

# LL1x30-E-CV24

Helvar

30 W **Constant Voltage** LED driver

freedom in lighting

30 W 220-240 VAC 50-60 Hz

- 24 V constant voltage output
- SELV protection for safety and flexibility in luminaires
- Open circuit, short circuit and overload protection
- Suitable for Class I and Class II luminaires
- Strain reliefs for independent use
- Suitable for use with LL1xCV-DA driver extension in DALI dimmable solutions



## Mains Characteristics

Voltage range	198-264 VAC
Max mains current at full load	0.17 A
Frequency	50 - 60 Hz
Power factor at full load	0.95
THD at full load	< 15 %
Input Power at no load	< 0.5 W
Leakage current to earth	< 0.7 mA
Tested surge protection	1 kV L-N, 2 kV L-GND (IEC 61000-4-5, performance criteria B)
Tested fast transient protection	2 kV (IEC 61000-4-4, performance criteria B)

## Load Output (SELV < 60 V)

Output voltage (U-OUT)	24 V
Output voltage tolerance	± 5 %
Max output current (I-OUT)	1.25 A
Max output power	30 W
Efficiency, at full load	86 %

## Operating Conditions and Characteristics

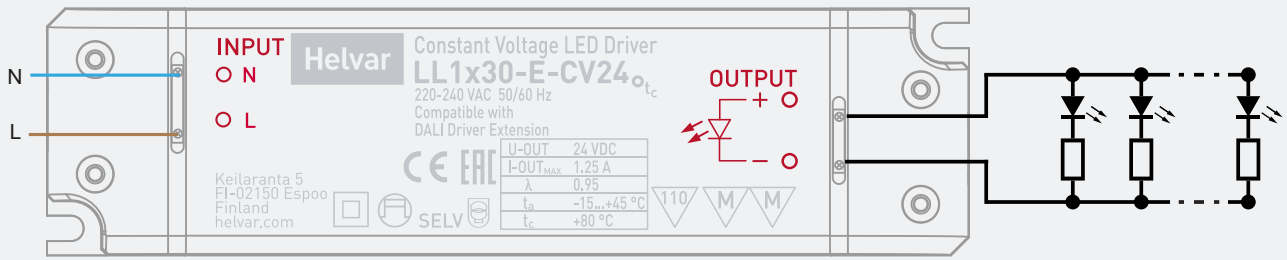
Max.temperature at $t_c$ point	80 °C
Ambient temperature range	-15...+45 °C
Storage temperature range	-40...+80 °C
Maximum relative humidity	No condensation
Life time (90 % survival rate)	50 000 h, at $t_c = 70$ °C 30 000 h, at $t_c = 80$ °C

## Connections and Mechanical Data

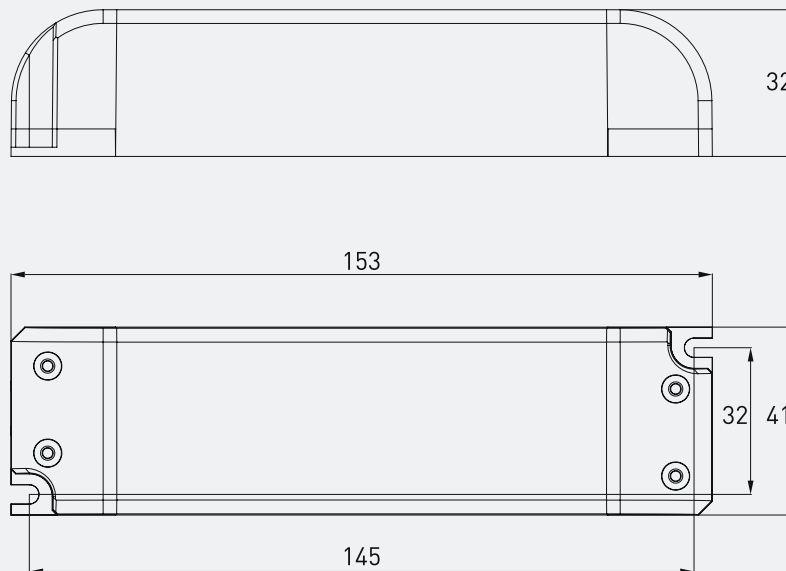
Wire size	0.5 – 1.5 mm <sup>2</sup>
Wire type	Solid core and fine-stranded
Wire insulation	According to EN 60598
Maximum driver to LED wire length	5m
Weight	150 g
IP rating	IP20

