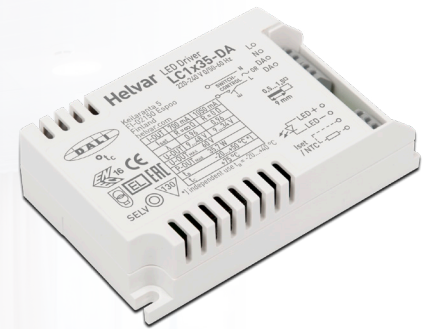


35 W Dimmable DALI LED driver

Product code: 5564

35 W 220 – 240 V 0 / 50 – 60 Hz

- SELV output protection for safety and flexibility in luminaires
- DALI control input, 1-100 % dimming range
- Suitable for use in emergency lighting applications
- Long lifetime up to 100 000 h
- Driver protection Class II (built-in)
- Suitable for Class I and Class II luminaires
- For driving Class III (SELV) luminaires, optional strain relief for independent use outside of luminaire (LC-SRA/LC1x30-SR or LC-SRA-LOOP for looping the input cables)



Functional Description

- Adjustable constant current output: 700 mA (default) to 1050 mA
- Current setting programmable by Helvar driver configurator, by DALI commands or by external resistors
- Hybrid dimming technique for high quality light
- Switch-Control functionality for easy-to-use intensity control
- Adaptive LED overload protection. Reduces output current if overload is detected
- Full load recognition, open and short circuit protection
- Multipurpose terminal Iset/NTC for current setting or over temperature protection
- Constant Light Output (CLO) (default disabled)

Mains Characteristics

Voltage range	198 VAC – 264 VAC
	Withstands max. 320 VAC (max. 1 hour)
DC range	176 VDC - 280 VDC
starting voltage	> 190 VDC
Mains current at full load	0.17 A – 0.19 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	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 and output - Driver case	Double/reinforced insulation

Load Output (SELV <60 V)

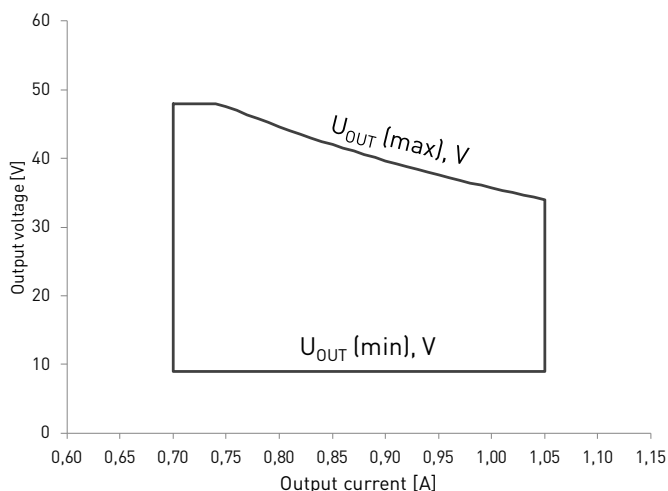
Output current (I_{out})	700 mA (default) – 1050 mA
Accuracy	$\pm 5 \%$
Ripple	< 2 %* at ≤ 120 Hz
	*] Low frequency, LED load: Cree XM-L LEDs
PstLM	< 0.01*
SVM	< 0.01*
	*] At full load, measured with Cree XP-G LED modules.
U_{out} (max) (abnormal)	60 V
EOF_1 (EL use)	> 0.98 x output current with AC supply

I_{out}	700 mA	1050 mA
P_{out} (max)	33.6 W	35.7 W
U_{out}	9 V – 48 V ¹⁾	9 V – 34 V ²⁾
λ at full load	0.96 ¹⁾	0.96 ²⁾
Efficiency (η) at full load	89 %	88 %

¹⁾ From revision G onwards. In earlier revisions U_{out} 20 V - 48 V and λ at full load 0.97.

