

45 W **Dimmable two channel** intelligent Colour LED driver

Product code: 5765

45 W 220 – 240 V 0/ 50 – 60 Hz

- 2-channel tunable white for human centric lighting
- Wide dynamic range of colour temperatures on all dimming levels \*
- Amplitude dimming for the highest quality light output, complying with IEEE 1789 recommendation
- NFC technology for wireless programming
- Suitable for DC use
- Suitable for Class I and Class II luminaires
- Optional strain relief for independent use outside of luminaire (LC-SRB and LC-SRB-LOOP) and driving Class III luminaires
- Helvar Driver Configurator support

\*) See pages 2-3 for details

**Functional Description**

- DALI Type 8 compatible. One DALI address for controlling colour temperature by two output channels
- DALI colour type: Colour temperature  $T_c$
- Adjustable constant current output: 100 mA to 900 mA (350 mA default current)
- Current setting programmable via NFC or DALI
- Suitable for flicker-free camera recording applications
- Patented Switch-Control 2 functionality for easy-to-use intensity and colour temperature control with single push button
- Full load recognition with automatic recovery, open and short circuit protection
- Constant Light Output (CLO), adjustable up to 100 000 h (default disabled)
- Energy consumption monitor (real time), running hour monitor (accumulative), energy management (accumulative)
- Memory bank for OEM customer data

**Mains 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) |
|                                  | Withstands min. 176 VAC (max. 1 hour) |
| DC voltage range                 | 176 VDC – 280 VDC                     |
| DC starting voltage              | > 190 VDC                             |
| Mains current at full load       | < 0.24 A                              |
| Frequency                        | 0 / 50 Hz – 60 Hz                     |
| Stand-by power consumption       | < 0.5 W                               |
| THD at full power                | < 15 %                                |
| 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 & 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 ( $I_{out}$ ) | 100 mA – 900 mA          |
| Accuracy                     | $\pm 5\%$ *              |
| Ripple                       | < 1 %** at $\leq 120$ Hz |

\*) At maximum current \*\*) Low frequency, LED load: Cree XP-G LEDs

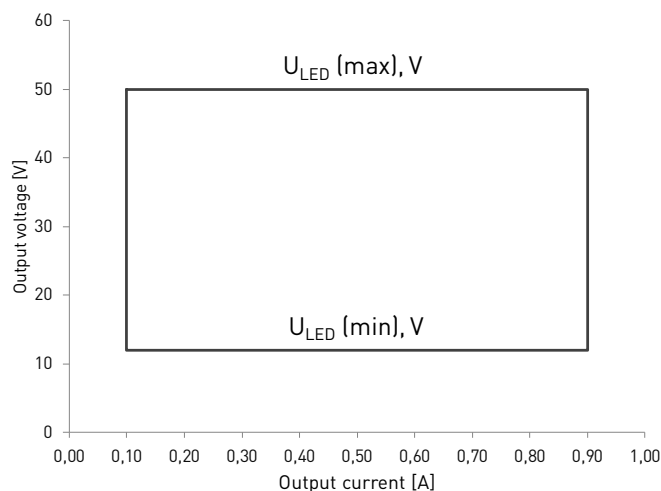
 $U_{out}$  (max) (abnormal)

60 V

| $I_{LED}$ *                        | 100 mA    | 350 mA (default) | 900 mA    |
|------------------------------------|-----------|------------------|-----------|
| $P_{Rated}$ *                      | 5 W       | 17.5 W           | 45 W      |
| $U_{LED}$ *                        | 12 – 50 V | 12 – 50 V        | 12 – 50 V |
| PF ( $\lambda$ ) at full load      | 0.67      | 0.89             | 0.97      |
| Efficiency ( $\eta$ ) at full load | 66 %      | 83 %             | 88 %      |