Note: See page 2 for connections and dimensions

## Connections



## Dimensions (mm)



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

Based on $I_{Cont}$ (pcs.)	Based on $I_{peak}$ (pcs.)	Typ.inrush current $I_{peak}$ (A)	1/2 value time $\Delta t$ ( $\mu s$ )	Calculated energy $I_{peak}^2 \Delta t$ (A <sup>2</sup> s)
72	68	16	208	0.0386

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

LL1x30-E-CV24 LED driver is suited for either built-in and independent luminaire usage. 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 datasheets.

## Installation & operational considerations

### 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 exceed the specified value on the datasheet

### Installation site:

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

## 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	EN61347, 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
Compliant with relevant EU directives	

Company Address:

**Helvar Oy Ab**

Keilaranta 5

FI-02150, Espoo

75 W 220-240 VAC 50-60 Hz

- 24 V Constant voltage output
- SELV protection for safety and flexibility in luminaires
- Low voltage ripple, complying with IEEE 1789-2015 recommendation
- Open circuit, short circuit and overload protection
- Suitable for Class I and Class II luminaires
- Strain reliefs for independent use
- Suitable for use with LL1xCV-DA driver extension in DALI dimmable solutions



### Mains Characteristics

Voltage range	198-264 VAC
Max mains current at full load	0.4 A
Frequency	50 - 60 Hz
Power factor at full load	0.95
THD at full load	< 10 %
Input Power at no load	0.5 W
Leakage current to earth	< 0.7 mA
Tested surge protection	1 kV L-N, 2 kV L-GND (IEC 61000-4-5, performance criteria B)
Tested fast transient protection	2 kV (IEC 61000-4-4, performance criteria B)

### Load Output (SELV < 60 V)

Output voltage (U-OUT)	24 V
Output voltage tolerance	± 5 %
Max output current (I-OUT)	3.125 A
Max output power	75 W
Efficiency, at full load	88 %

### Operating Conditions and Characteristics

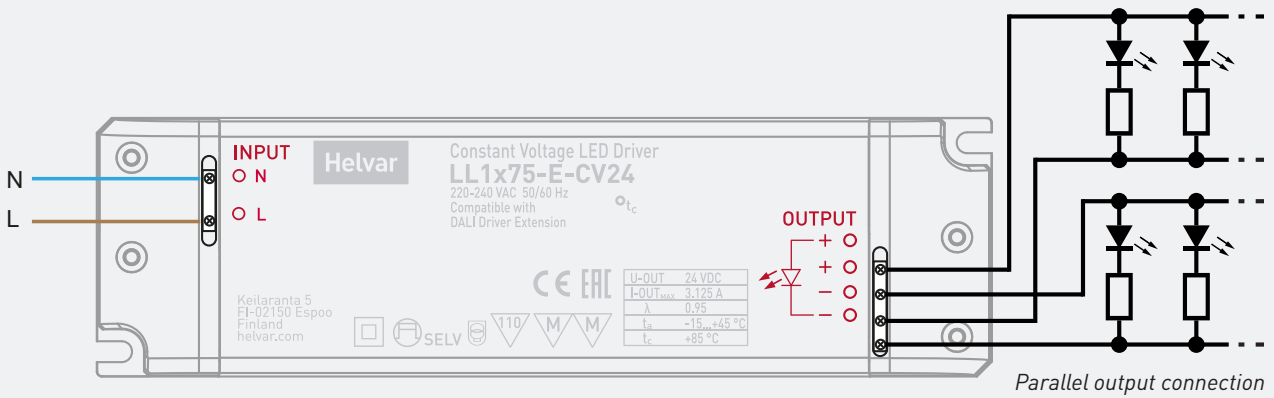
Max. temperature at $t_c$ point	85 °C
Ambient temperature range	-15...+45 °C
Storage temperature range	-40...+80 °C
Maximum relative humidity	No condensation
Life time (90 % survival rate)	50 000 h, at $t_c = 75$ °C 30 000 h, at $t_c = 85$ °C

