

44.2 W SELV Dimmable DALI-2 LED driver

Product code: 5744

44.2 W 220 – 240 V 0/ 50 – 60 Hz

- DALI-2 certified LED driver, 1-100 % dimming range
- Very low current ripple and amplitude dimming technology for the highest quality light output, complying with IEEE 1789 recommendations
- D4i compatible Smart Data features (DALI 251-253)
- Suitable for emergency lighting applications with central battery systems (e.g. Eaton-CEAG, Inotec), AC/DC input recognition
- NFC technology for wireless programming
- Optimised driver mechanics for independent usage applications
- Integrated spacious strain reliefs with screwless clamps, quick and simple installation process
- Doubled input terminals for looping the mains and DALI cables



Functional Description

- Adjustable constant current output: 150 mA to 1050 mA
- Current setting adjustable via DIP switch (default), or then programmable via NFC / DALI by using Helvar Driver Configurator
- Innovative Smart Switch technology: the DIP switch current values for different positions can also be programmed by the user in HDC to differ from the factory defaults and driver will follow this in output current setting
- Four default output current options via DIP switch: 350 mA (default) / 650 mA / 850 mA / 1050 mA
- The output current can also be set in a fixed way with Helvar Driver Configurator (HDC) and DIP switch position ignored
- D4i compatible Smart Data features, e.g. OEM customer and luminaire data, energy reporting, diagnostics and maintenance
- Internal thermal protection to actively reduce the output current in case of extreme temperatures
- Amplitude dimming technology for the highest quality light in every application
- Flicker-free light output suitable for camera recording applications
- Latest Switch-Control 3 technology for easy-to-use intensity control
- Corridor Control for straightforward lighting control with e.g. external sensors with built-in relay
- Constant Light Output (CLO), adjustable up to 100 000 h (default disabled)

Mains Characteristics

Voltage range	198 VAC – 264 VAC Withstands max. 320 VAC (max. 1 hour)
DC range	198 VDC - 264 VDC
Mains current at full load	Max. 0.27 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	< 0.5 W
THD at full power	< 7 %
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

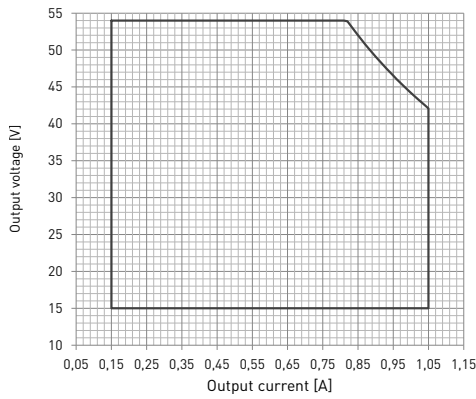
Mains circuit - SELV circuit	Double/reinforced insulation
DALI circuit - SELV circuit	Double/reinforced insulation
Mains circuit - DALI circuit	Basic insulation
Mains, DALI and output - Driver case	Double/reinforced insulation
Mains input - Ground input	Basic insulation

Load Output (SELV <60 V)

Output current (I_{out})	150 mA – 1050 mA	
Accuracy	$\pm 5\%$ ¹⁾	1) 7 % at < 350 mA output current, 5% at ≥ 350 mA
Ripple	$\leq 5\%$ ²⁾ at ≤ 120 Hz	2) Low frequency
PstLM	< 0.05 ³⁾	
SVM	< 0.01 ³⁾	3) At full power, LED load: Samsung LM281B LEDs
U_{out} (max) (abnormal)	60 V	