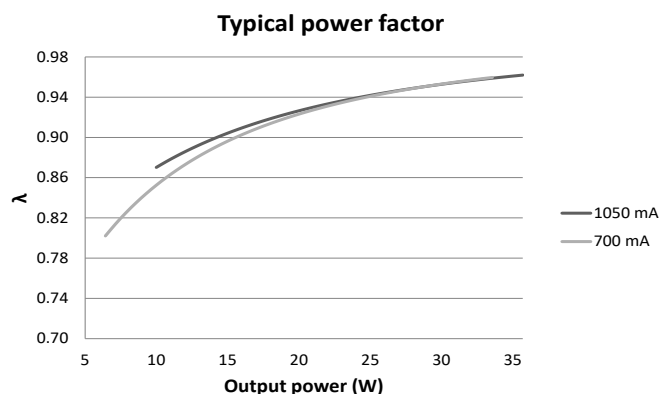
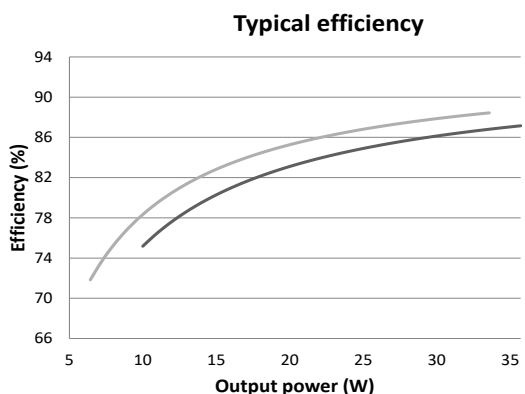
²⁾ From revision G onwards. In earlier revisions U_{out} 20 V - 34 V and λ at full load 0.97, efficiency at full load 87 %.

Operating window



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

Driver performance

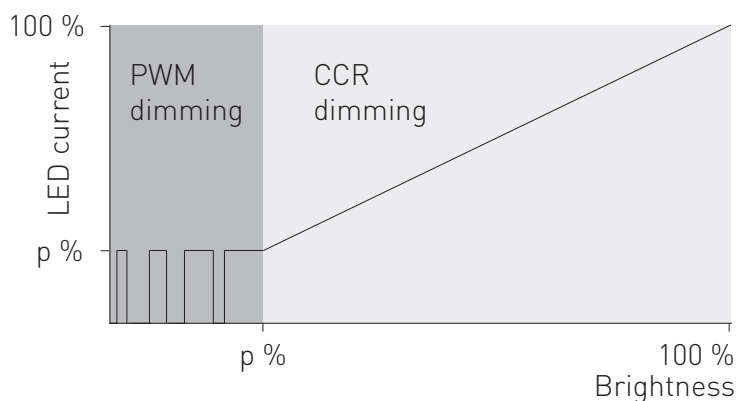


Operating Conditions and Characteristics

Highest allowed t_c point temperature	75 °C
Ambient temperature range*	-20 °C ... +50 °C
in independent use	-20 °C ... +40 °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
	90 000 h, at $t_c = 70$ °C
	60 000 h, at $t_c = 75$ °C

*) For other than independent use, higher t_a of the controlgear possible as long as highest allowed t_c point temperature is not exceeded

Hybrid dimming technique per channel



Dimming range/ch	Dimming technique
1 % – 20 %	Pulse Width Modulation (PWM)*
20 % – 100%	Constant Current Reduction (CCR)

* PWM dimming frequency 800 Hz

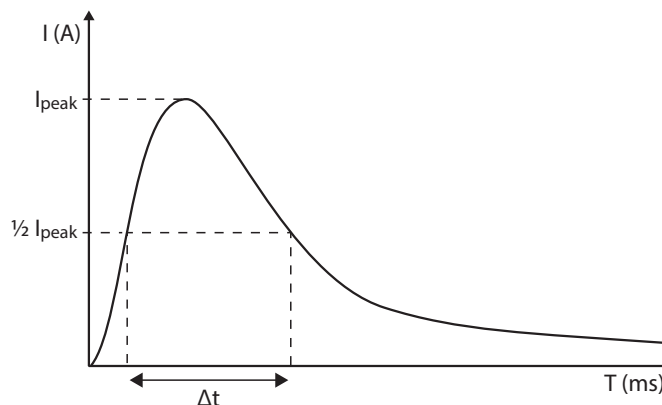
Helvar hybrid dimming products combines both Constant Current Reduction (CCR) amplitude dimming and Pulse Width Modulation (PWM) dimming. CCR is a very efficient technique for dimming the light output, especially on higher range. On lower range, the hybrid dimming products implement high-frequency PWM dimming according to the table above.

