LL1x80-CR-DA

Helvar

80 W **Dimmable DALI-2** LED driver

Product code: 5559

80 W 220 – 240 V 0 / 50 – 60 Hz

- DALI-2 certified LED driver, 1 - 100 % dimming range
- Very low flicker output complying with IEEE 1789 recommendations
- Suitable for flicker-free camera recording applications
- Very high efficiency up to 93 %
- Suitable for use in emergency lighting applications
- Long lifetime up to 100 000 h
- Driver protection Class I
- Suitable 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 dimming for high-quality light in every application
- Latest technology Switch-Control 2 functionality for easy-to-use intensity control
- Adaptive LED overload protection, reduces output current if output power over 81 W 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)

Mains Characteristics

Voltage range	198 VAC – 264 VAC
DC range	176 VDC – 280 VDC
starting voltage	> 190 VDC
Mains current at full load	0.34 A – 0.44 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	0.4 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	2 kV (IEC 61000-4-4)

Insulation between circuits & driver case

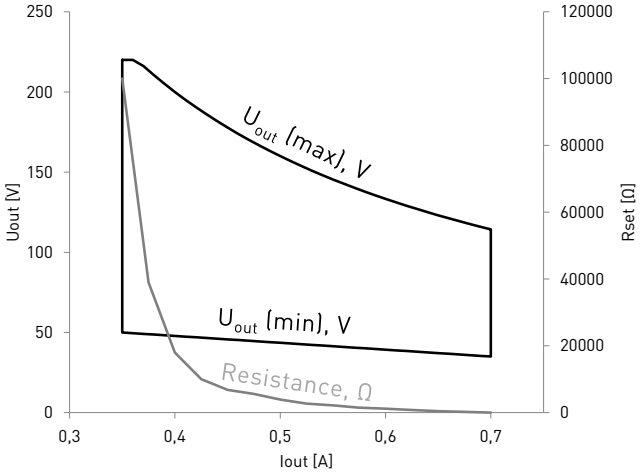
Mains circuit - Output	Non-isolated
DALI circuit - Output	Basic insulation
Mains circuit - DALI circuit	Basic insulation
Mains, DALI and output - Driver case	Basic insulation

Load Output

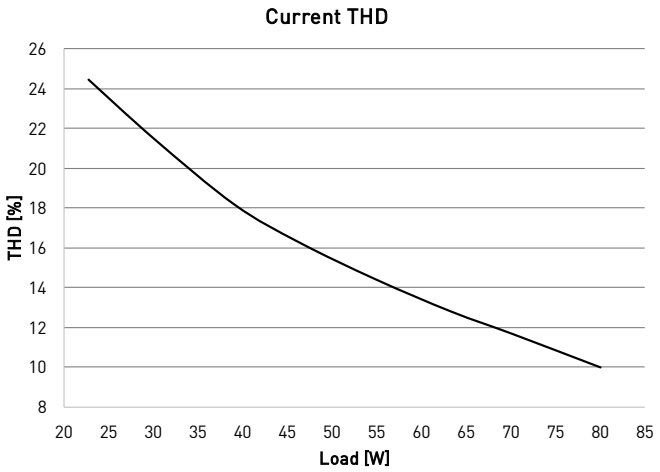
Output current (I_{out})	350 mA (default) – 700 mA
Accuracy	± 5 %
Ripple	< 2 %* at ⩽ 120 Hz
	*) Low frequency, LED load: Cree XM-L LEDs
PstLM	< 0.01*
SVM	< 0.01*
	*) At full load, measured with Cree XP-G LED modules.
U_{out} (max) (abnormal)	250 V
Outrush current	1000 mA*
	*) When starting driver with short-circuited load or connecting load to running driver
EOF_l (EL use)	> 0.98 x output current with AC supply