### Connections and Mechanical Data

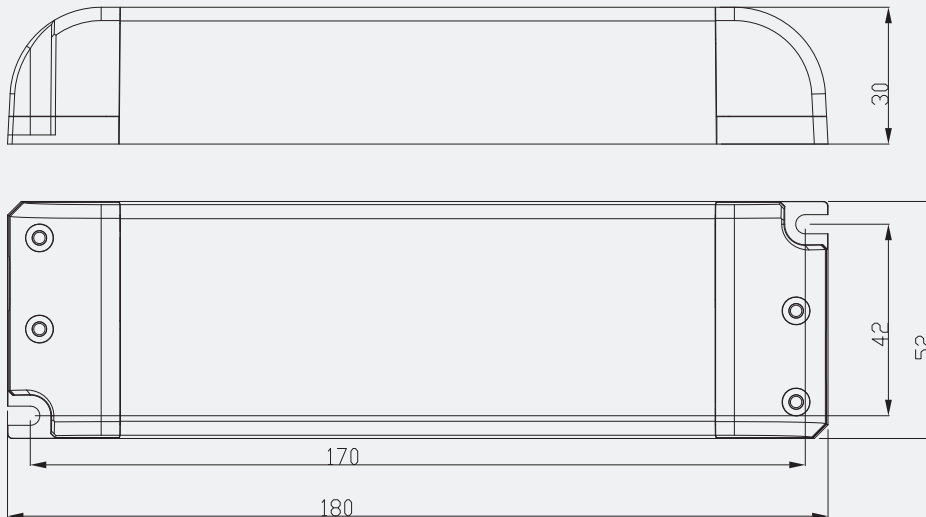
Wire size	0.5 – 1.5 mm <sup>2</sup>
Wire type	Solid core and fine-stranded
Wire insulation	According to EN 60598
Maximum driver to LED wire length	5m
Weight	280 g
IP rating	IP20

Note: See page 2 for dimensions

## Connections



## Dimensions (mm)



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

Based on $I_{Cont}$ (pcs.)	Based on $I_{peak}$ (pcs.)	Typ.inrush current $I_{peak}$ (A)	1/2 value time $\Delta t$ ( $\mu s$ )	Calculated energy $I_{peak}^2 \Delta t$ ( $A^2 s$ )
29	37	29	218.0	0.134400

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

LL1x75-E-CV24 LED driver is suited for either built-in and independent luminaire usage. 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 datasheets.

## Installation & operational considerations

### 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 exceed the specified value on the datasheet

### Installation site:

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

## 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	EN61347, 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
Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers	IEEE 1789-2015
Compliant with relevant EU directives	

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# LL1x120-CV24

Helvar

freedom in lighting

## 1x120W Constant Voltage LED driver

- Open & short circuit protection
- Over voltage protection
- 24 V Constant voltage output
- Maximum 120 W load
- Suitable for Class I and Class II luminaires, as well as for independent use
- Double insulated enclosure
- Suitable for use with LL1xCV-DA driver extension for DALI dimmable solutions

120 W 220-240 VAC 50-60 Hz



### Connections



Parallel output connection

### Mains Characteristics

Voltage range	198-264 VAC,
Max mains current at full load	0.7 A
Frequency	50 - 60 Hz
Power factor	0.95
Input Power at no load	0.5 W

### Load Output (SELV < 60 V)

Output voltage (U-OUT)	24 V
Max output current (I-OUT)	5 A
Max output power	120 W
Efficiency, at full load, typical	0.88

### Operating Conditions and Characteristics

Max. temperature at tc point	+90 °C
Ambient temperature range	-20...+45 °C
Storage temperature range	-40...+80 °C
Maximum relative humidity	no condensation
Life time	50 000 h at $t_c = 80$ °C 40 000 h at $t_c = 85$ °C 30 000 h at $t_c = 90$ °C (90 % survival rate)

### Connections and Mechanical Data

Wire size	0.5 – 1.5 mm <sup>2</sup>
Wire type	solid core and fine-stranded
Maximum driver to LED wire length	5 m
Weight	425 g
IP rating	IP20