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, $I_{peak}^2 \Delta t$
53 pcs.	86 pcs.	25 A	177 μs	0.08 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 %

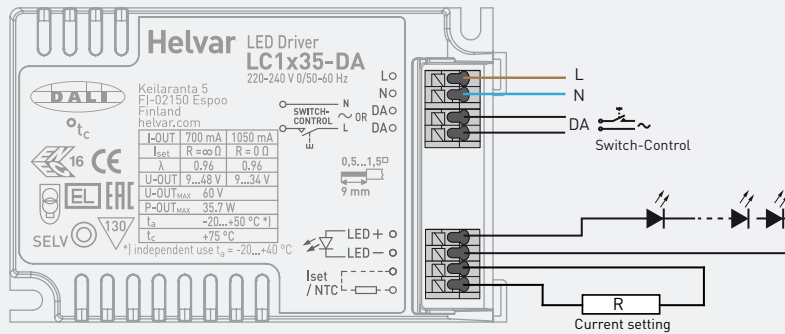


Type C MCB's are strongly recommended to use with LED lighting. Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

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	5 m
Weight	135 g
IP rating	IP20

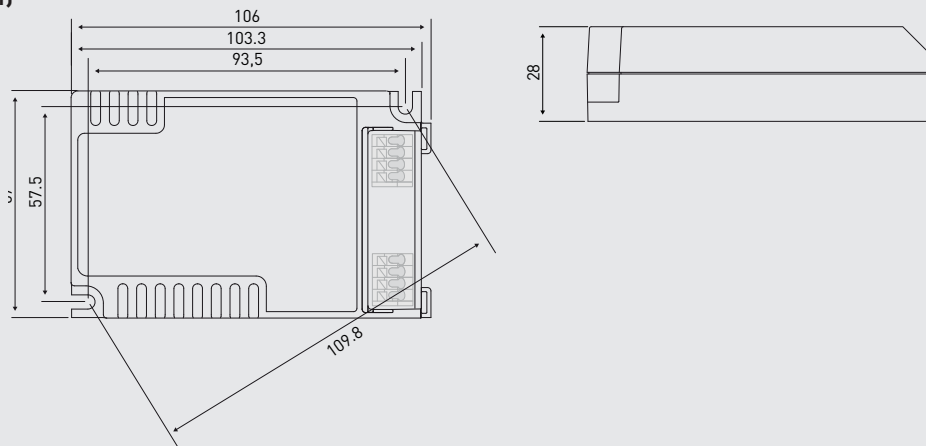
Connections



Note:

- Not suitable for load side switching operation
- Label may differ if the unit is preset to fixed current
- Gray label from revision G onwards
- LC1x35-DA has Iset terminal, however it is compatible with LED-Iset resistor values according to the table below.

Dimensions (mm)



The current setting values are adjusted according to the LEDset specification. The resistor value for each required output current can thus be calculated from the formula $R [\Omega] = (5 [V] / I_{out} [A]) * 1000$. Below are the available LED-Iset resistors from Helvar, pre-adjusted for the most common output currents.

Helvar LED-Iset resistors and currents (Nominal I_{out} (±5 % tol.))

LED-Iset resistor model	MAX	1000 mA	950 mA	900 mA	850 mA	800 mA	750 mA	No resistor
I_{out} (mA)	1050	1000	950	900	850	800	750	700
Order code	T90000	T91000	T90950	T90900	T90850	T90800	T90750	N/A
Resistance values (Ω)	0	4.99k	5.23k	5.6k	5.90k	6.20k	6.65k	∞

The current can be adjusted also with normal resistors by selecting suitable resistor value (formula $R [\Omega] = (5 [V] / I_{out} [A]) * 1000$). Reference resistor values can be found below order code in the table above.

LC1x35-DA 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 driver may never exceed the specifications as per the product datasheet.

Installation & operation

Maximum t_c temperature:

- Reliable operation and lifetime is only guaranteed if the maximum t_c point temperature is not exceeded under the conditions of use
- Ensure that the t_c point temperature does not rise higher than specified on the product datasheets

Installation site:

- The general preferred installation position of LED drivers for independent use is to have the top cover facing upwards

Current setting resistor

LC1x35-DA LED driver features 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. Minimum diameter for resistor leg is 0.51mm
- Always connect the current setting resistor only into the terminals marked with Iset on the LED driver label.
- Resistor/current values follow LEDset specification for current setting and are presented on page 3

Lamp failure functionality

No load

When open load is detected, driver will go to standby. Automatic recovery is on during the first 10 minutes. If open load is still detected after the first 10 minutes, driver goes to standby mode and recovers through mains reset.

Short circuit

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

Overload

When high over load is detected, driver goes to standby mode and follows the same logic as described in the short circuit condition. When low over load is detected, output current will be reduced to have maximum rated output power.

Underload

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

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 DC or AC supplied electronic control gear for LED modules	EN 61347-2-13 Annex J
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
Independent usage acc. to relevant clauses of	EN 60598-1
Compliant with relevant EU directives	
RoHS / REACH compliant	
ENEC and CE / UKCA marked	

Label symbols



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



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 130 °C.