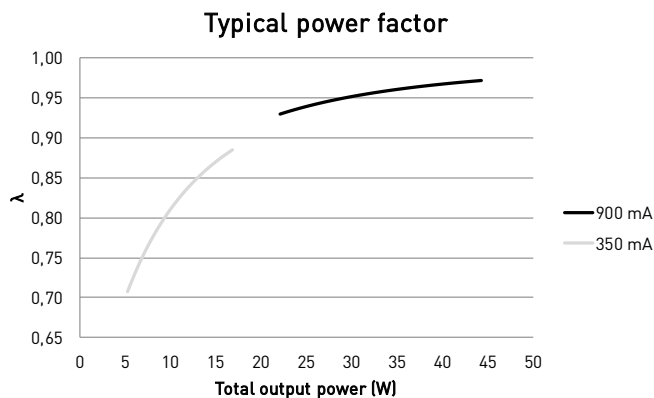
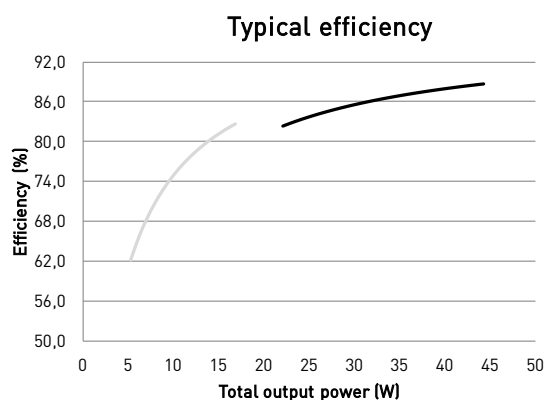
\*Current and power are divided into two channels according to the chosen CCT and module specifications. Total maximum power of the two channels can't exceed given  $P_{Rated}$ .

## Operating window



\*From 500 mA to 900 mA, full dimming range (2 % - 100 %) and wide CCT dynamic range available in the whole area. From 100 mA to 500 mA, the absolute minimum dimming level is limited to 10 mA of total current. Dimming / CCT control possible all the way down to that current, but the dynamic range may be limited. Each single channel can dim down to 0.5 mA level.

## Driver performance

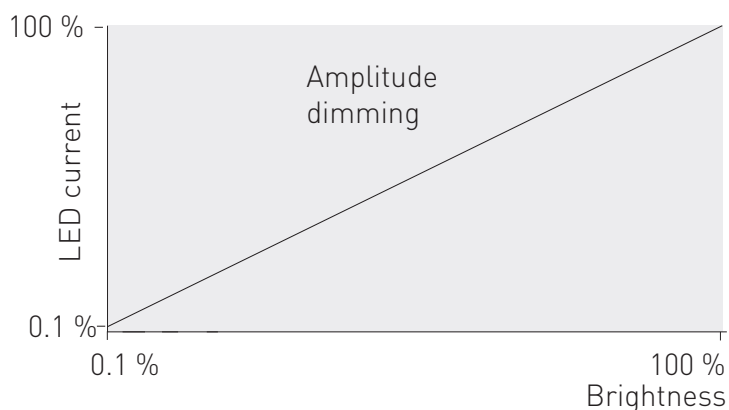


## Operating Conditions and Characteristics

|                                                  |                             |
|--------------------------------------------------|-----------------------------|
| Absolute highest allowed $t_c$ point temperature | 75 °C                       |
| $T_c$ life (50 000 h) temperature                | 75 °C                       |
| Ambient temperature range*                       | -25 °C ... +50 °C*          |
| in independent use                               | -25 °C ... +45 °C           |
| Storage temperature range                        | -40 °C ... +80 °C           |
| Maximum relative humidity                        | No condensation             |
| Life time(90 % survival rate)                    | 100 000 h, at $t_c = 65$ °C |
|                                                  | 70 000 h, at $t_c = 70$ °C  |
|                                                  | 50 000 h, at $t_c = 75$ °C  |

\*) For other than independent use, higher  $t_s$  of the control gear possible as long as highest allowed  $t_c$  point temperature is not exceeded

