

80 W Dimmable 16mm DALI-2 LED driver

Product code: 5840

80.3 W 220 – 240 V 0/ 50 – 60 Hz

- DALI-2 certified 16 mm slim LED driver
- Superior efficiency up to 95.5 %
- Very low current ripple and amplitude dimming technology for the highest quality light output, complying with IEEE 1789 recommendations
- Smart Switch technology - customize the DIP switch currents yourself
- 250 V U_{out} by default - possibility to unlock 350 V U_{out} mode via NFC for higher module voltages
- NFC technology for wireless programming
- 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



Functional Description

- Adjustable constant current output: 80 to 550 mA
- Current setting adjustable via DIP switch (default), or then programmable via NFC / DALI
- Eight output current options via DIP switch: 200 (default) / 250 / 300 / 350 / 400 / 450 / 500 / 550 mA
- Very high efficiency stability across the operating window - efficiency range from > 90 % achievable from as low as 25 % of the maximum load (20 W)
- The output current can be set in a fixed way with with Helvar Driver Configurator (HDC) and DIP switch position ignored
- 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
- D4i compatible Smart Data features, e.g. OEM customer and luminaire data, energy reporting, diagnostics and maintenance
- Built-in adjustable 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
- 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)

Input Characteristics

Nominal rated voltage range	220 V – 240 V, 0 / 50 – 60 Hz
AC voltage range	198 VAC – 264 VAC
	Withstands max. 320 VAC (max. 1 hour)
DC voltage range	176 VDC – 280 VDC
DC starting voltage	> 186 VDC
Mains current at full load	0.35 – 0.39 A
Frequency	0 / 50 Hz – 60 Hz
Stand-by power consumption	< 0.27 W
THD at full power	< 6 %
Leakage current to earth	< 0.5 mA
Tested surge protection	1 kV L-N, 2 kV L/N-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		
Accuracy	± 2 % ¹⁾	1) From 500 - 550 mA, ± 3 % from 80 - 500 mA.
Ripple	< 1 % ²⁾ at ≤ 120 Hz	2) Low frequency, measured with Cree XP-G LED modules.
PstLM	≤ 0.02 ³⁾	
SVM	≤ 0.01 ³⁾	3) At full power, measured with Samsung LM281B LED modules.
U _{OUT} (max) (abnormal)	250 V or if enabled via NFC: 350 V	
EOFx (EL use)	15 % ⁴⁾	4) By default setting, available range 1...100 %

This LED driver does not allow operation with high output capacitance according to IEC 62384 clause 7.3.

250 V Uout mode, default

I_{LED}	80 mA	200 mA (default)	240 mA	350 mA	550 mA
P_{Rated}	2.8...18.4 W	7...46 W	8.4...55.2 W	12.3...80.2 W	19.3...80.3 W
U_{LED}	35 – 230 V	35 – 230 V	35 – 230 V	35 – 229 V	35 – 146 V
PF (λ) at full load	0.85	0.95	0.97	0.99	0.99
Efficiency (η) at full load	89.7 %	94.1 %	94.6 %	94.8 %	94.1 %

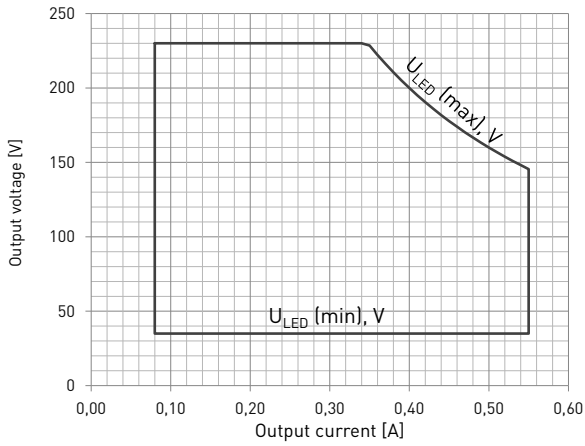
350 V Uout mode, enabled only via NFC

I_{LED}	80 mA	200 mA (default)	240 mA	350 mA	550 mA
P_{Rated}	2.8...26.4 W	7...66 W	8.4...79.2 W	12.3...80.2 W	19.3...80.3 W
U_{LED}	35 – 330 V	35 – 330 V	35 – 330 V	35 – 229 V	35 – 146 V
PF (λ) at full load	0.90	0.97	0.99	0.99	0.99
Efficiency (η) at full load	92.5 %	95.3 %	95.5 %	94.8 %	94.1 %

