

1x50 W **Dimmable DALI** LED driver

- Hybrid dimming technique for high quality light
- Suitable for use in emergency lighting applications
- DALI control input, 1 % - 100 % dimming range
- Helvar Driver Configurator support
- Long lifetime, up to 100 000 h
- Driver protection Class II
- SELV output, suitable for Class I and Class II luminaires
- Optional strain relief for independent use outside of luminaire (LL1x2130-SR) and driving Class III luminaires

50 W 220 – 240 V 0 / 50 Hz – 60 Hz

**Functional description**

- Adjustable constant current output: 1050 mA (default) to 1400 mA
- Adaptive overload protection up to 52 V. Reduces output current if overload is connected.
- Switch-Control functionality for easy-to-use intensity control (*Note: from product revision G onwards*)
- Current setting programmable via DALI or with external resistors
- Multipurpose terminal Iset/NTC for current setting or overtemperature protection
- Constant Light Output CLO, adjustable up to 100 000 h, maximum 75 % reduction (default disabled)
- Full load recognition with automatic recovery, open and short circuit protection
- 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	0.22 A – 0.31 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	< 0.5 W
THD at full power	< 13 %
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

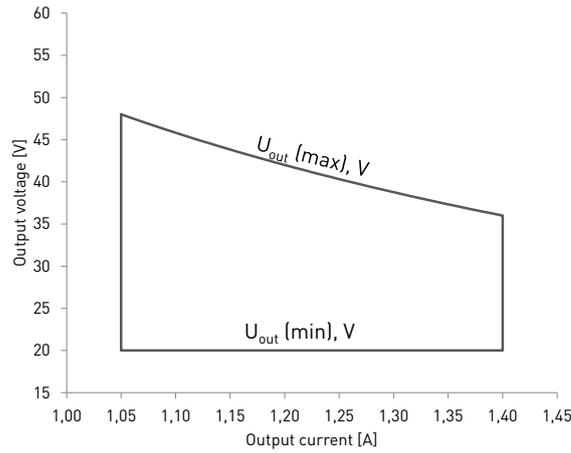
Mains circuit – SELV circuit	Double/reinforced insulation
DALI circuit – SELV circuit	Double/reinforced insulation

Load output (SELV < 60 V)

Output current (I_{out})	1050 mA (default) – 1400 mA
Accuracy	± 5 %
Ripple	< 2 % at ≤ 120 Hz*
	*] Low frequency, LED load: Cree XM-L LEDs
U_{out} (max) (abnormal)	60 V

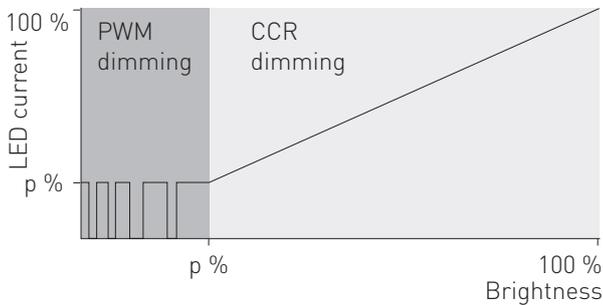
	I_{out} 1050 mA	1400 mA
P_{out} (max)	50.4 W	50.4 W
U_{out}	20 V – 48 V	20 V – 36 V
λ at full load	0.98	0.98
Efficiency (n) at full load	88 %	86 %

Operating window



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

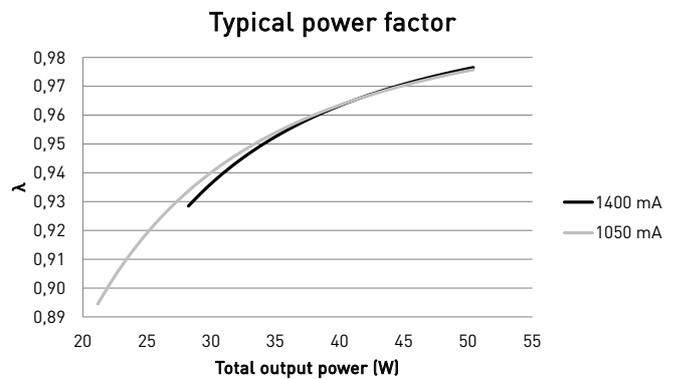
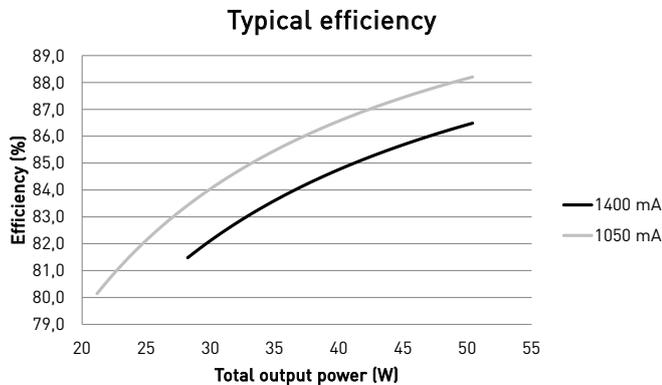
Hybrid dimming technique



Dimming range	Dimming technique
1% - 20%	Pulse Width Modulation (PWM)*
20% - 100%	Constant current reduction

* PWM dimming frequency 800 Hz

Driver performance



Operating conditions and characteristics

Max. temperature at t_c point	80 °C
Life time	50 000 h, at $t_c = 80$ °C 70 000 h, at $t_c = 75$ °C 100 000 h, at $t_c = 70$ °C (90 % survival rate)
Ambient temperature range	-20 °C ... +50 °C
Storage temperature range	-25 °C ... +80 °C
Maximum relative humidity	No condensation