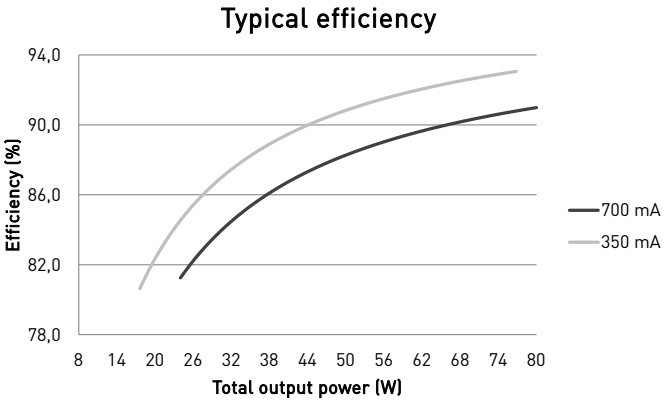
I_{out}	350 mA	700 mA
P_{out} (max)	77 W	80 W
U_{out}	50 V – 220 V	35 V – 114 V
PF (λ) at full load	0.98	0.98
Efficiency (η) at full load	93 %	91 %

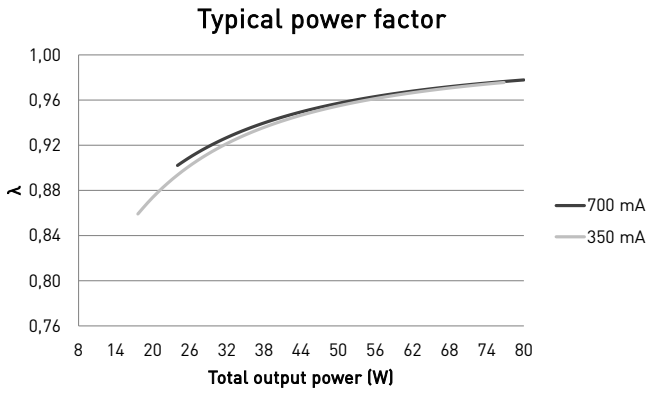
Operating window and driver performance



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





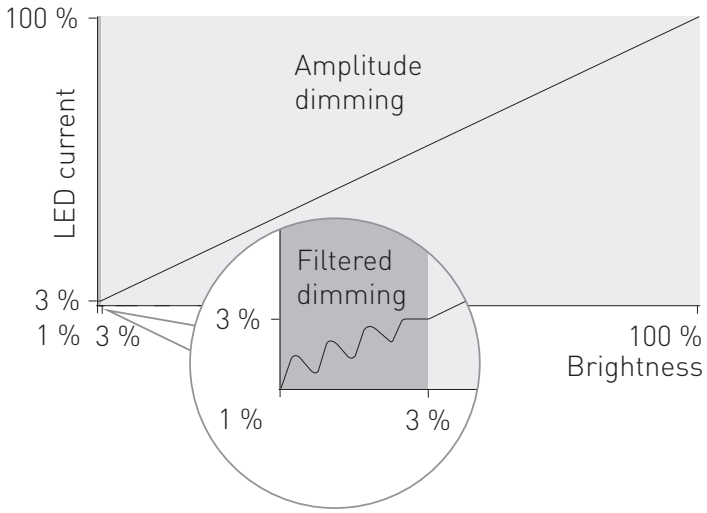


Operating Conditions and Characteristics

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

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

Filtered dimming technology



Dimming range	Modulation frequency
100 % – 3 %	0 Hz (DC)
3 % – 1 %	> 2 kHz

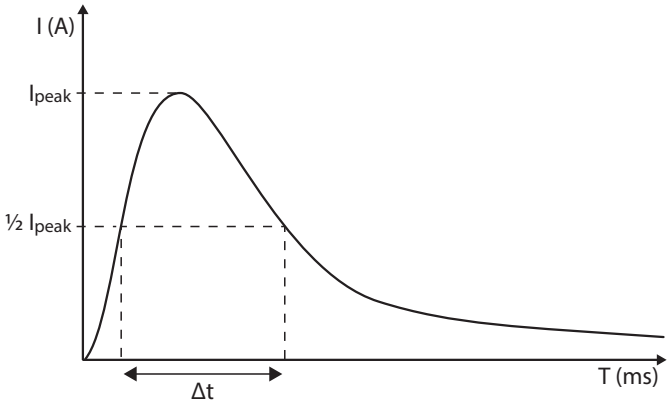
Filtered dimming technology is created to achieve extremely high quality and flicker free light output even at the lowest dimming levels. Light output is dimmed with amplitude dimming until the very lowest light levels (< 3%) and below that, stable light output is provided with filtered high frequency signal. Dimming technology complies with IEEE 1789-2015 recommendations of current modulation to mitigate health risks to viewers.