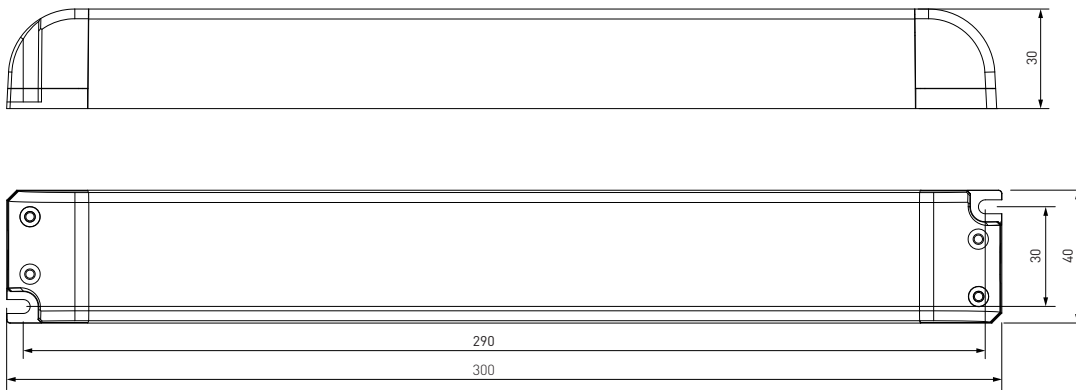
### Conformity

Radio Frequency Interference, acc. to	EN 55015
Immunity standard, acc. to	EN 61547

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
Performance requirements, acc to	EN 62384
Mains current harmonics, acc. to	EN 61000-3-2
Limits for Voltage Fluctuations and Flicker	EN 61000-3-3

CE and SELV marked

Note: See page 2 for dimensions



## Wiring & connectivity

LL1x120-E-CV24 LED driver is suited for either in-built and independent luminaire usage. 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. Specifications of the LED drivers may never exceed the operating conditions as per the product datasheets.

### 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

#### Miniature Circuit Breakers (MCB)

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

### 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.

#### Installation site

- 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.

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

Based on $I_{cont}$ (pcs.)	Based on $I_{peak}$ (pcs.)	Typ.inrush current $I_{peak}$ (A)	1/2 value time $\Delta t$ ( $\mu s$ )	Calculated energy $I_{peak}^2 \Delta t$ ( $A^2 s$ )
20	55	12.8	308	0.0205



## 180 W **Constant Voltage** LED driver

- 24 V Constant voltage output
- Maximum 180 W load
- Very high efficiency up to 92%
- Driver protection Class II
- Suitable for Class I and Class II luminaires
- Suitable for independent use
- SELV output for driving Class III luminaires
- Suitable for use with LL1-CV-DA driver extension for DALI dimmable solutions and LL1-CV-SC for Switch-Control applications\*

\*] Restrictions apply, see page 3

**180 W 220-240 VAC 50-60 Hz**



### Functional Description

- In-built overvoltage protection, open circuit protection and short circuit protection

### Mains Characteristics

Voltage range	198 - 264 VAC
Mains current at full load	0.7 - 0.9 A
Frequency	50 - 60 Hz
Input Power at no load	1 W
THD at full power	< 20%
Tested surge protection	1 kV L-N
Typical peak inrush current	51 A*

\* See the MCB chart on page 2 for more details

### Insulation between circuits & driver case

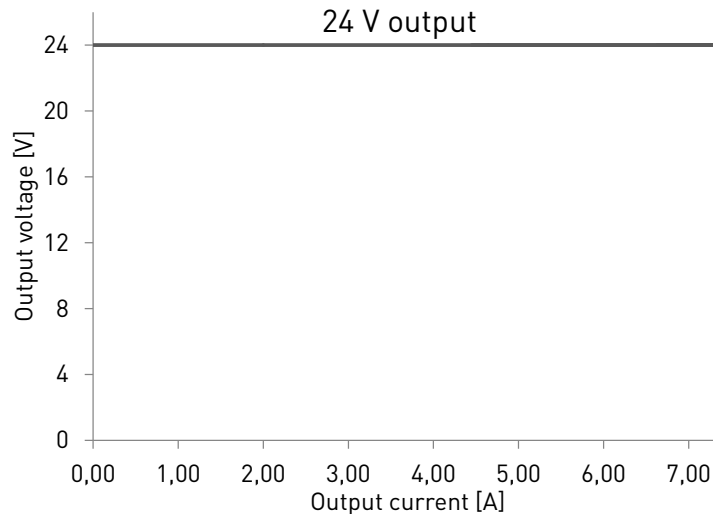
Mains circuit - Output (SELV) circuit	Double / reinforced insulation
Input and output - Driver case	Double / reinforced insulation