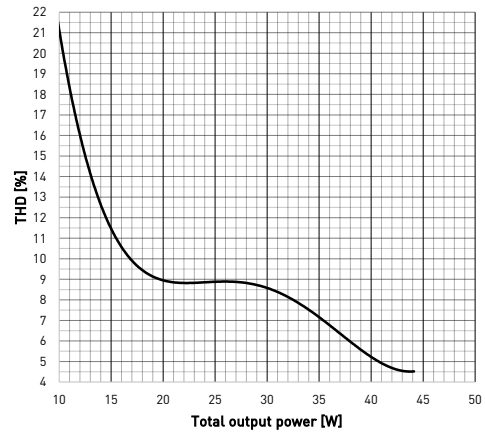
I_{LED}	150 mA	350 mA	650 mA	850 mA	1050 mA
P_{Rated}	2.3...7.8 W	5.3...18.9 W	9.8...35.1 W	12.8...44.2 W	15.8...44.1 W
U_{LED}	15 - 54 V	15 - 54 V	15 - 54 V	15 - 52 V	15 - 42 V
PF (λ) at full load	0.70	0.94	0.98	0.98	0.98
Efficiency (η) at full load	81%	89 %	91 %	90 %	90 %

Operating window & driver performance

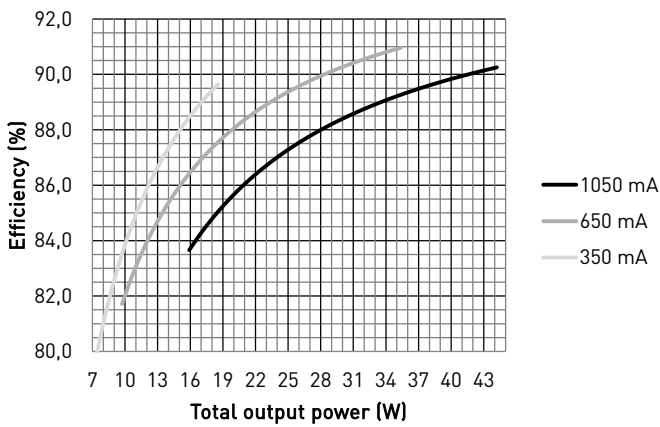


Note: Dimming between 1% - 100% possible across the whole operating window, limited by the absolute minimum dimming current of 3.5 mA

