LL60/2-E-DA Dynamic

60 W DALI LED driver with **preset scenes for Tunable White**

Helvar
freedom in lighting

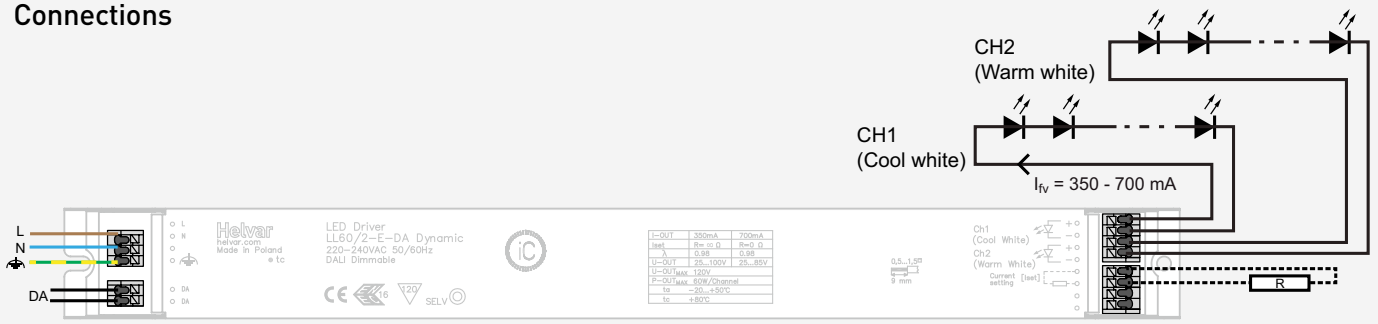
- 4 preset Tunable White scenes simulating different weather conditions, Dynamic scene as default
- Easy solution for Tunable White control in new build
- No ballast or module configuration needed
- Out-of-box dynamic operation without DALI network
- 3 % - 100 % dimming range per scene *)
- SELV rated output channels
- High efficiency, 0.90

60 W 220-240 VAC 50-60 Hz

*) The colour temperature accuracy is +/-10% of the set value. Colour temperature starts to drift towards the mid point of the modules when dimming below 30 %

SELV

Connections



Current setting (p. 2)	
Resistor R	**output I_{fv}**
open	350mA
0 Ω	700mA

Note:

- *FE is not required to be connected in suitably designed class II luminaires*

Mains Characteristics

Voltage range	198 - 264 VAC
DC range	176 - 280 VDC, starting voltage > 190 VDC
Max mains current at full load	0.26 - 0.34 A
Frequency	0 / 50 - 60 Hz
U-OUT$_{max}$ (abnormal)	120 V
Stand-by power	< 0.5 W

Load Output (p. 2)

Output current (I-OUT)	350 mA (default) - 700 mA
Max output power	60 W
Efficiency, at full load, typical	0.90

I-OUT / channel	350 mA	700 mA
P-out (max) / channel	35 W / ch	60 W / ch
U-OUT	25-100 V	25-85 V
λ (both channels loaded)	0.98	0.98
η (both ch loaded @ max)	0.90	0.90

Operating Conditions and Characteristics

Max.temperature at tc point	80 °C
Ambient temperature range	-20...+50 °C
Storage temperature range	-40...+80 °C
Maximum relative humidity	no condensation
Life time	50 000h, at TC max (90 % survival rate)

Connections and Mechanical Data

Maximum driver to LED wire length	5 m
Weight	365 g
IP rating	IP20

Conformity & Standards

General and safety requirements	EN 61347-1
Particular safety requirements for d.c. or a.c. supplied electronic controlgear for LED modules, acc. to	EN 61347-2-13
Thermal protection class	EN61347, C5e
Mains current harmonics, acc. to	EN 61000-3-2
Limits for Voltage Fluctuations and Flicker, acc to	EN 61000-3-3
Radio Frequency Interference, acc. to	EN 55015
Immunity standard, acc. to	EN 61547
Performance requirements, acc to	EN 62384
Digital adressing lighting interface (DALI) **	EN62386-207

See IEC 62386-209 for using Dali type 8 colour control commands

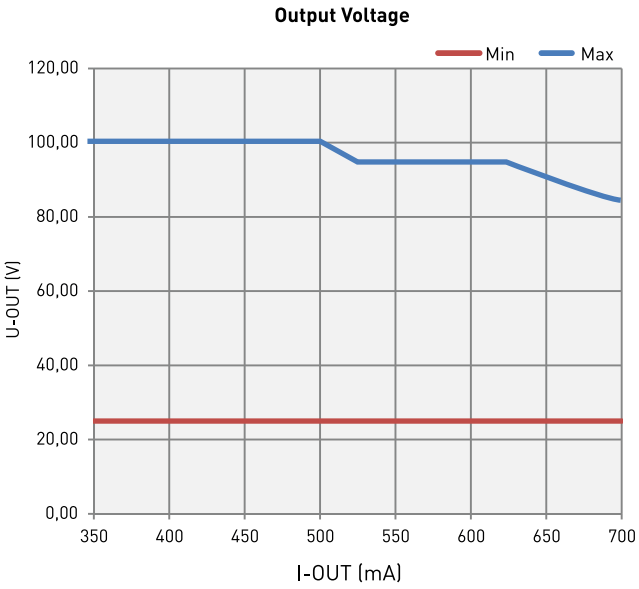
Compliant with relevant EU directives
ENEC,CE & SELV marked

