 certified control gear.