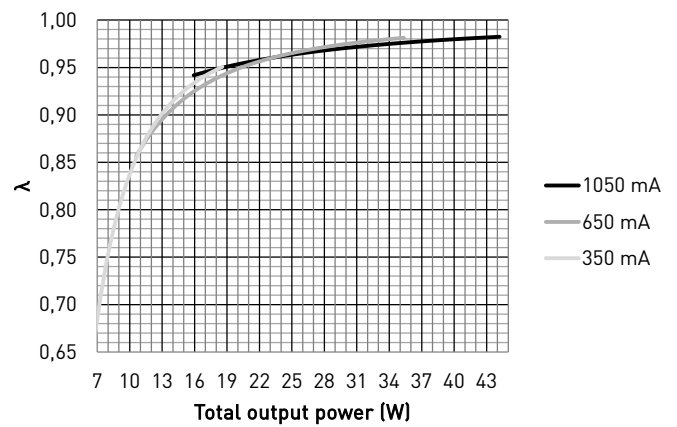
Current THD



Typical efficiency



Typical power factor



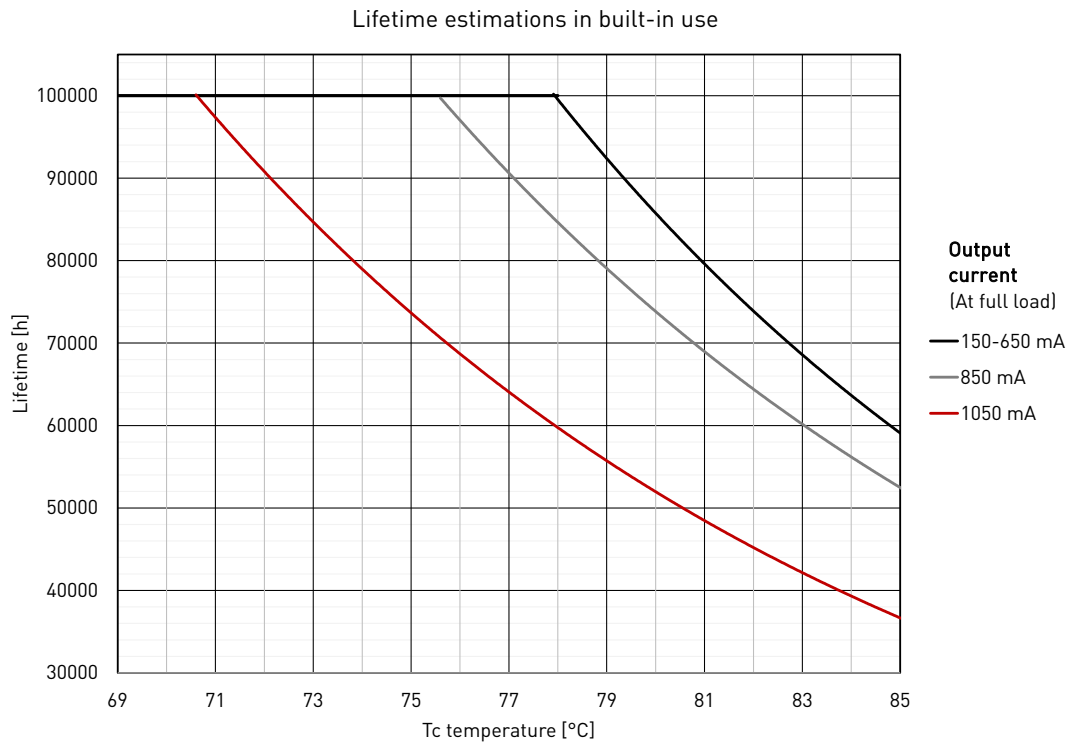
Operating Conditions and Characteristics

Absolute highest allowed t_c point temperature	90 °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

*) For other than independent use, higher t_a of the controlgear possible as long as highest allowed t_c point temperature is not exceeded (acc. to EN IEC 61347-1).