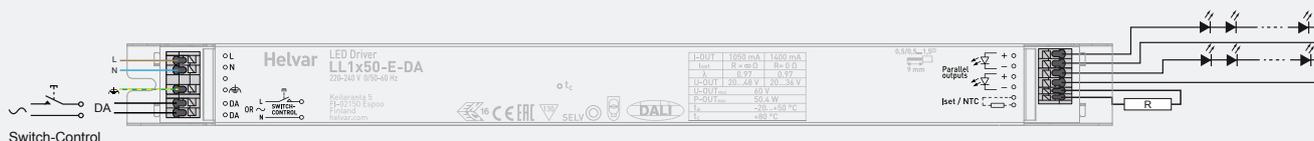
Quantity of drivers per miniature circuit breaker 16 A Type C

Based on I_{cont}	Based on inrush current I_{peak}	Typ. peak inrush current I_{peak}	1/2 value time, Δt	Calculated energy, $I_{peak}^2 \Delta t$
41 pcs.	60 pcs.	18 A	180 μ s	0.0412 A ² s

Connections and mechanical data

Wire size	0.5 mm ² – 1.5 mm ²
for I[set] terminal	0.14 mm ² – 0.5 mm ²
Wire type	solid core and fine-stranded
Wire insulation	According to EN 60598
Maximum driver to LED wire length	1 m
Weight	270 g
IP rating	IP20

Connections



Note:

- Not suitable for load side switching operation.
- Switch-Control enabled from product revision G onwards

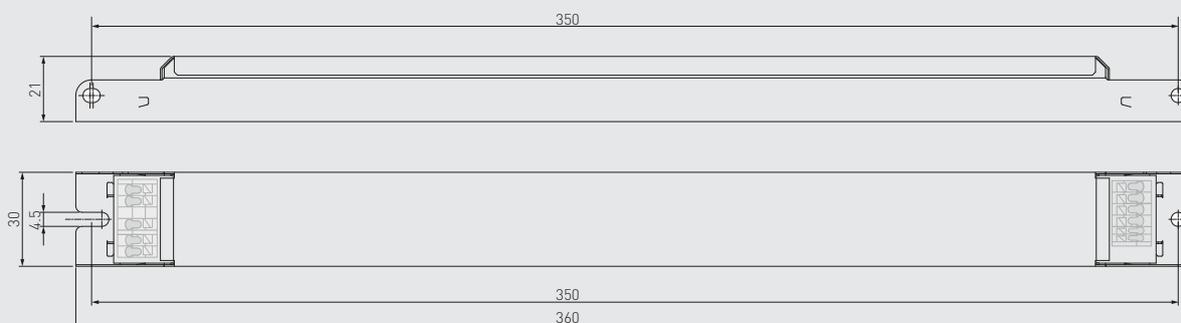
Current setting resistor values (Nominal I_{out} (±5 % tol.))

R (Ω)	0	1k	2k2	3k3	4k7	8k2	10k	18k	22k	33k	47k	68k	100k	220k	Open
I _{out} (mA)	1400	1380	1360	1340	1320	1290	1270	1220	1200	1170	1140	1120	1100	1070	1050
Order code	T70000	T70102	T70222	T70332	T70472	T70822	T70103	T70183	N/A						

Configurator value for NTC triggering resistance

Triggering R (Ω)	0	1k	2k2	3k3	4k7	8k2	10k	15k	22k	33k	47k	68k	100k	220k	Open
Configurator value	0	93	184	253	326	459	509	610	699	779	837	880	922	969	1023

Dimensions



LL1x50-E-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

LL1x50-E-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.
- 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.

LED driver earthing

- LED drivers are designed to support different luminaire classifications, such as Class I or Class II fittings (no earth required). LL1x50-E-DA is Class II driver and suitable for Class I and II luminaires, as well as driving SELV Class III luminaires in independent installation with strain reliefs.
- As Class II driver, LL1x50-E-DA does not need the earth connection for electrical safety. To improve e.g. EMC performance, functional earth can be connected.

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.

Use of Switch-Control functionality

- Maximum numbers of LED drivers to be connected to one switch is 30.
- The maximum cabling length from the switch to the driver is 25 meters. If longer cabling is needed, please connect a capacitor across the Switch-Control input (1 μ F, min. 275 VAC and X2 rated).
- Ensure that all components connected to Switch-Control circuitry are mains rated.

Helvar Driver Configurator support

LL1x50-E-DA 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 detected, driver will go to stand by, automatic recovery on first 10 minutes. After 10 minutes if no load detected driver goes to standby mode and will recover with DALI command or mains reset. *Timeout can be modified with Helvar Driver Configurator.*

Short circuit

When short circuit is detected, driver goes to stand-by mode, and returns by DALI command or mains reset.

Overload

When high over load detected, driver goes to stand-by mode and follows the same functions described in open load condition. High overload is triggered by overvoltage above the limit of 52 V. When low overload is detected, output current will be reduced to result maximum rated power. This is triggered by overvoltage below the limit of 52 V.

Underload

When undervoltage is detected, driver goes to stand-by mode, and returns by DALI command or mains reset.

NTC trigger

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

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
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 marked	

Label symbols



Safety isolating control gear with short circuit protection (SELV control gear).



Double insulated control gear suitable for built-in use.



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