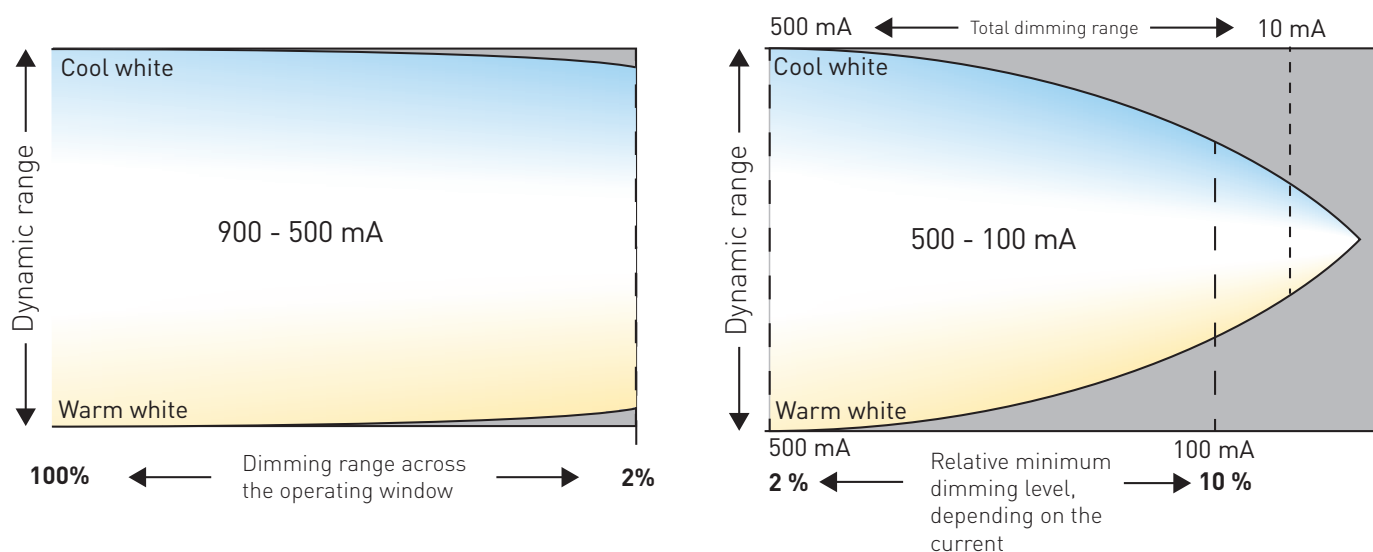
## Amplitude dimming technology



| Dimming range per single channel | Dimming range in tunable white use | Dimming technology |
|----------------------------------|------------------------------------|--------------------|
| 0.1 % – 100 %                    | 2 % - 100 %                        | Amplitude (DC)     |

LC45iC-DA-100-900 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.

## Dynamic range in colour temperature control



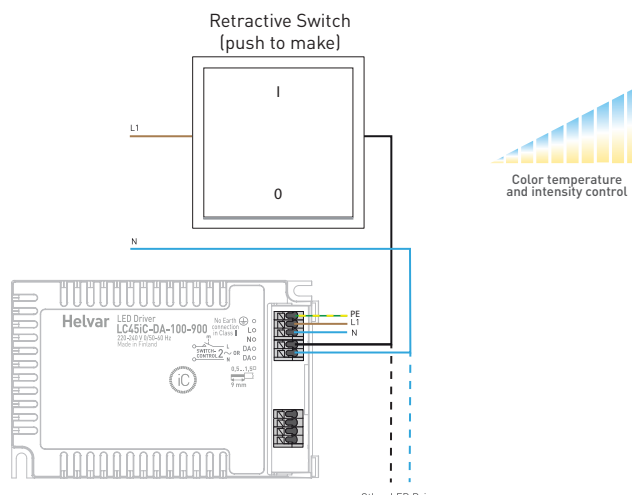
LC45iC-DA-100-900 LED driver is ready to be used out of the box.

Highest precision and color consistency in controlling combinations of different luminaire types is achieved by setting colour temperatures and lumen outputs before use with Helvar driver configurator. The configured colour temperatures of the channels should match the ones of the LED modules used. The factory default settings of cool and warm channels are 6500 K and 2700 K accordingly.

After setting up the colour temperatures, the lumen output values of full dimming level (100 %) should be configured for both channels. By default, output currents are set to be equal in both channels.

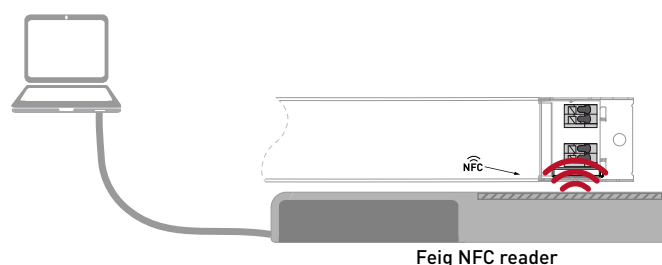
## Switch-Control 2 with tunable white

Helvar iC drivers provide the simplest form of control in tunable white with Helvar patented single switch Switch-Control 2 functionality. With single push button the user is able to control both the light intensity and colour temperature to the desired level. The system synchronises the light levels and CCTs every time the colour temperature is adjusted to ensure pleasant user experience and uncompromised lighting comfort. More information about the functionality can be found in Switch-Control user guide at [www.helvar.com](http://www.helvar.com).