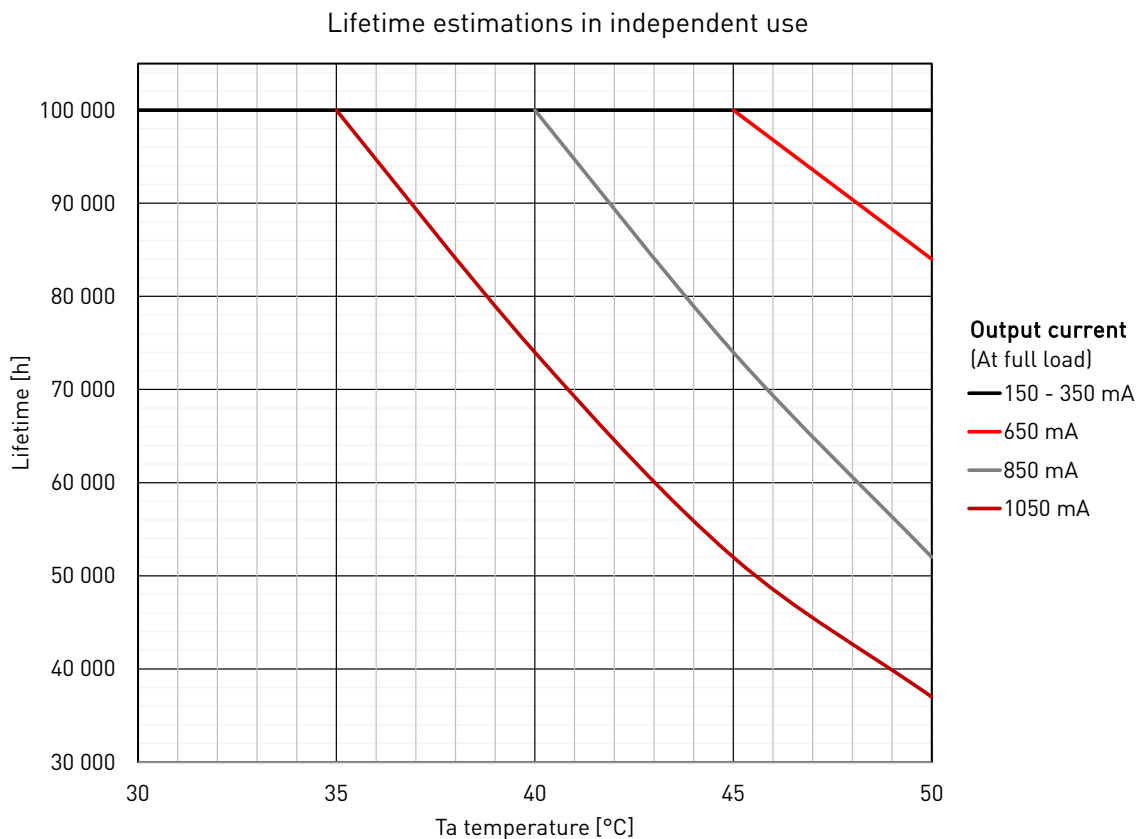
Lifetimes

Lifetime graphs (90 % survival rate)



The shown t_c temperatures and lifetimes were measured in non-metallic luminaire design and built-in use. Please refer to the used output current and t_c for the most accurate lifetime estimation.

Never exceed the t_c maximum of the driver stated in the datasheet!



The shown t_a temperatures and lifetimes were measured in independent use. Please refer to the used output current and t_a for the most accurate lifetime estimation.

Never exceed the t_c or t_a maximum for built-in usage of the driver stated in the datasheet!

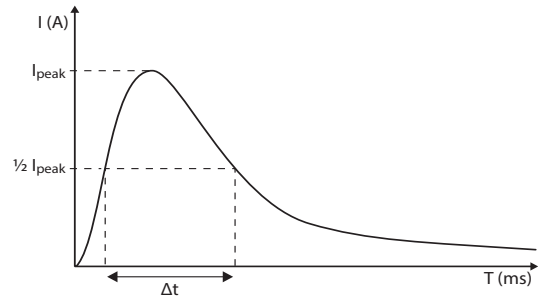
Quantity of drivers per miniature circuit breaker 16 A Type C

Based on inrush current I_{peak}	Typ. peak inrush current I_{peak}	1/2 value time, Δt	Calculated energy, $I_{peak}^2 \Delta t$
>100 pcs*	10 A	40 μs	0.0027 A ² s

*Inrush current is not the limiting factor for the products per C 16 A MCB, please notice the continuous current limitations.

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 %

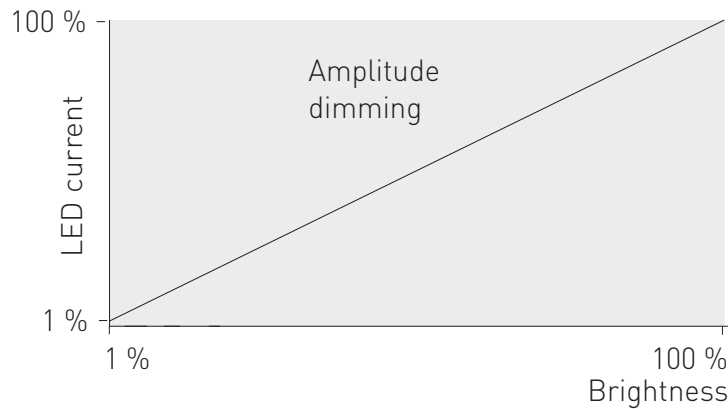


CONTINUOUS CURRENT

Total continuous 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 continuous current: $n(I_{cont}) = (16 A (I_{nom, T_a}) / \text{"nominal mains current with full load"}) \times 0.76$. 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 inrush current and continuous 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.

Amplitude dimming technology



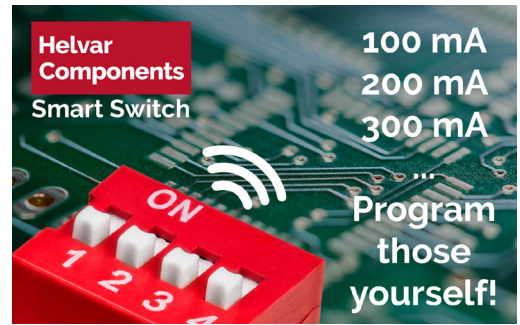
Dimming range	Dimming technology
1 % – 100 %	Amplitude (DC)

LC45SE-DA-150-1050-LOOP LED driver implements amplitude dimming technology across whole dimming range. Amplitude dimming offers the best available technology for dimming the light output in an accurate and flicker-free way to ensure high quality lighting in even the most demanding situations such as camera recording applications. Amplitude dimming technology complies with IEEE 1789-2015 recommendations of current modulation to mitigate health risks to viewers.