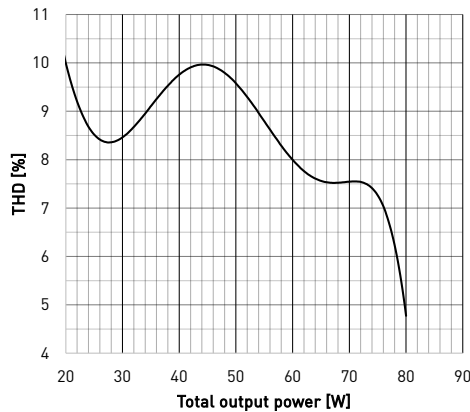
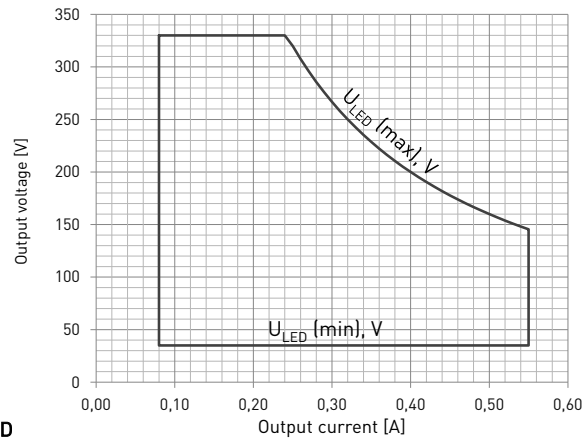
For the electrical safety, higher working voltage range can only be enabled by programming the LED driver with NFC using the Helvar Driver Configurator.

Operating window & driver performance

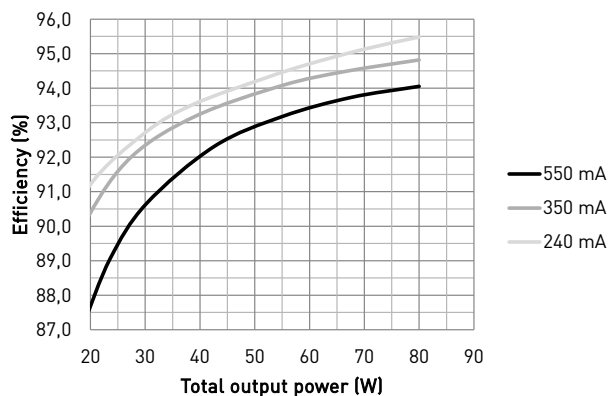
250 V Uout mode, default



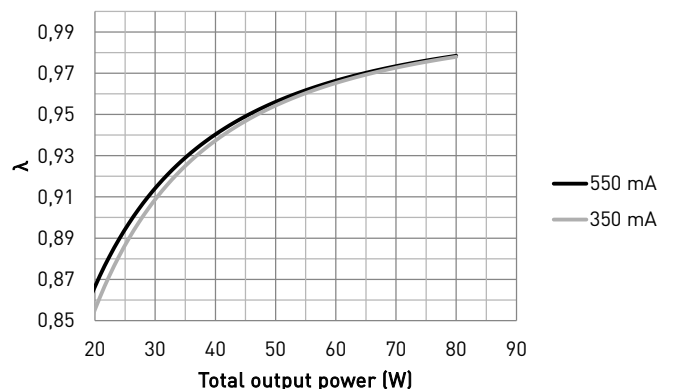
350 V Uout mode, enabled only via NFC



Typical efficiency



Typical power factor



Operating Conditions

Absolute highest allowed t_c point temperature	90 °C
Ambient temperature range	-25°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.*

Lifetimes

Lifetime tables (90 % survival rate)

Metallic luminaires (built-in use)

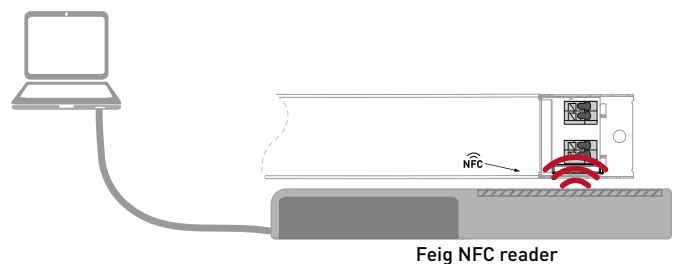
Output current	T_a	55 °C	60 °C	65 °C	70 °C	75 °C
550 mA	T_c at full load	69 °C	74 °C	79 °C	84 °C	89 °C
	Lifetime	>100 000 h	>100 000 h	80 000 h	55 000 h	40 000 h
450 mA	T_c at full load	67 °C	72 °C	77 °C	82 °C	87 °C
	Lifetime	>100 000 h	> 100 000 h	84 000 h	59 000 h	42 000 h
350 mA	T_c at full load	65 °C	70 °C	75 °C	80 °C	85 °C
	Lifetime	>100 000 h	>100 000 h	89 000 h	63 000 h	45 000 h
200 mA	T_c at full load	62 °C	67 °C	72 °C	77 °C	82 °C
	Lifetime	>100 000 h	>100 000 h	>100 000 h	85 000 h	60 000 h
80 mA	T_c at full load	61 °C	66 °C	71 °C	76 °C	81 °C
	Lifetime	>100 000 h	>100 000 h	>100 000 h	>100 000 h	86 000 h