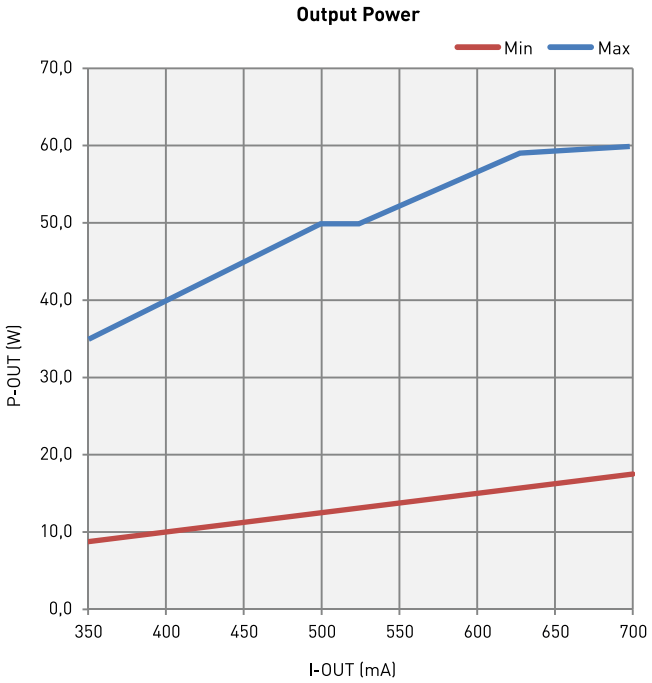
** with additional extensions

SELV = *Control gear for inbuilt usage is double insulated from live parts*

Note: See page 2 for dimensions

Load Output

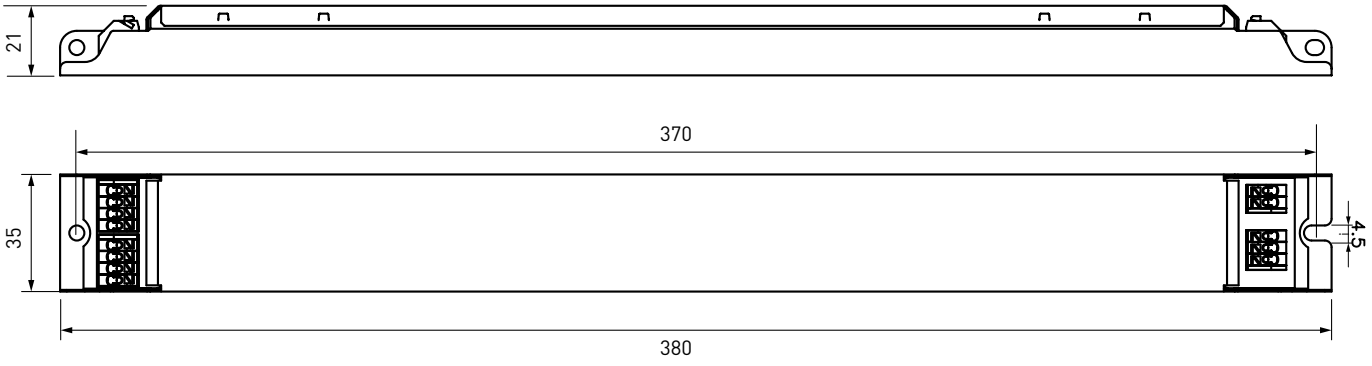




Current setting resistor values LL60/2-E-DA Dynamic

R (Ω)	0	1k	1k2	1k5	1k8	2k2	2k7	3k3	3k9	4k7	5k6	6k8	8k2	10k	12k	15k	22k	27k	33k	39k	47k	56k	68k	82k	100k	150k	330k	1M	∞
I_{out} (mA)	700	650	640	630	620	610	600	580	570	550	530	520	500	480	470	450	430	420	410	400	390	385	380	375	370	365	360	355	350

Dimensions



LL60/2-E-DA Dynamic is designed for in-built luminaire to use either class I or class II 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 drivers 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 datasheet. Specifications of the LED driver may never exceed the operating conditions as per the product datasheet.

Wiring considerations

Wire type and cross section

- Please refer to datasheets connections & mechanical data

Wiring insulation

- According to recommendations in EN 60598

Maximum wire lengths

- Please refer to datasheets connections & mechanical data

Wire connections

- Please refer to datasheets connections diagram
- Pay attention that wrong wiring might damage the product
- Load is not alloved to remove or reconnect while mains connected

Miniature Circuit Breakers (MCB)

- Type-C MCB's with trip characteristics in according to EN 60898 are recommended.