Smart Switch technology

LC45SE-DA-150-1050-LOOP LED driver is equipped with unique Smart Switch feature to help you customise the LED drivers according to your exact needs for luminaire production. In case when the factory-default output currents behind the DIP switch combinations are not optimal for you, just use the Smart Switch - by programming your own currents behind the different DIP switch positions, you can streamline the production process according to your specifications and lumen levels!

This innovative feature allows the output currents to be configured in Helvar Driver Configurator via NFC technology.



D4i-specified Smart Data Features (DALI 251-253)

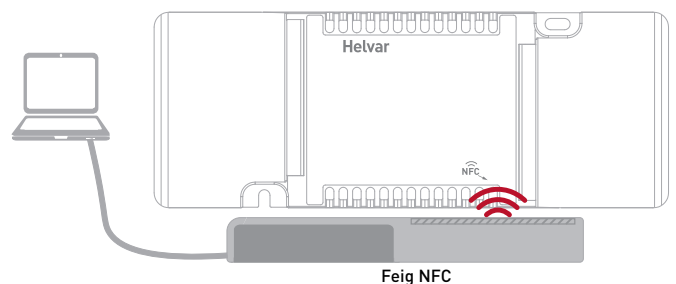
LC45SE-DA-150-1050-LOOP LED driver has integrated Smart Data features, which monitor, gather and provide key data about the LED driver usage and internal parameters through DALI. This useful data provided by LED driver enables various applications and integrations into data management and IoT services, establishing the Helvar Components LED drivers as key components in the latest generation of smart luminaires.

The DALI parts 251-253 include:

- OEM Customer data (DALI part 251)
- Energy reporting (DALI part 252)
- Diagnostics and maintenance (DALI part 253)

Wireless configuration

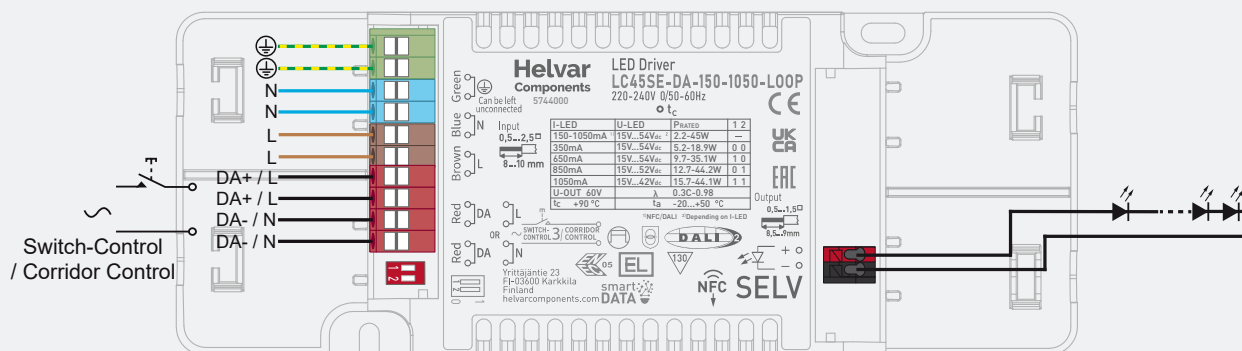
LC45SE-DA-150-1050-LOOP LED driver is equipped with NFC wireless technology for effortless configuration of the driver via Helvar Driver Configurator Support. Helvar Driver Configurator enables easy-to-use automatic configuration of the driver parameters via NFC, without mains or DALI connection to the driver. The most popular MD-SIG qualified NFC readers (FEIG CPR30-USB & ISC.MR102-USB) are supported giving flexibility for the operator. For further information about the usage with Helvar Driver Configurator, please see the user guide at www.helvarcomponents.com