The shown t_c temperatures and lifetimes were measured in reference conditions i.e. metallic luminaire design and built-in use.

The shown T_c temperatures for each T_a environment in the table above are for guidance only, as the real relation between T_a and T_c depends always on the luminaire design. In built-in use, refer to the used output current and T_c for lifetime estimation. Never exceed the T_c maximum of the driver stated in the datasheet!

Wireless configuration

LL80HE16-DA-80-550 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 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



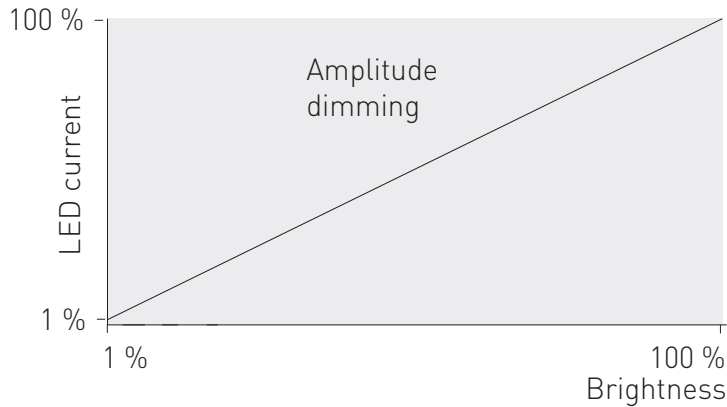
D4i-compatible Smart Data Features (DALI 251-253)

LL80HE16-DA-80-550 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)

Amplitude dimming technology



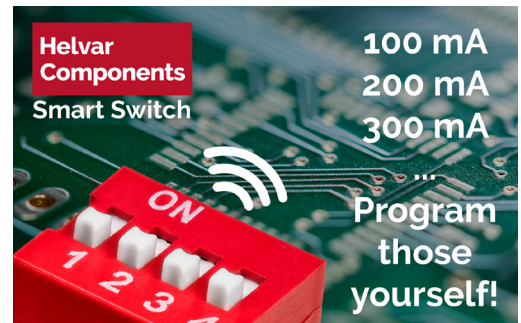
Dimming range	Dimming technology
1 % – 100 %	Amplitude (DC)

LL80HE16-DA-80-550 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

LL80HE16-DA-80-550 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.

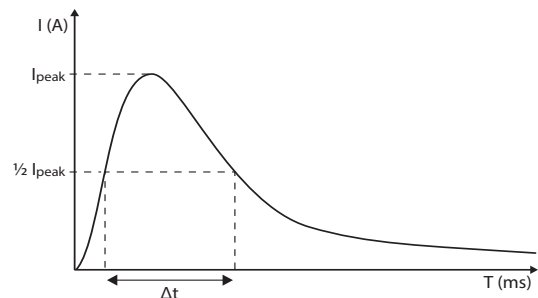


Quantity of drivers per miniature circuit breaker 16 A Type C

Based on inrush current I_{peak}	Typ. peak inrush current I_{peak}	1/2 value time, Δt	Calculated energy, $I_{peak}^2 \Delta t$
35 pcs	36 A	190 μs	0.186 A ² s