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, $I_{peak}{}^2\Delta t$
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 %



CONTINOUS CURRENT

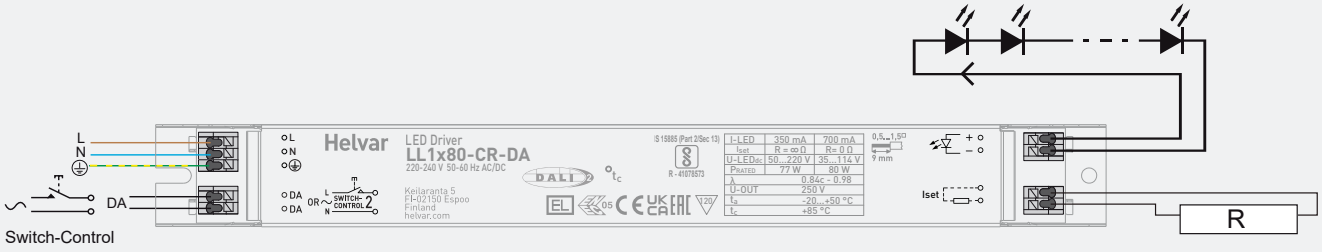
Total continous current of the drivers and installation environment must always be considered and taken into calculations when installing drivers behind miniature circuit breaker. Example calculation of total drivers amount limited by continous current: n(I_{cont}) = (16 A ($I_{nom,Ta}$) / "nominal mains current with full load") x 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 in-rush current and continous 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	5 m
Weight	220 g
IP rating	IP20

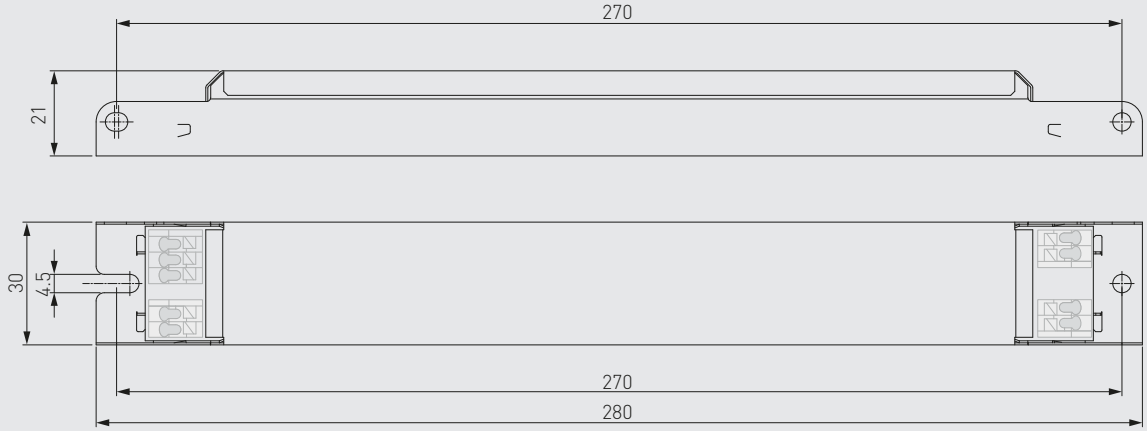
Connections



Note:

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

Dimensions (mm)



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 4.

Iset current setting resistor values

Resistor (Ω)	0	220	470	820	1k2	1k5	2k2	2k74	3k9	5k6	6k8	10k	18k	39k	Open
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-CR-DA 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-CR-DA 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.
- Specific Iset resistor/current values are illustrated in the operating window on page 2 and presented on page 3.

LED driver earthing

- LL1x80-CR-DA 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.

Helvar Driver Configurator support

LL1x80-CR-DA LED driver is supported by Helvar Driver configurator software. The LL1x80-CR-DA 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.

Short circuit

When short circuit is detected, driver goes to standby mode and returns 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, 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.

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

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.
- Before installation, please refer to Switch-Control User Guide at www.helvar.com.

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 Requirements for DALI control gear Requirements for control gear of LED modules (DALI Device Type 6)	 EN 62386-101 (DALI-2) EN 62386-102 (DALI-2) EN 62386-207 (DALI-2)
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

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.