Connections and Mechanical Data

Wire size	Input: 0.5 mm ² – 2.5 mm ²
Wire type	Output: 0.5 mm ² – 1.5 mm ²
Wire insulation	Solid core and fine-stranded
Maximum current through looping terminals	According to EN 60598
Maximum driver to LED wire length	16 A
Weight	1.5 m
IP rating	224 g
	IP20

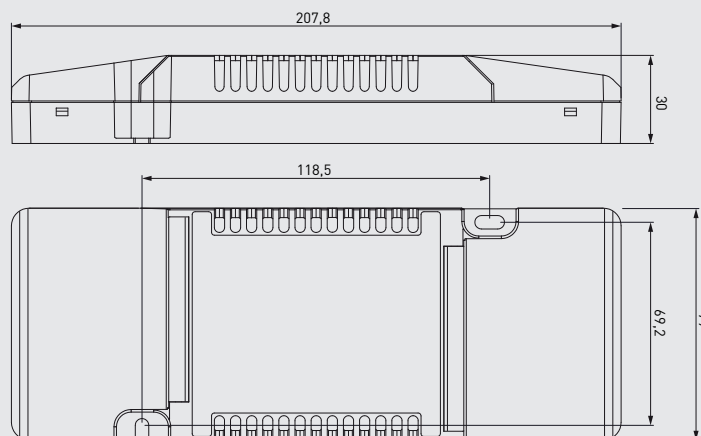
Connections



Note:

- PE terminal is for looping only and therefore earth connection is not needed for the functionality of the driver. See page 5 for details.
- When looping mains, only additional LED drivers shall be connected through the device terminals
- Please connect Line (L) and Neutral (N) into the respective terminals and not the other way around for the DC Emergency lighting mode to operate optimally.
- Not suitable for load side switching operation

Dimensions (mm)



In LC45SE-DA-150-1050-LOOP, the current can be set in a simple way with DIP switches, when not programmed through NFC/DALI. With each combination of switch setup, a different output current value can be set. The maximum value can be reached with the DIP switch setting "11" (DIP switches pushed towards the driver body and minimum with setting "00" (pushed away from the driver body, see the connections picture above). The output current values according to the DIP switch settings are presented below.

Note: The DIP switch is always the default method for setting the output current. If the current is programmed with Helvar Driver Configurator however, the DIP switch will be ignored.

DIP switch combinations, output currents and voltage ranges (Nominal I_{out} (±5 % tol.))

DIP switch combination	00 (default)	10	01	11
I _{out} (mA)	350	650	850	1050
Voltage range (V)	15 - 54	15 - 54	15 - 52	15 - 42

LC45SE-DA-150-1050-LOOP LED driver is suited for independent use and 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 is not allowed to be covered with thermally insulating material. 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 with DIP switch or NFC/DALI

LC45SE-DA-150-1050-LOOP LED driver features a constant current output adjustable with DIP switch combinations or NFC/DALI programming.

- For the DIP switch combination/current values, refer to the table on page 5.

LED driver earthing

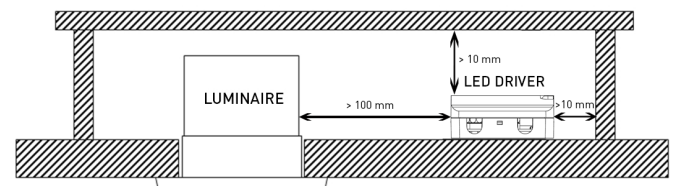
- LC45SE-DA-150-1050-LOOP is Class I LED driver suitable for Class I and II luminaires, as well as driving Class III (SELV) luminaire parts in independent installation.
- If used inside **Class I** luminaires, the earth cable is not required for electrical safety in this driver. The PE connection is designed for earth signal looping between drivers.
- If used inside **Class II** luminaires, the safety of the luminaire shall be ensured through double/reinforced insulation of live parts. LC45SE-DA-150-1050-LOOP has double/reinforced insulation between accessible and live parts, and is suitable for use in all Class II luminaires. In this case the earth terminal of the driver must be left unconnected and the luminaire terminal block shall not have any protective earthing terminal.
- If used in **independent** installation with Class I/II/III luminaires, the earth cable is not required to be connected. The PE connection is designed for earth signal looping between drivers.