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

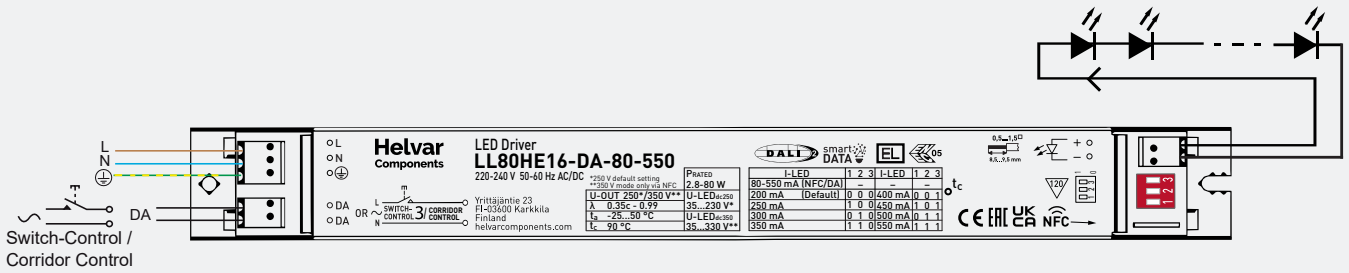
Total continuous current of the drivers and installation environment must always be considered and taken into calculations when installing drivers behind miniature circuit breaker. Example calculation of total drivers amount limited by continuous current: $n(I_{cont}) = (16 A (I_{nom,TS}) / \text{"nominal mains current with full load"}) \times 0.76$. 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.

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	1.5 m
Weight	184 g
IP rating	IP20

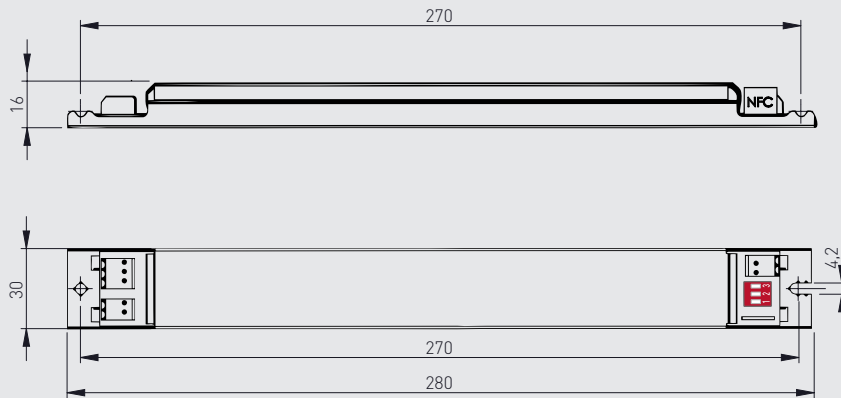
Connections



Note:

- Not suitable for load side switching operation

Dimensions (mm)



In LL80HE16-DA-80-550, 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 “111” (DIP switches pushed towards the driver body and minimum with setting “000” (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

DIP switch combination	000	100	010	110	001	101	011	111
I _{out} (mA)	200	250	300	350	400	450	500	550
Voltage range, default	35 - 230 V	35 - 230 V	35 - 230 V	35 - 229 V	35 - 200 V	35 - 178 V	35 - 160 V	35 - 146 V
Voltage range, 350 V U _{out} mode	35 - 330 V	35 - 320 V	35 - 267 V	35 - 229 V	35 - 200 V	35 - 178 V	35 - 160 V	35 - 146 V

LL80HE16-DA-80-550 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 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.

LED driver earthing

- LL80HE16-DA-80-550 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.

DALI control terminals

- DALI control terminals are classified as FELV terminals and they are not safe to touch. Circuits connected to DALI terminals shall be insulated for the LV supply voltage of the controlgear and any terminals connected to the DALI circuit shall be protected against accidental contact.

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

LL80HE16-DA-80-550 LED driver is supported by Helvar Driver Configurator software. With the LL80HE16-DA-80-550 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, the driver will go to standby mode and remain in automatic recovery status. In automatic recovery mode, the driver will check every four seconds if the load has been reconnected. Once that happens, it returns to normal operation.

Short circuit

When short circuit 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.

Overload

When overload/voltage is detected, driver will act similarly to no load situation, it will go to standby mode and remain in automatic recovery status. In automatic recovery mode, the driver will check every four seconds if the load has been reconnected. Once that happens, it returns to normal operation.

Underload

When underload/voltage is detected, driver will act similarly to short circuit 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 decrease and limit the maximum output current level. It will be decreased down to 30 % level within one minute fade time, after which in case the temperature still rises, the output of the driver will be eventually shut down. The output will be returned after the temperature drops below a certain threshold. 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: The internal temperature protection feature can never force the light level off or below the set emergency level in DC emergency mode.

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.

Label symbols



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.



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.

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 A
Thermal protection class	EN 61347-1, B3e
Mains current harmonics	EN IEC 61000-3-2
Limits for voltage fluctuations and flicker	EN 61000-3-3
Radio frequency interference	EN IEC 55015
Immunity standard	EN 61547
Performance requirements	EN IEC 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	

Suitable for emergency luminaires complying with the standard EN 60598-2-22.

This LED driver is provided with internal protection that supports selectivity in the case of installation with fuse gG 16 A.