LED driver earthing

- LED drivers are designed to support all luminaire classifications. Please check the individual LED driver type for its exact safety class rating.
- For Helvar LED drivers to have a reliable operation and EMC performance, the luminaires are expected to have an earth connection. Earth connection can be left out if luminaire safety is guaranteed by its construction.
- When using a SELV-rated LED driver, then the SELV driver output has to be insulated from the luminaire earth connection (ref. EN60598-1 luminaire standard).

Installation & operational considerations

Maximum tc temperature

- Reliable operation and lifetime is only guaranteed if the maximum tc point temperature is not exceeded under the conditions of use.

Strain Relief for independent use

- Some of the Helvar LED drivers allow use both inside the luminaire and outside the luminaire, via a strain relief. The strain relief provides reliable fastening method for the mains and LED output wiring.
- Ensure that the LED driver does not exceed temperature higher than specified on the product datasheets.
- The general preferred installation position of LED drivers is to have the top cover facing upwards.

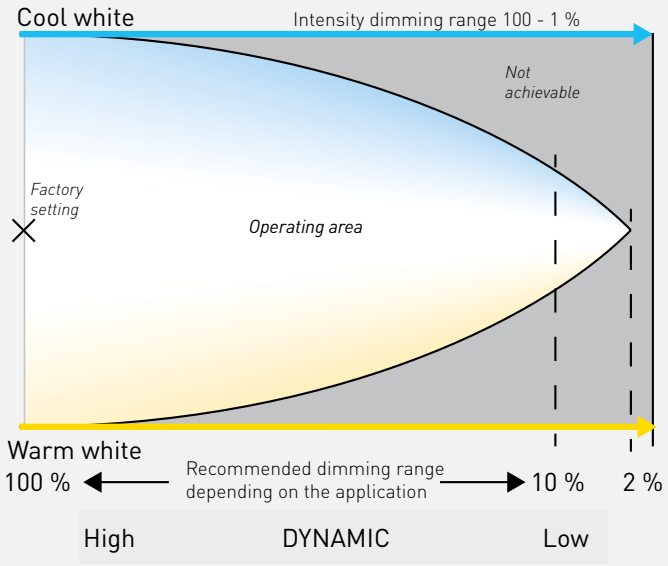
Current setting resistor

The Helvar LL60/2 driver feature an adjustable constant current output.

- 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.
- For the resistor / current value selection, please refer to the enclosed table below.

Tunable white functionality

- The LL60/2 Dynamic driver have 2 output channels used to control the intensity and temperature of white colour as well known as "Tunable White"
- These drivers respond to DALI type 8 (DT8) commands, which in practice means that they only have 1 common address for both output channels
- The tunable white level of intensity and colour temperature can be set with a DALI command
- The driver will operate correctly once tunable white LED module parameters are programmed to the driver. Use "Helvar DALI Driver Configurator" for the parameter setting
- See Helvar DALI Driver Configurator user guide for more information how to set the parameters to the driver



Select the weather scenes

The Dynamic driver has 16 scenes that can be recalled by DALI commands.

Fixed scenes 1-4 recall different weather scenarios

1. Scene 1: Morning light
2. Scene 2: Daylight
3. Scene 3: Cloudy weather
4. Scene 4: Dynamic weather (factory default scene)

The predefined colour temperature values of scenes 1-4 are fixed and cannot be changed.

The light level can be adjusted in scenes 1-4 but the new light level values cannot be stored under these scenes.

Icon	Effect	When to use	Colour Temp.	Light output
	Calm down	High stress period	Warm	80 %
	Energise	Early morning	Cool	100 %
	Concentrate	Individual work & Presentation	Intermediate	50 %
	Stay alert	Normally daily work	Changing naturally	90 %

Default values of the scenes

Scene 4: Dynamic weather, randomly changes the colour temperature of the luminaire

- Randomly selected colour temperature between 4 predefined values
  - Maximum Warm white (99% warm + 1% cold)
  - 2 mixed colour temperatures (calculated in Mireds)
    - 1/3 Cold White + 2/3 warm white
    - 2/3 Cold White + 1/3 warm white
  - Maximum Cold white (99% cold + 1% warm)
- Ex. CCT values in the driver with default temperatures of 3000K and 5000K
  - Appr: 3000K, 3500K, 4100K, 5000K
- Randomly selected (4 different) fade times of 2 subsequently recalled colour temperature levels
  - 30s, 2min, 5min, 10min
  - The fade times can be reprogrammed by DALI

Scenes 5-13 are free to be configured with regard of colour and intensity by DALI commands.

The fade time between the different scenes is 2 seconds, as a default and can be changed by DALI commands.

Return from mains failure / system failure as a default is to recall last dimming level and colour.

Scenes 14-16 are designed to recall scenes serving PIR operation.

- Scene 14: min light level, last colour
- Scene 15: OFF
- Scene 16: last used dimming level and colour