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.
- Minimum recommended distances below:



Helvar Driver Configurator -support

LC45SE-DA-150-1050-LOOP LED driver is supported by Helvar Driver Configurator software. With the LC45SE-DA-150-1050-LOOP the output current of the driver can be programmed using the HDC software, as well as OEM customer data and parameters for features such as CLO, Corridor Control and Internal Thermal Protection. Programming the driver with Helvar Driver Configurator can be done either wirelessly via NFC or then via DALI bus.

Lamp failure functionality

No load

When open load is detected, driver will go to standby power consumption and remain in automatic recovery mode. In automatic recovery mode, the driver waits till load is returned and once that happens, it returns to normal operation.

Short circuit

When short circuit is detected, driver goes to automatic recovery mode and follows the same logic as described in the no load condition.

Overload

When overload is detected, driver will go to standby mode. It will return to normal operation through DALI light level OFF -> ON command or through mains reset.

Underload

When underload/voltage is detected, driver will act similarly to overload situation, it will go to standby power consumption status. It will return to normal operation through DALI light level OFF -> ON command or through mains reset.

Internal overtemperature

When the driver exceeds the T_c max operating temperature, soon above that point the driver will start decreasing the maximum output current. Details about the operation in page 4 "Internal Thermal Protection". Parameters of this feature can be adjusted via Helvar Driver Configurator, or then the feature disabled if so desired.

AC to DC emergency lighting mode

When AC supply is switched to DC, driver will recognise this and switch to emergency lighting mode. The light level will be adjusted to 15 % of the nominal AC operation output current by default. The DC light level cannot be adjusted or turned off by manual control or by active features, unless "DC dimming" is specifically enabled through Helvar Driver Configurator. When the AC is switched back on, the driver returns to normal operation.

Note 1: The internal temperature protection feature can never force the light level off or below the set emergency level in DC emergency mode.

Note 2: Please connect Line (L) and Neutral (N) into the respective terminals and not the other way around for the DC Emergency lighting mode to operate optimally.

Switch-Control 3 & Corridor Control

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.
- Power on to last level mode is enabled by default, ensuring that the driver returns to the last memorized light level before mains interruption in cases of e.g. power outages. Driver also remembers the dimming direction before power cycle and continues in the opposite dimming direction after powering on.
- Ensure that all components connected to Switch-Control circuitry are mains rated.
- If needed, the synchronisation of light levels in the Switch-Control circuit can be carried out by either of the two options:
 - Press and hold the Switch-Control switch until all lights are ON. Then switch all lights OFF with a short press.
 - Press and hold the Switch-Control switch for 10 seconds without interruption.

Use of Corridor Control

- Activate Corridor Control feature by connecting mains voltage to the DALI terminal for 55 seconds without interruption.
- Disable Corridor Control feature by giving exactly 5 short mains voltage signal pulses (less the 350 ms) to the DALI terminal within 3 seconds.
- Ensure that all components connected to Corridor Control circuitry are mains rated.
- Default settings are described in the User Guide.

See more details in Switch-Control and Corridor Control User Guides at www.helvarcomponents.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
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 (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)
Memory Bank 1 extension	DALI Part 251
Energy Reporting	DALI Part 252
Diagnostics & Maintenance	DALI Part 253
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



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



Thermally controlled control gear, incorporating means of protection against overheating to prevent the case temperature under any conditions of use from exceeding 130 °C.



DALI-2 certified control gear.



Driver equipped with NFC wireless technology for effortless configuration.



Driver is capable of monitoring and measuring key data about driver usage and providing access to that data via DALI, complying with DALI parts 251-253. This includes data sets such as OEM customer data, energy reporting and diagnostics.



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