### Load Output

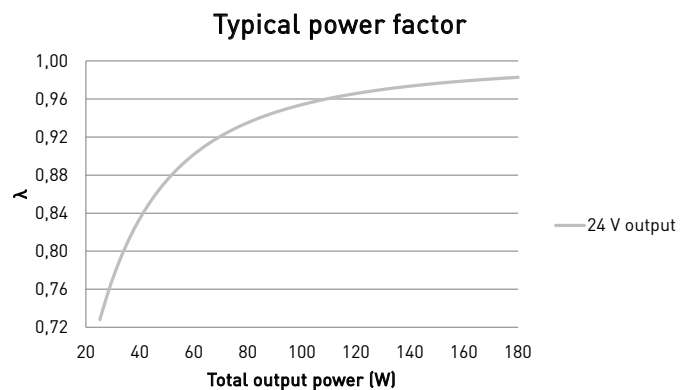
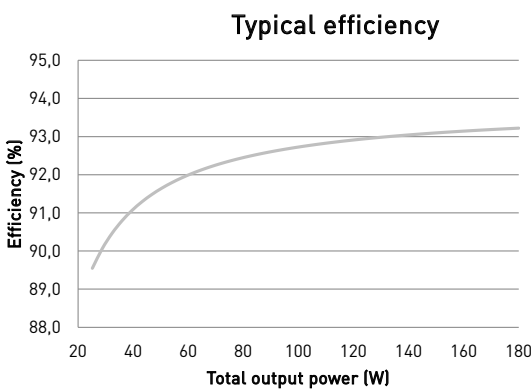
Output voltage ( $U_{LED}$ )	24 V
Accuracy	± 3 %
Ripple	< 1 %
$U_{out}$ (max)	25 V
Max output current ( $I_{LED}$ )	7.5 A
Max output power	180 W

$U_{LED}$	24 V
$P_{Rated}$	180 W
$I_{LED}$ (max)	7.5 A
PF ( $\lambda$ ) at full load	> 0.95
Efficiency ( $\eta$ ) at full load	92 %

Operating window



Driver performance



Operating Conditions and Characteristics

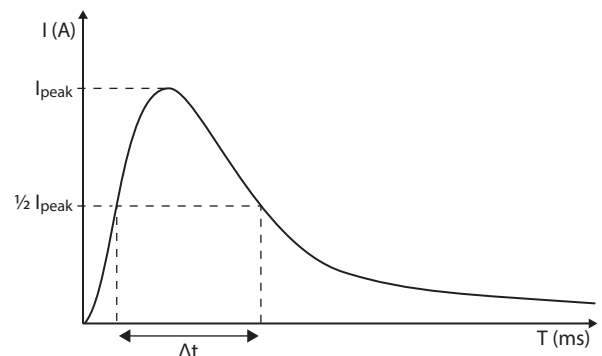
- Max. temperature at tc point: 95 °C
- Ambient temperature range: -20...+50 °C
- Storage temperature range: -40...+80 °C
- Maximum relative humidity: No condensation
- Life time (90 % survival rate): 50 000 h at  $t_c = 85\text{ °C}$   
40 000 h at  $t_c = 90\text{ °C}$   
30 000 h at  $t_c = 95\text{ °C}$

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, $I_{peak}^2 \Delta t$
14 pcs.	10 pcs.	51 A	417 $\mu s$	0.653 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 %