## Wireless configuration

LC45iC-DA-100-900 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.helvar.com](http://www.helvar.com)

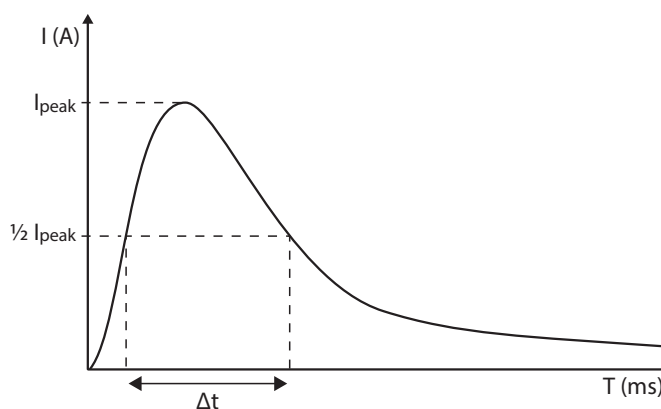


## Quantity of drivers per miniature circuit breaker 16 A Type C

| Based on $I_{cont}$ | Based on inrush current $I_{peak}$ | Typ. peak inrush current $I_{peak}$ | 1/2 value time, $\Delta t$ | Calculated energy, $I_{peak}^2 \Delta t$ |
|---------------------|------------------------------------|-------------------------------------|----------------------------|------------------------------------------|
| 51 pcs              | 58 pcs                             | 29 A                                | 153 $\mu s$                | 0.093 A <sup>2</sup> 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

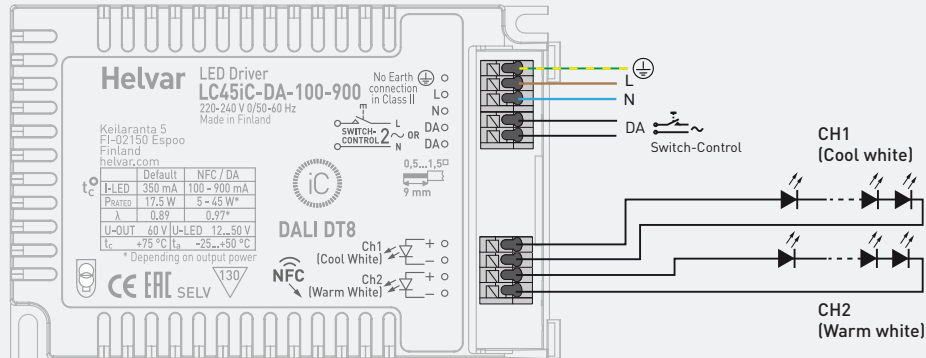
Total continuous current of the drivers and installation environment must always be considered and taken into calculations when installing drivers behind miniature circuit breaker. Example calculation of total drivers amount limited by continuous current:  $n(I_{cont}) = (16 \text{ A } (I_{nom, T_a})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

## Connections and Mechanical Data

|                                   |                                           |
|-----------------------------------|-------------------------------------------|
| Wire size                         | 0.5 mm <sup>2</sup> – 1.5 mm <sup>2</sup> |
| Wire type                         | Solid core and fine-stranded              |
| Wire insulation                   | According to EN 60598                     |
| Maximum driver to LED wire length | 1.5 m                                     |
| Weight                            | 193 g                                     |
| IP rating                         | IP20                                      |

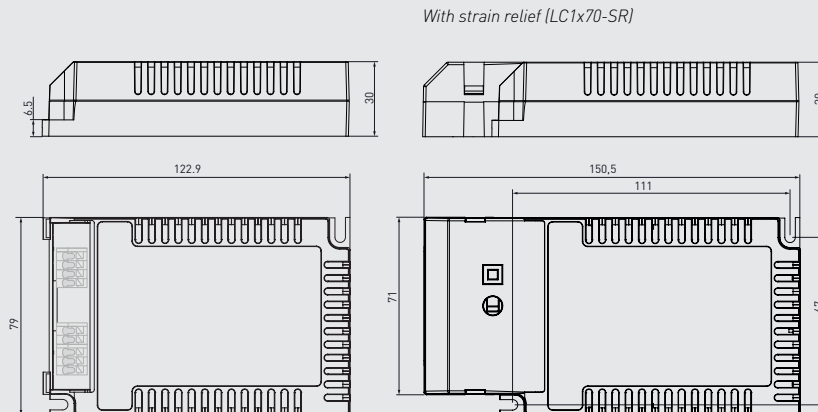
## Connections



Note:

- Earth connection to PE terminal is optional and not needed for the functionality of the driver. See page 4 for details.
- Not suitable for load side switching operation
- Label may differ if the unit is preset to fixed current

## Dimensions (mm)



LC45iC-DA-100-900 LED driver is suited for built-in usage in luminaires. With LC1x70-SR/LC-SRB/LC-SRB-LOOP strain relief, independent use is possible too. 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

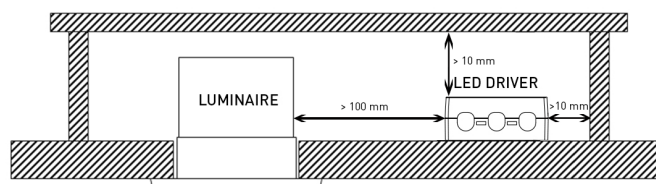
- LC45iC-DA-100-900 is Class I LED driver suitable for Class I and II luminaires, as well as driving Class III (SELV) luminaire parts in independent installation with external strain relief.
- If used inside **Class I** luminaires, the earth cable is recommended to be connected to improve the EMC performance of the driver, but it is not mandatory. It is the responsibility of the integrator to ensure that the assembled luminaire EMC performance complies with the latest standards. Driver RFI measurement data will be provided by request.
- If used inside **Class II** luminaires, the safety of the luminaire shall be ensured through double/reinforced insulation of live parts. LC45iC-DA-100-900 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 connection is optional. Please follow the instructions provided in the strain relief datasheets.

### Miniature Circuit Breakers (MCB)

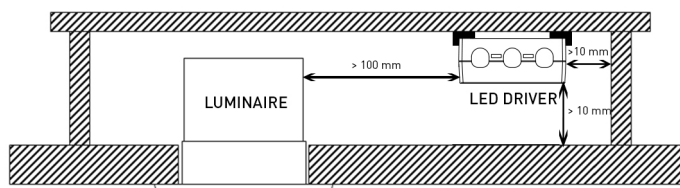
- Type-C MCB's with trip characteristics in according to EN 60898 are recommended.
- Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

### 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:



- Suitable for installation upside down and in the corner, in this case separate spacers must be used. For more information, please consult Helvar.



### Helvar Driver Configurator -support

LC45iC-DA-100-900 LED driver is supported by Helvar Driver configurator software. The LC45iC-DA-100-900 driver supports output current setting with software, the output current of the driver can be programmed using Helvar Driver Configurator, as well as OEM customer data and parameters for functions such as CLO and Tunable White behavior. 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 remains 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 goes to standby mode and returns through mains reset.

### Underload

When undervoltage is detected, driver goes to standby mode and returns through mains reset.

## 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.
- More information in Switch-Control User Guide at [www.helvar.com](http://www.helvar.com).

## Conformity & standards

|                                                                                                             |                               |
|-------------------------------------------------------------------------------------------------------------|-------------------------------|
| General and safety requirements                                                                             | EN 61347-1: 2015              |
| Particular safety requirements for DC or AC supplied electronic control gear for LED modules                | EN 61347-2-13: 2014 + A1:2017 |
| Thermal protection class                                                                                    | EN 61347, C5e                 |
| Mains current harmonics                                                                                     | EN 61000-3-2: 2014            |
| Limits for voltage fluctuations and flicker                                                                 | EN 61000-3-3: 2013            |
| Radio frequency interference                                                                                | EN 55015: 2013 + A1:2015      |
| Immunity standard                                                                                           | EN 61547: 2009                |
| Performance requirements                                                                                    | EN 62384: 2006 + A1:2009      |
| <b>Digital addressing lighting interface:</b>                                                               |                               |
| General requirements for DALI system                                                                        | EN 62386-101                  |
| Requirements for DALI control gear                                                                          | EN 62386-102                  |
| Requirements for control gear of LED modules                                                                | EN 62386-207                  |
| Particular requirements for control gear - Colour control (Dali Device Type 8)                              | EN 62386-209                  |
| 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                                                                                        |                               |
| CE 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 120 °C.



Driver equipped with NFC wireless technology for effortless configuration.



Helvar Intelligent Colour drivers providing DALI colour control (tunable white) functionality.