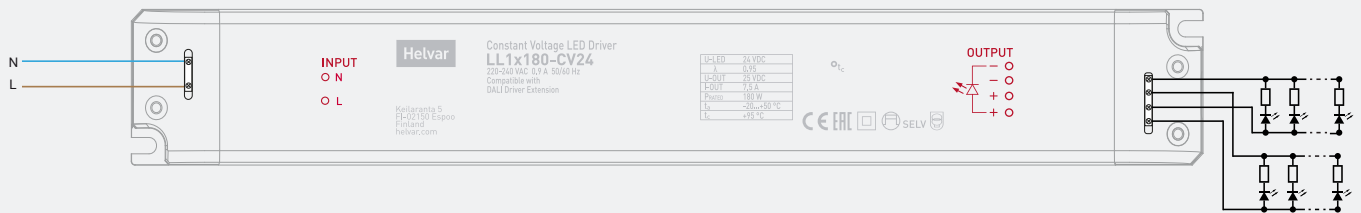


Type C MCB's are strongly recommended to use with LED lighting. Please see more details in "MCB information" document in each driver product page in "downloads & links" section.

## Connections and Mechanical Data

Wire size	0.5 - 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	665 g
IP rating	IP20

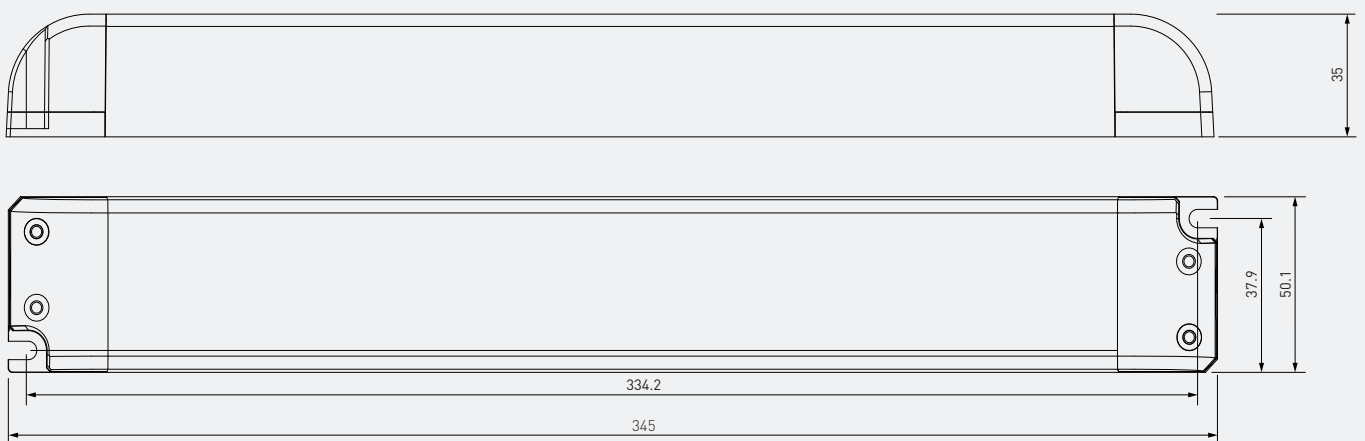
## Connections



**Attention: If using LL1-CV-DA or LL1-CV-SC control units to control LED load with this driver, make sure the total output current from the LL1x180-CV24 driver does not exceed 5 A!**

Note: Avoid using longer LED strips that 5 meters, the voltage losses grow substantial with long runs. In case of uneven brightness of LEDs in long strips, parallel connection of shorter strips is recommended.

## Dimensions



LL1x180-CV24 LED driver is suited for built-in and independent luminaire usage. 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 $t_c$ temperature:

- The maximum ambient temperature is a guideline given for luminaire components such as LED drivers. However, integrator must always ensure proper thermal management (i.e. ventilation) so that the  $t_c$  point does not exceed the  $t_c$  max limit.
- Reliable operation and lifetime is only guaranteed if the  $t_c$  point temperature does not exceed the specified maximum  $t_c$  point temperature under the conditions of use

### Installation site:

- The general preferred installation position of LED drivers for independent use is to have the top cover facing upwards
- In order to prevent condensation, relative humidity shall be low enough in relation to the ambient temperature

## 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
Radio frequency interference	EN 55015
Immunity standard	EN 61547
Performance requirements	EN 62384: 2006
Compliant with relevant EU directives	
RoHS / REACH compliant	
CE marked	

## Label symbols



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



Double insulated control gear suitable for independent use.



Symbol for independent control gear.